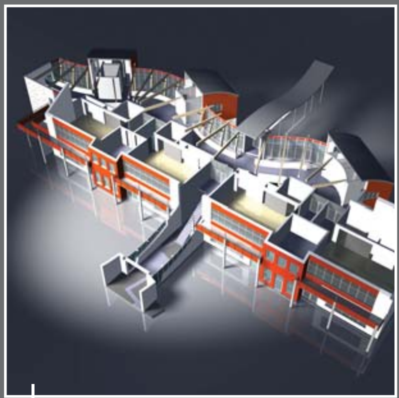
SCIA User Contest 2007



CAD Architecture

CAD Engineering

CAE Civil works

CAE Buildings

CAE Special projects

Inspiring People to move Limits

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The SCIA User Contest Book 2007 passed into your hands. It is the reproduction of the 5th contest between SCIA users; in the 2002 edition, 40 projects appeared; the previous edition in 2005 resulted in 85 projects. This edition covers 99 projects, as you will see all projects of very high quality.

For this contest five categories were defined: for architectural CAD 14 projects are presented; for engineering CAD 12 projects are represented. For engineering design (CAE) there are 3 categories i.e. civil works (19 projects), buildings (40 projects) and special structures (14 projects).

Clients from 11 countries in Europe have participated in this edition. The book gives a reflection in 6 languages, with a short résumé in English, of the architectural & engineering work. The reader will also gain a good insight of how interesting projects are conceived and designed with modern software tools.

The SCIA clients prove – once again – that creativity and effort give rise to excellent results. The projects illustrate the variety of structures that are subject to design with SCIA software. Many bridges, high-rise buildings, steel structures, industrial equipments, towers, stage-installations, hotels, library buildings, tunnels, quays ... are nicely represented in full colours.

Beyond the functionality of the software, the quality of the presented projects has surprised the members of the jury. Their congratulations go to the five winners, the nominated candidates and all project participants. The effort by the SCIA users to submit illustrated projects is well appreciated by the architectural and engineering community.

We wish you a lot of reading pleasure and we invite you to join the SCIA user group and to submit already your project(s) for the next book, which will become a recognized future bestseller!

Jean-Pierre Rammant
CEO of SCIA Group International

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= Winner   N = Nomination

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Georges & Theis Architectes associés: Primary school in Bourscheid





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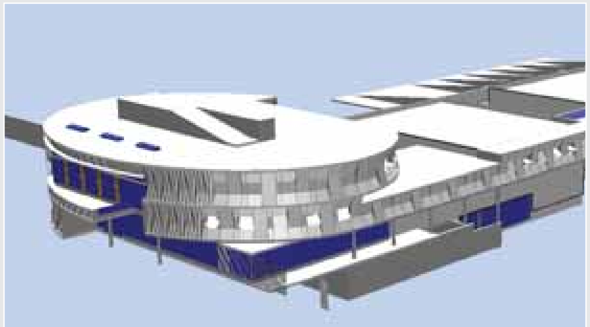

SIA s.a.
Rehabilitation of an army ground

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Category 2: CAD Engineering (Allplan Engineering and Allplan Precast)

WINNER

PT Baja Engineering Indonesia and SC Engineering BV: Waste water treatment plant in Hilversum

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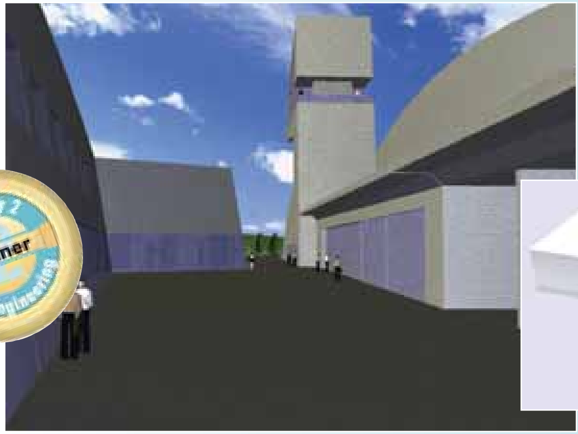

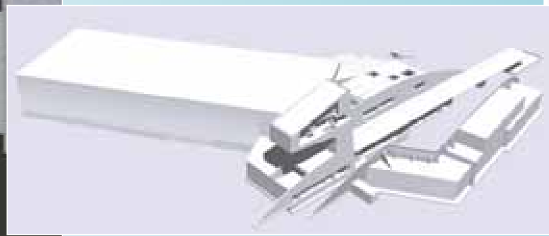

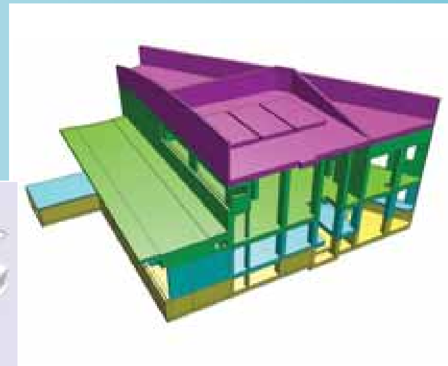

NOMINATIONS

ADEM

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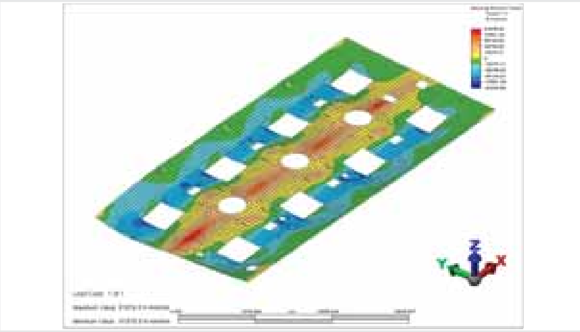
Tank for phosphoric acid - Maroc Phosphore



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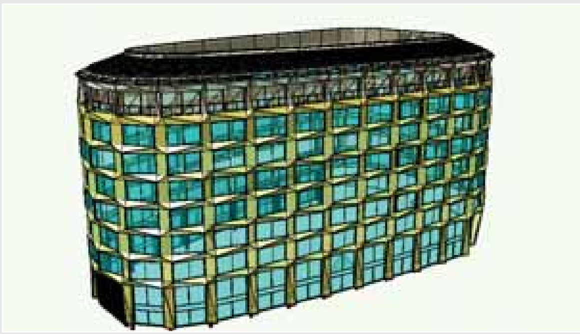
One Coleman Street



Witteveen+Bos

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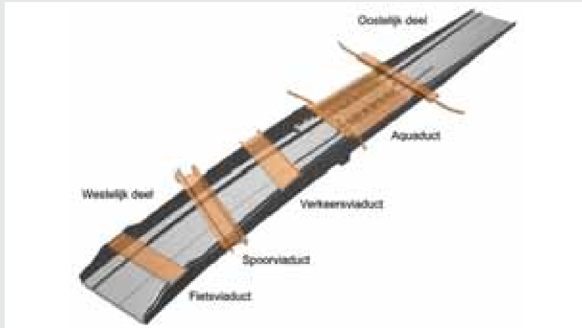
Realisation Geeuwaquaduct Sneek



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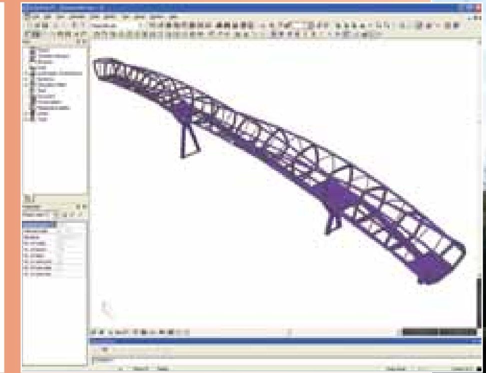
Schroeder & Associes s.a.: Pedestrian bridge of Evry





WINNER

ABT Belgie

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Museum at the Stream in Antwerp


Ingenieursbureau Stendess N.V.

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Victor Buyck Steel Construction

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Combination bridge in Utrecht


NOMINATIONS

Category 4: CAE Buildings (ESA)

WINNER

EXCON a.s.: Metro station Strizkov-Prague

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SETEC Bâtiment
Recycling plant Flamoval

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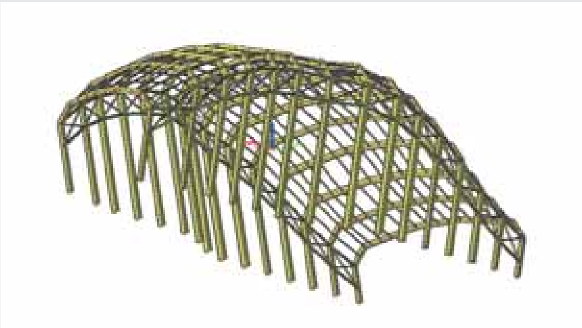

Tappy Bornand Michaud SA
Wellnes Centre, Nestle Vevey

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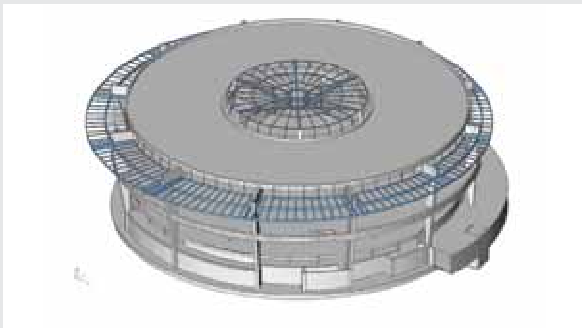

VK Engineering
The Roof Structure - Indoor Stadium

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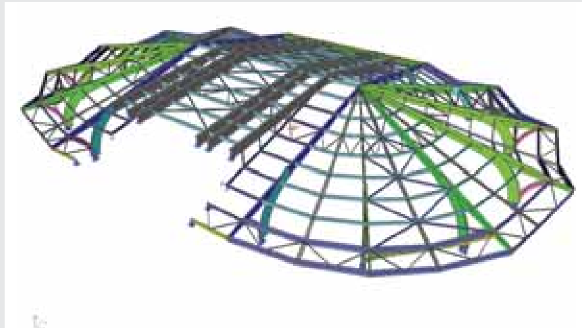

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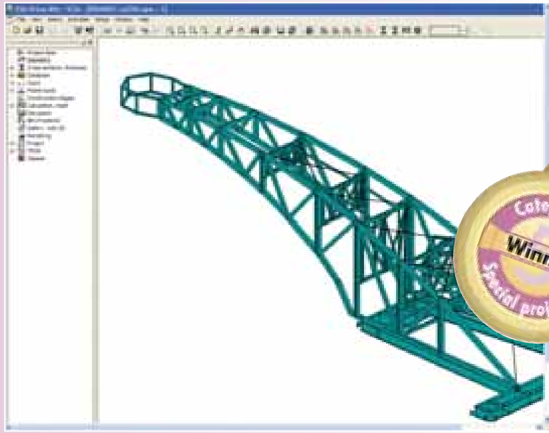
Stageco Belgium NV: Robbie Williams Close Encounters 2006



WINNER

NOMINATIONS

Ing. Adolf Godík

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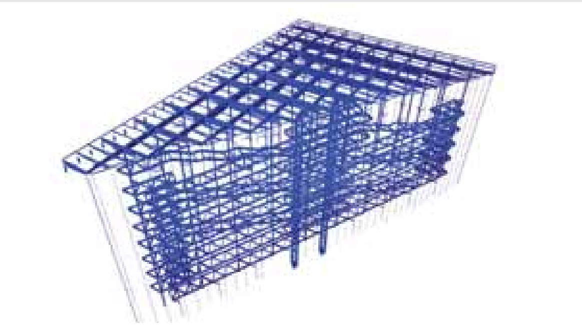
River City Prague




Ing. Daniel Bukov OK TEAM

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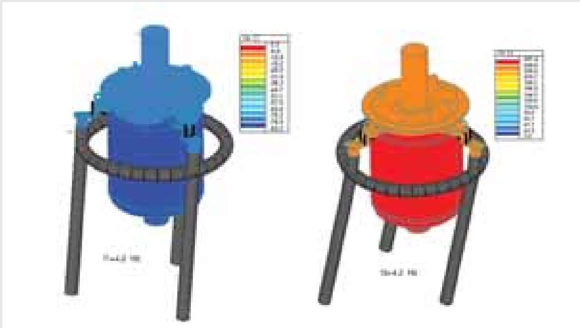
Vessel for dangerous liquid waste treatment




VK Engineering

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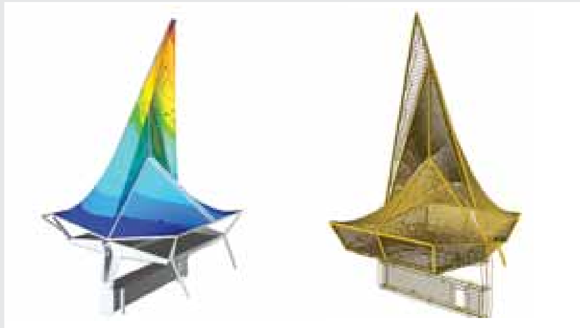
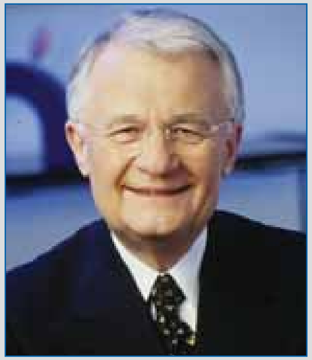
Roofs Courthouse Antwerp




Introduction of the international jury

When leafing through this book, it will quickly become clear to you that judging the entered projects has not been a simple assignment. The high technical level of these projects and the often sublime project presentations called for a competent international jury. The specialist members of the jury for the SCIA User Contest 2007, both from the academic and the business world, have done the job to perfection.
We are very delighted to introduce them to you...

Special guest of honour



A Pioneer of His Times:

Professor Georg Nemetschek

Born in 1934, company founder and main shareholder in Nemetschek AG, possesses the qualities that have been decisive for the success of the company: fascination for construction and a passion for information technology.

In recognition of his life's work, the then German president, Johannes Rau, awarded our founder with the "Bundesverdienstkreuz am Bande" (Federal Cross of Merit on ribbon) on November 26, 2001.

Rudolf Aroch
Slovak University of Technology in Bratislava
Dept.: Faculty of Civil Engineering
Function: Assistent Professor
Specialty: Steel Structures

Zdenek Bittnar
Czech Technical University Prague
Dept.: Mechanics
Function: Dean
Specialty: Computer mechanics

Lola Bosch
Hogeschool Sint Lukas
Dept.: Construction
Function: University teacher - Head of education
Specialty: Architecture

Frans Coursier
Coursier Frans bvba
Function: Business Manager
Specialty: Architecture

Wim De Cock
Vlaamse Overheid
Function: Engineer
Specialty: Steel Constructions

Jean-Claude Delongueville
CTICM
Dept.: Steel Constructions
Function: Directeur de projets
Specialty: Structural design

Donald Desmet
Signum + Architects nv
Function: Architect
Specialty: Architecture

W. Patrick Dewilde
Vrije Universiteit Brussel
Dept.: Civil Engineering
Function: Full Professor
Specialty: Structural Design

J. C. Galjaard
Van Hattum en Bankevoort
Dept.: Design & Engineering
Function: Chief Design Engineer
Specialty: Structural design

Marc Steffens
Architekten Team
Dept.: Construction
Function: Architect
Specialty: Architecture

Category 1

CAD Architecture (Allplan Architecture)

Georges & Theis Architectes associés

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Email info@georges-theis.lu
Website www.georges-theis.lu

WINNER WINNER WINNER WINNER WINNER WINNER WINNER

History

Indépendant associé depuis mars1984 l'architecte G. Theis crée en fin d'année 1994 l'actuel bureau
En janvier 2004, l'architecte B. Georges (ancien employé) devient associé dans la société qui porte depuis lors la dénomination «B. GEORGES & G. THEIS, architectes associés Sàrl.»

Company missions

Notre mission consiste dans la conception, la mise en adjudication et le suivi des travaux d'exécution pour :

- Projets privés (maisons unifamiliales, logements collectifs, bureaux, hôtels, ...)
- Projets publics (écoles, centres culturels, cinémas, complexes sportifs, ...)
- Projets hospitaliers (cliniques, centres psychiatriques, maisons de soins, ...)
- Projets s'inscrivant dans une logique de «bio-construction» et de «développement durable»
- Projets d'urbanisme

Vision and philosophy

La philosophie du bureau est résolument tournée vers la Haute Qualité Environnementale.

Organizational structure

Le bureau se compose actuellement de

- Deux architectes associés
- Quatre architectes employés
- Un technicien de chantier
- Deux dessinateurs CAO
- Un ingénieur commercial
- Une secrétaire

En 2005 a été crée une agence complémentaire chargée de simulations énergétiques et de contrôles thermographiques et «blower-door»

Key activities

Projets du secteur hospitalier

Equipment

Allplan, Cinéma 4D, Illustrator, Photoshop, Indesign, Premiere pro, Quicktime, ...

Target groups

Ministère des Travaux Publics (Administration des Travaux Publics)
Centre Hospitalier du Nord – Clinique St. Joseph à Wilts
Centre Hospitalier Neuro-Psychiatrique à Ettelbrück
Administrations Communales de Wiltz, Goesdorf, Erpeldange et Bourscheid
Promoteurs privés

References

Centre Socio-Culturel à Wiltz
Centre Culturel à Bürden
Hôtel Interkoener à Clervaux
Centre Intégré pour Personnes Agées à Wiltz
Clinique St. Joseph à Wiltz
CHNP à Ettelbrück

Ecole Bourscheid

Used software • Allplan Architecture

Vu la perspective d'une augmentation considérable du nombre d'élèves dans la commune de Bourscheid dans les prochaines années, le Conseil Communal a pris la décision d'agrandir l'infrastructure scolaire actuelle.

▪ Implantation du projet

L'ajoute de salles de classes complémentaires ne pouvait se faire qu'en relation directe avec le bâtiment existant tout en gardant les spécificités architecturales et le caractère rural du village.
L'ensemble, ancienne école et nouveau bâtiment formera un seul centre scolaire rassemblant dorénavant précoce, préscolaire et primaire.

Vu la configuration en pente et la seule disponibilité de terrain située à l'arrière de l'actuelle école de Bourscheid, la dissociation du volume existant et du futur projet s'avéra une solution justifiée, avec comme point de connexion une galerie piétonne. Cette solution permet :

- d'Éviter une proximité trop forte entre les volumes ;
- d'Orienter toutes les futures classes avec un ensoleillement optimal (sud-est) ;
- De s'intégrer parfaitement au dénivellement du terrain ;
- d'Offrir la possibilité ultérieure d'une extension de la construction (en phase II).

Cette implantation permet également une réorganisation des accès à l'arrière des nouveaux bâtiments comprenant :

- La mise en place d'un arrêt bus ;
- l'Aménagement d'un accès pour véhicules de secours la possibilité d'un accès aisé pour les handicapés moteurs ;
- l'Accès direct pour les élèves du précoce permettant un horaire flexible liée aux exigences du précoce.

Primary school in Bourscheid

The main idea of this project was to be coherent in the choice of the architectural elements, just like the teachers who have to be coherent on the level of education. Materials do not lie, each one is used in its natural state so that their application and behaviour in time can be analysed in class.
The objective was to cause questioning by surprising. Water oozing from a wall, greyed wood under the influence of natural light, a line meeting a curve, not aligned benches, oxidized steel ... are all subjects which can be discussed in class to develop the imagination of the child.
The new building is based on the paradox of education and leisure. The adjustment of the accesses as well as the contrast between the strict and severe layout of the classrooms to the cheerfulness of the corridors wants to show that one can learn by having fun just like pedagogy invites to have fun with learning.

▪ Architecture du projet

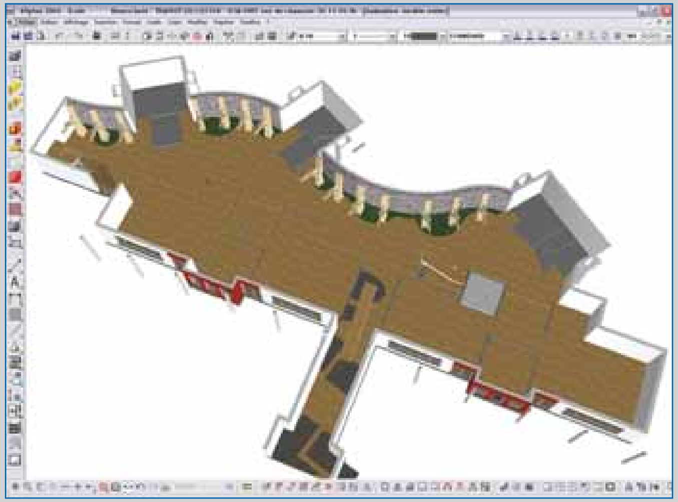
Le projet s'articule autour de l'idée qu'une école doit être un espace vécu garantissant une double fonction, l'apprentissage intellectuel (lieu d'étude) et lieu social (espace de rencontre et d'échange). Ce double aspect de l'école s'est définit architecturalement et au niveau spatial par une double approche, un paradoxe entre le caractère sérieux de l'étude et le caractère ludique des lieux d'échange.

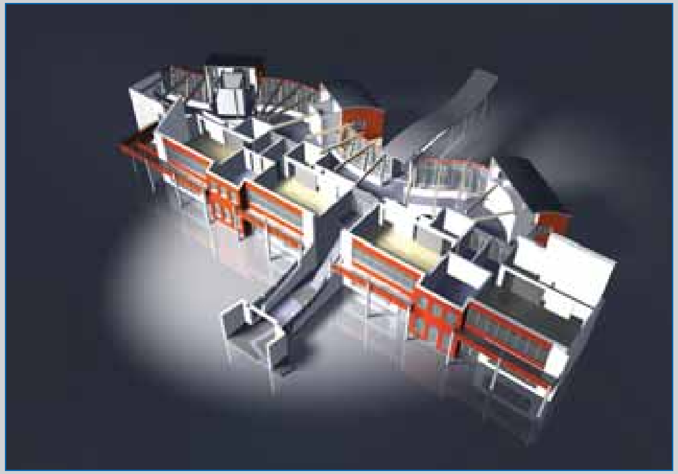
Ainsi, les zones d'étude et leurs annexes (classes, vestiaires, hall ...) sont comprises dans trois volumes indépendants pavillonnaires à l'architecture académique et ordonnée. Les vestiaires et rangements individuels attenants à chaque accès de classe sont des lieux de passage obligés servant de transition entre l'espace d'étude et l'espace récréatif.

La zone récréative ou zone dite «d'échange et de rencontre» (dégagement, circulation, hall principal ...) a été projetée comme espace ouvert, dégagé, lumineux, aux aspects naturels (utilisation de pierre naturelle, matériaux laissés à leur état brut et sujets à recevoir une patine naturelle, végétation intérieure ...) proche de l'extérieur, espace à caractère ludique aux formes arborescentes et fluides.
Ce foyer d'accueil et de distribution a pour but d'être le lieu le plus animé, l'espace de présentation des ouvrages des élèves, le pôle de rencontre des enfants durant les heures de récréation.
Deux cours de récréation distinctes pour le primaire et le préscolaire sont prévues. Les espaces sanitaires sont accessibles du hall principal mais restent indépendants permettant ainsi une lisibilité architecturale claire.

Quote of the jury:

"The 3D-model is not only used for the final design, it has also proven its efficiency during the pre-design phase. Even more, the designers could use this 3D-model to explain the structure to all building partners and third parties. The virtual 3D-model serves as a live "scale model" and the integration of curved elements and shapes is a surplus in an educational context, without getting too complex. The use of spotlights and the black background gives this presentation a special twist."





ACTE 1 s.a. Architectes

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Fax +32 (4)229.59.69
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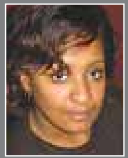
Email fj@acte1architecture.be
Website www.acte1architecture.be



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ACTE 1 s.a. est un bureau d'Architecture, créé en 1994, et dont les bureaux sont situés à LIEGE, à quelques centaines de mètres de la gare TGV.
Il s'agit d'un bureau composé de 17 personnes dont 15 Architectes, Ingénieurs Architectes, Architectes d'Intérieur et Architecte Urbaniste.

Certifications :

ACTE 1 s.a. dispose, depuis février 2003, des certifications CoQual et ISO 9001.
ACTE 1 s.a. est d'autre part agréé par la Région Wallonne pour la réalisation des Etudes d'Incidences sur l'Environnement.

Compétences :

ACTE 1 s.a. est compétent dans les domaines d'activités suivants:

- Logements (appartements, logements sociaux, ...) ;
- Immeubles de bureaux et sièges de sociétés ;
- Bâtiments industriels ;
- Infrastructures sportives ;
- Soins de santé (hôpitaux, maisons de retraites, ...) ;
- Bâtiments et complexes commerciaux ;
- Immeubles de standing, hôtellerie ;
- Bâtiments culturels ;
- Assainissement de site et rénovation urbaine.

Equipement Informatique :

ACTE 1 s.a. est équipé depuis sa création de postes Allplan architecture.
Il y a 11 licences, dont 2 "Terrain et Urbanisme", 2 "Image de synthèse".
Toutes sont reliées à un serveur xeon et utilisent le gestionnaire de réseau Allplan.
ACTE 1 s.a. est équipé également de traceurs et imprimantes laser et couleur grand format.
Allplan est utilisé dès l'esquisse jusqu'aux plans as-built.
Tous les projets sont encodés en 3D et tous les plans utilisés existent sous format pdf (module Allplan), pour la communication extérieure.

F1 Circuit of Spa-Francorchamps

The project concerns the realization of the new infrastructure works (stands, carparks, paddocks, new chicane...) for the F1 Circuit of SPA - FRANCORCHAMPS (Belgium). With its 6.968 meters, the circuit of Spa-Francorchamps is the longest F1 circuit of the world. 150.000 m³ of earthworks will be carried out.
All these infrastructure works have to be finalized within 180 calendar days starting from November 15, 2006 and this so as to allow the homologation of the circuit before the next Grand Prix of Belgium for F1 on September 16, 2007.

Used software • Allplan Architecture

Circuit F1 de Spa - Francorchamps

Il s'agit de la réalisation des nouvelles infrastructures (stands, parkings, paddocks, nouvelle chicane, ...) au niveau du Circuit automobile de F1 de Spa - Francorchamps.

Ce projet est le résultat d'un appel d'offres lancé par l'Intercommunale de Spa-Francorchamps (ISF) en Mai 2006 et qui s'appuyait sur le souhait de la Région Wallonne de voir les infrastructures existantes répondre aux nouvelles normes de la FIA (Fédération Internationale de l'Automobile) et de la FIM (Fédération Internationale de Motocyclisme) et ceci dans le cadre de la négociation menée avec Bernie ECCLESTONE.

L'appel d'offres était adressé à des équipes composées d'Entrepreneurs, de bureaux d'Architecture et de bureaux d'Etudes. 5 équipes ont remis un dossier complet (dossier de Permis Unique). La notification du choix final a eu lieu en Août 2006. Le dossier a été déposé à l'Urbanisme à cette date, simultanément à l'Etude d'Incidences réalisée par le bureau ARIES (Bruxelles). Le Permis d'Urbanisme a été délivré

Notre équipe lauréate du projet, s'articule autour des Entreprises WUST s.a. (Malmédy), BESIX s.a. (Bruxelles) et BODARWE s.a. (Malmédy) – des Bureaux d'Etudes beg s.a. (Liège) pour la stabilité et Pierre Berger s.a. (Chaudfontaine) pour les Techniques Spéciales – des Bureaux d'Architecture bag s.a. (Liège) et ACTE 1 s.a. (Liège).

Quelques chiffres

- La construction d'un bâtiment d'une surface totale de 16.500,00 m² et destiné à abriter notamment :
  - 42 stands de F1 de 125,00 m² chacun ;
  - 36 cabines pour commentateurs ;
  - Les infrastructures FIA, FOM, Race Control, Presse écrite et parlée, les locaux sociaux, les sanitaires, ...;
  - Un paddock club fermé d'une surface nette de 3.100,00 m² ;
  - Un paddock club ouvert d'une surface nette de 5.500,00 m² ;
- La réalisation de tribunes pour abriter près de 20.000 personnes (tribunes d'autre part équipées de leurs infrastructures sanitaires) ;
- La réalisation d'une nouvelle ligne droite de départ de plus de 500 mètres de longueur ;
- La réalisation d'une nouvelle chicane et des infrastructures de sécurité nécessaires;

Quelques informations

- Le circuit de Spa-Francorchamps est le plus long circuit de F1 du monde avec ses 6.968 mètres;
- 150.000 m³ de terrassements seront réalisés;
- Toutes ces infrastructures devront être finalisées dans un délai de 180 jours calendrier (courant à partir du 15 Novembre 2006) et ce de manière à permettre l'homologation du circuit pour le prochain Grand-Prix de Belgique de F1 dont la date est fixée au 16 Septembre 2007.

NOMINATION NOMINATION NOMINATION

Atelier d'Architecture du Centre SARL

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Fax	+352 26 32 15 13
Contact	M. Vincent Duvivier, M. Stéphane Gutfrind
Email	mail@aadc-architectes.lu
Website	www.aadc-architectes.lu

Historique

La société constituée en 2002 est gérée par deux architectes diplômés et développe des moyens informatiques avancés de production de plans en cao et dao.

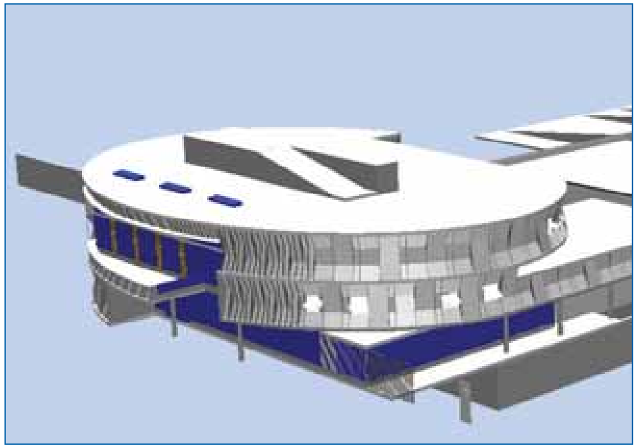
Domaines d'activité

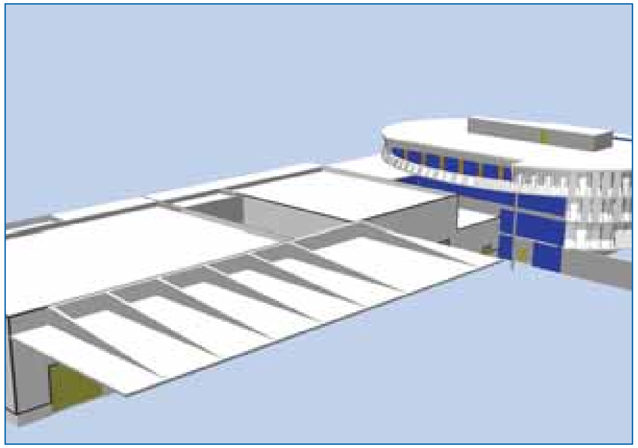
La position centrale de ses bureaux lui permet une capacité d'intervention étendue à l'ensemble du pays dans tous les champs d'activité de la mission de l'architecte.

Architectes associés

Vincent Duvivier, Ir architecte F.P.M's ;
Diplômé de la Faculté Polytechnique de Mons (B) ;
Membre de la F.A.B.I. et de l'A.I.M's ;
Expérience professionnelle en Espagne, en Belgique, et au Grand-Duché de Luxembourg ;
Nationalité belge, 35 ans.

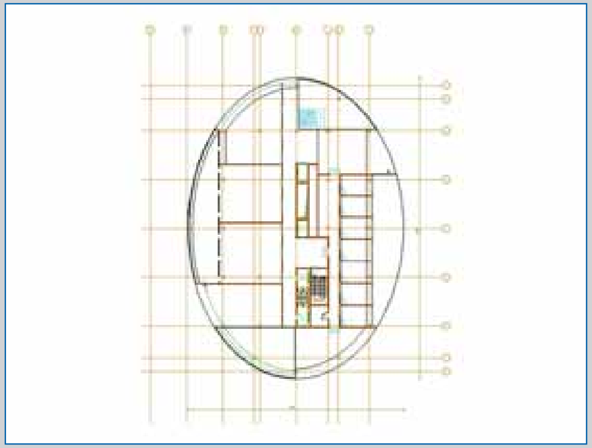
Stéphane Gutfrind, Architecte D.P.L.G. ;
Diplômé de l'École d'Architecture de Nancy (F) ;
D.E.S.S. Pratiques Européennes de l'Architecture (CH-F-P) ;
Études à la Faculté d'Architecture de l'Université de Porto (P) ;
Expérience professionnelle en France, au Portugal,
et au Grand-Duché de Luxembourg ;
Nationalité française, 37 ans.





Used software • Allplan Architecture, Cinema 4D

l'Institut de Formation Sectoriel du Bâtiment



Institut IFSB

The composition of the units is connected to the alignment of three distinct volumes gathered by the high technicality of one communal façade. The important variations of the noise levels generated by the activities of the various programming teams required the physical separation of the three principal sectors (administration - pedagogy; construction; and public works). The difficulty was to reconcile the mix of the public spaces and their social cohesion, this required an architectural gesture of gathering.

Ce projet participe à un "concours d'architecture sur invitation".

Justification de la solution proposée

Caractérisé par une pente sensible descendant d'est en ouest, le site a permis par le seul positionnement des données du programme de définir l'exploitation du bâtiment sur deux degrés d'accessibilité. Le contexte topographique devait induire les principes d'organisation spatiale retenus sur quatre niveaux sans déroger aux prescriptions dimensionnelles du Projet d'Aménagement Particulier. Sur ce point, la silhouette du bâtiment profite des douze mètres de hauteur tolérés par le règlement pour générer une émergence de l'édifice dans sa partie elliptique. Cette hauteur servant de contrepoint à l'horizontalité du projet porte l'enjeu de la représentation de l'institution qui lui donne ainsi ses chevrons de bâtiment à vocation d'intérêt national.

La composition de l'ensemble procède de l'alignement de trois volumes distincts rassemblés par la haute technicité de leur façade. Les écarts importants des niveaux sonores générés par les activités des différents groupes de programmation nécessitaient la séparation physique des trois principaux secteurs (administration - pédagogie ; construction ; et travaux publics). Pourtant la mixité des publics et leur cohésion sociale dans l'établissement nécessitait un geste architectural de rassemblement. Les caractéristiques des éléments de façade conçus pour les parties vitrées profitent à l'ensemble du projet.
L'exploitation des 3.5 hectares de la parcelle IFSB nécessitait une approche claire dans le positionnement du bâtiment. La plus grande pente du terrain suivant le profil de la voie pompier et l'accès requis par le Ministère de l'Environnement depuis le rond point ont dicté une implantation dans la marge de terrain. Les alentours ainsi dégagés sont toujours qualifiés non seulement en utilisant les degrés de la topographie (les deux possibilités de niveaux de parkings en terrasse) mais encore par l'affectation claire des zones d'entraînements des hommes et d'évolution des engins.
L'enveloppe du bâtiment ouvragée par l'organisation des facettes vitrées qui la compose constitue le vecteur de communication majeur de l'IFSB. Non seulement par les valeurs de haute technicité qu'elle renvoie mais aussi par le jeu cristallin et transparent du volume qu'elle constitue, véritable repère d'identification dans le site.
Si ces éléments à facettes constituent l'enveloppe du volume elliptique du pôle administratif et pédagogique de l'Institut, ils anoblissent les halls d'entraînements des secteurs Construction et Travaux Publics par leur déroulement côté nord à travers une galerie haute de desserte. Si la galerie nord règle la répartition maîtrisée des parcours du public, il faut y voir aussi un axe structurant du projet servant d'appui au développement futur des infrastructures.

Argumentation des choix d'organisation spatiale et du choix architectural

La répartition en trois volumes des secteurs donnés par le programme donne le degré de lisibilité le plus immédiat de la proposition.

Le volume elliptique réunissant les secteurs de l'accueil, des manifestations événementielles, de la cafétéria (Rez-de-chaussée), de l'administration et de la pédagogie générale (Étages 1 et 2) dans une figure architecturale forte, constitue le pôle administratif et pédagogique de l'Institut.

Les volumes des ateliers reliés à la tête du complexe par une galerie (Étage 1) sont accessibles depuis les espaces administratifs et pédagogiques de l'Institut.

La galerie règle les parcours vers les ateliers en les desservant par leur mezzanine où vestiaires, sanitaires et salles pédagogiques d'appoint aux ateliers vont définir la transition entre les usages théoriques et pratiques.

Sans jamais opposer ces deux valeurs, la nécessité d'assurer une étanchéité acoustique, une étanchéité aux poussières, une étanchéité thermique, entre les espaces qui leur sont propre oblige. Néanmoins, tous les espaces doivent être fondamentalement reliés pour servir la vocation d'enseignement de l'Institut dans un esprit de cohésion sociale des publics.
Cette indication trouve de multiples échos architecturaux ; le premier au travers du développé de la galerie haute (façade NORD) d'accès aux ateliers.
À la distribution horizontale de la galerie, il faut opposer les distributions verticales prévues.
L'installation d'une rampe permettant d'accéder au premier étage depuis la zone d'accueil au rez-de-chaussée alimente le thème du parcours collectif à une autre vitesse.

Les escaliers, l'un fermé prévu depuis l'antichambre de l'auditorium, l'autre ouvert depuis la salle polyvalente, desservent en situation opposée les deux niveaux supérieurs du pôle elliptique.
Deux élévateurs accompagnent ces deux points de circulations verticales.
L'accueil très perméable aux abords de l'Institut, prend place dans la continuité de l'entrée du bâtiment et articule les accès à la cafétéria (Sud), à la salle polyvalente (Nord), et à l'auditorium (Ouest).

La pente de l'auditorium suit la pente du terrain naturel et permet d'exploiter un niveau partiel hors sol, sous le bâtiment elliptique. Au niveau bas de l'auditorium s'ajoutent des locaux techniques et de service, (infirmerie, réserves, locaux poubelles, livraisons et locaux «sales» de la cafétéria, récupérant le niveau de l'aire extérieure d'entraînement (-374).

Dans les étages du pôle elliptique, les espaces s'organisent de part et d'autre du grand axe du plan. La position centrale du volume opaque (éclairé par le haut) le long du grand axe permet de passer les circulations verticales et de contreventer efficacement les dalles elliptiques.

Les bureaux et leur circulation se déploient à l'est dans la petite largeur, et les salles pédagogiques à l'ouest dans toute la largeur de la moitié restante.

Aux extrémités des dalles, des vides alternés permettent de générer de l'espace à des endroits qui appellent à la double hauteur. Ces dédoublements des hauteurs agissent comme des liens spatiaux entre les différents niveaux tout en assurant l'étanchéité acoustique requise entre les activités. Le jeu des dalles génère de l'espace et donne à lire un enroulement de leur plate-forme largement exprimé par le développé de leur bordure alors que les facettes des éléments de façade obéissent davantage à un tracé horizontal déroulant et enveloppant.

La vocation de rassemblement des usages de l'Institut trouve un écho supplémentaire dans l'aménagement de terrasses extérieures dont la forme en quartier participe largement à l'expression volumétrique de l'Institut et au dispositif de protection solaire des façades :

- À l'est, terrasse de l'étage 1 formant auvent au dessus de l'entrée de l'Institut ;
- À l'ouest, terrasse en balcon de l'étage 2 formant brise-soleil à la façade ouest.

NOMINATION NOMINATION NOMINATION

SIA s.a.

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Réhabilitation d'un terrain militaire

Données de la société

Nom : Société Internationale d'Architecture en abrégé S.I.A.
Forme juridique : S.A.
Adresse : Rue de la Première Armée Américaine 63, 5100 Wepion
Téléphone : 081/58.24.13
Télécopie : 081/58.24.73
Contacts : Jean-Paul Menten, Thierry Geldof, administrateurs délégués
Année de création : 1995
Effectifs : 16 architectes; 1 ingénieur techniques spéciales ; 1 ingénieur constructions ; 1 géomètre ; 30 dessinateurs ; 3 métreurs ; 1 secrétaire ; 3 employés administratifs
Activités : Bureau d'études d'architecture et de techniques spéciales

Profil de la société

1. Historique
   La société a été créée en 1995. L'effectif initial était de 10 personnes. La conclusion d'un contrat cadre avec une importante société de promotion/construction a grandement contribué au développement du bureau d'études.
   Actuellement, le bureau compte plus de 50 collaborateurs et a étendu ses activités sur le Grand Duché de Luxembourg, la France, le Maroc et le Rwanda.

2. Mission
   Le bureau accepte tous types de missions d'études architecturales et/ou de techniques spéciales. Notre expérience en maisons familiales, appartements, bureaux et surfaces commerciales est très large. En dix années d'activités, nous avons conçu plus de 3.000 maisons unifamiliales et autant d'appartements.

3. Vision & Philosophie
   Notre ambition est non seulement de continuer à développer nos points forts, mais également de développer d'autres activités comme l'imagerie de synthèse, les métrés automatisés, ...

4. Organigramme
   Le bureau se divise en trois secteurs :
   - Le secteur unifamilial
   - Le secteur bâtiments (appartements, bureaux, ...)
   - Le secteur techniques spéciales

   Chaque secteur est chapeauté par un responsable, lui-même sous la responsabilité des deux administrateurs délégués.

5. Activités principales
   - Maisons unifamiliales
   - Immeubles à appartements
   - Complexes industriels et commerciaux
   - Immeubles de bureaux
   - Centres pour des personnes âgées
   - Villages de vacances
   - Bâtiments publics (crèches, hôtels de police, ...)
   - Transformations, rénovations de bâtiments
   - Aménagement du territoire (PCA, lotissements, ...)

6. Equipements
   Aujourd'hui, nous disposons de 39 stations de travail équipées de licences AllPlan et 2 stations équipées d'Autocad pour les techniques spéciales.

7. Références
   Notre liste de références est particulièrement longue en maisons unifamiliales pour que nous citions l'une ou l'autre réalisation.
   En ce qui concerne les immeubles d'appartements, nos projets les plus récents sont les suivants :
   - Bord de Meuse à Jambes (150 appartements)
   - La rénovation du Sanatorium de Fléron en 110 appartements
   - Les Brigittines à Bruxelles (22 appartements)
   - Neufbois à Court Saint Etienne (98 appartements)
   - Les Jardins de Merl à Luxembourg (300 appartements en première phase)
   - Systemat à Mamer (6.000 m² de bureaux)
   - Le Centre commercial «Les Acacias» à Athus (7.500 m²)
   - Le Centre commercial «Les Corettes» à Bertrix (5.300 m²)

Used software • Allplan Architecture

Description du projet

A l'origine, ce site a été aménagé pour répondre aux besoins de la collectivité et a nécessité la mise en œuvre d'une infrastructure conséquente (voiries, bâtiments ...) destinée au stockage de matériels et de munitions. Cette infrastructure n'a pu trouver de nouvelle affectation. Comme bon nombre de site en Wallonie, cette absence de reconversion a conduit à l'abandon et à la dégradation d'une infrastructure devenue sans intérêt.
Un tel chancre constitue une perte de contrôle de la situation tant par les pouvoirs publics que par les acteurs privés qui doivent ensemble apporter des solutions à un problème surgi du passé.

Le projet de restructuration proposé vise à recycler six des huit constructions existantes en habitations unifamiliales. Ce choix constitue une solution réaliste, cohérente avec la destination des parcelles voisines, adaptée à la situation de fait et respectueuse du site.

Dans ce projet, aucune surface qui ne soit déjà utilisée par une infrastructure ne sera consommée. Les habitations seront réalisées sans augmenter l'emprise au sol des constructions existantes. Les accès aux différentes habitations se feront par le réseau de voiries existant qui sera rénové et maintenu en zone privative.

Afin de garantir la pérennité de l'espace forestier et la mise en œuvre des moyens nécessaires à son entretien, celui-ci sera géré en copropriété. Les copropriétaires se verront contraints à respecter un ensemble de mesures destinées à assurer le maintien et le développement de la faune et de la flore ainsi que la pleine expression des potentialités environnementales du site.

Par ailleurs, un ensemble de règles régissant les parcelles privatives a été établi de façon à garantir la parfaite intégration paysagère du bâti. C'est ainsi que les jardins seront maintenus arborés et que les éléments de délimitation des parcelles seront impérativement constitués de haies vives composées d'essences locales.

Parti architectural

Cette volonté d'intégration du bâti se retrouve bien entendu dans le choix du parti architectural, tant au travers de la volumétrie des habitations que dans le choix des matériaux et de leurs teintes. Des simulations en 3 dimensions des habitations ont été réalisées et incrustées au sein de photographies des lieux de leur futur emplacement. Ces simulations «photo-réalistes» ont constitué un outil performant qui a permis, au travers des différentes phases de ce projet, de valider la pertinence des choix effectués quant à leurs effets sur l'intégration du bâti au site. Ces simulations ont également permis d'affiner les décisions prises quant à la transition entre les parties neuves et anciennes constituant les futures habitations.

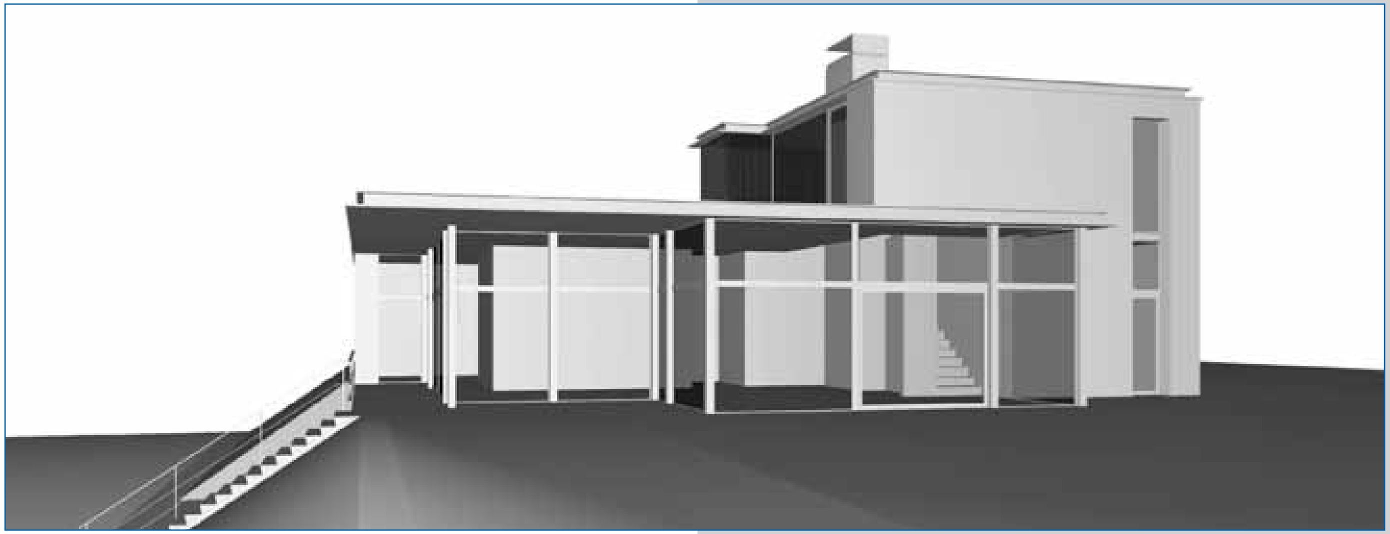
Les habitations créées seront imperceptibles depuis l'extérieur du site. En effet, leur répartition, déterminée par la localisation des constructions existantes est telle qu'une importante zone boisée fera toujours écran entre les habitations et la périphérie du site. Par ailleurs, la cime des arbres dépassera très largement au-dessus des toitures des habitations.

En résumé, le projet doit permettre :

- La restructuration du site désaffecté.
- La création d'un habitat de qualité.
- l'Amélioration du cadre de vie.
- La valorisation paysagère et environnementale du site.

Rehabilitation of a military site

Originally, this site was conceived to meet the needs of the community and required a consequent infrastructure (public road networks, buildings, ...) intended for the storage of military equipments.
The proposed restructuring project wants to recycle six of the eight existing constructions.
Houses will be realized without influencing the ground of the existing constructions. The accesses to the various houses will be made through the existing network of public roads, that will be renewed.
In summary, the project has to take into account:
- The restructuring of the disused site.
- The creation of a quality environment.
- The improvement of the living environment.
- The landscape and environmental value of the site.



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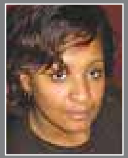

ACTE 1 s.a. is an architect's office, created in 1994; their offices are located in the city of LIEGE (B), at a few hundred meters of the TGV (high-speed train) station.
At ACTE 1 work 17 people among which Architects, Engineer-Architects, Interior designers and town-planners.

Certifications

ACTE 1 s.a. is certified for CoQual and ISO 9001, since February 2003.
ACTE 1 s.a. is also appointed by the Walloon Area for the realization of the Studies of Influences on the Environment.

Competences

ACTE 1 s.a. is qualified for the following activities:

- Residences (apartments, social housing...);
- Office buildings;
- Industrial buildings;
- Sports infrastructures;
- Health care buildings (hospitals, old people's homes, ...);
- Commercial buildings and complexes;
- Luxury buildings, hotels;
- Buildings for cultural activities;
- Site clearance and urban restoration.

Data-processing equipment

Since its creation, ACTE 1 s.a. is equipped with Allplan Architecture.
They work with 11 licences, including 2 "Digital terrain modeller and City planning" programs and 2 "Overview image".
All are connected to a xeon server and use the Allplan network manager.
ACTE 1 s.a. is also equipped with plotters and laser printers and printers for large size colour prints.
Allplan is used from the original draft until the as-built plans.
All projects are encoded in 3D and all plans used exist in PDF format (module Allplan), for the external communication.

Used software • Allplan Architecture

5* Hôtel in Liège

Hotel Crowne Plaza ***** of Liege

The project concerns a 5* Hôtel 'The Royal Selys Crowne Plaza ' in Liège .
In 2004, the building developer Pierre-Charles Berryer of I&C, presented the plans to construct a substantial hotel complex in historic Liège.
Nearly 2 years ago ACTE 1 began the long intricate process of entering the building data of the two historically protected existing hotels by hand.
The two buildings,"Hotel des comtes de Méan and Hotel Sélys-Longchamps, situated on the hill Saint Martin, are to be renovated and rebuilt as one new Royal Selys Crowne Plaza hotel.
The building site was demanding: the conditions were not optimal as the site contained a steep slope, and the two existing buildings were of varying heights and levels making it difficult to determine how and where to place foundations. In addition, the site lies in a very densely built area.

In 2004, building developer Pierre-Charles Berryer of I&C first laid plans to construct a substantial hotel complex in historic Liege.

ACTE 1 has been awarded the extraordinary project due to be completed in 2008.

The real work began nearly 2 years ago in 2004, when ACTE 1 began the long intricate process of entering the building data of the two historically protected existing hotels by hand, on site with Allplan.

The two buildings,"Hotel des comtes de Méan and Hotel Sélys-Longchamps, situated on the hill Saint Martin, are to be renovated and rebuilt as the the new Royal Selys Crowne Plaza hotel.

The hotel Sélys dates from the 16th century and is classiffied as a grade 1 listed building.The hotel comte de Méan dates from the 18th century.

These two historically protected buildings would need to be joined with one new building.

The typical time constraints were at hand and the return on invest-ement or ROI called for no less than 120 rooms with leisure and spa facilities.

The building site was demanding:the conditions were not optimal as the site contained a steep slope, and the two existing buildings were of varying heights and levels making it difficult to determine how and where to place foundations.In addition, the site lies in a very densely built area.

The Royal Selys Crowne Plaza: Facts and figures

- The complex consists of 5 wings surrounding 2 beautiful patios and one tower.
- The hotel will have more than 120 rooms in total among them are: 11 full suites, 27 junior suites, 2 rooms for handicapped people or people with limited mobility, and 20 anti-allergic rooms.
- Located just 5 minutes away from the city centre, by train it takes 50 minutes to reach Brussels and 20 minutes to reach Maastricht.
- The new hotel will create more than 100 new jobs for the region, and increases the tourist appeal of the city of Liege while closing the existing gap in the hotel business.

The new Royal Crowne Plaza Hotel will be the first and the only 5 star hotel in the area.

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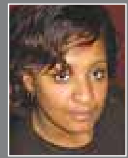


Immeuble de bureaux à Herstal pour NRB

ACTE 1 s.a. est un bureau d'Architecture, créé en 1994, et dont les bureaux sont situés à LIEGE, à quelques centaines de mètres de la gare TGV.
Il s'agit d'un bureau composé de 17 personnes dont 15 Architectes, Ingénieurs Architectes, Architectes d'Intérieur et Architecte Urbaniste.

Certifications

ACTE 1 s.a. dispose, depuis février 2003, des certifications CoQual et ISO 9001.
ACTE 1 s.a. est d'autre part agréé par la Région Wallonne pour la réalisation des Etudes d'Incidences sur l'Environnement.

Compétences

ACTE 1 s.a. est compétent dans les domaines d'activités suivants:

- Logements (appartements, logements sociaux, ...) ;
- Immeubles de bureaux et sièges de sociétés ;
- Bâtiments industriels ;
- Infrastructures sportives ;
- Soins de santé (hôpitaux, maisons de retraites, ...) ;
- Bâtiments et complexes commerciaux ;
- Immeubles de standing, hôtellerie ;
- Bâtiments culturels ;
- Assainissement de site et rénovation urbaine.

Equipement Informatique

ACTE 1 s.a. est équipé depuis sa création de postes Allplan architecture.
Il y a 11 licences, dont 2 "Terrain et Urbanisme", 2 "Image de synthèse".
Toutes sont reliées à un serveur xeon et utilisent le gestionnaire de réseau Allplan.
ACTE 1 s.a. est équipé également de traceurs et imprimantes laser et couleur grand format.
Allplan est utilisé dès l'esquisse jusqu'aux plans as-built.
Tous les projets sont encodés en 3D et tous les plans utilisés existent sous format pdf (module Allplan), pour la communication extérieure.

Used software • Allplan Architecture

Il s'agit de la réalisation d'un complexe de bureaux et de ses infrastructures pour une société d'Informatique (NRB s.a.) et les 500 personnes qu'elle occupe à HERSTAL.

Network Research Belgium s.a. (NRB s.a.) fait partie des sociétés informatiques du Groupe ETHIAS. NRB se comporte comme un entrepreneur général en informatique, jouant un rôle d'interface conseil, en assurant, pour l'ensemble du processus d'informatisation, l'étude, la mise en place et le fonctionnement des solutions proposées, puis choisies, en partenariat avec le client.

Parmi les clients de NRB, on citera: Ethias, les Ministères de la Région Wallonne et de la Communauté Française, les sociétés d'utilité publique ALE et SPE, AIEG et Régie de Wavre, ALG, CILE, SWDE et AQUASAMBRE, Télédis. En outre, NRB assure à titre divers, des services informatiques pour les communes wallonnes, le CHU de Liège, les Provinces de Liège et du Hainaut.

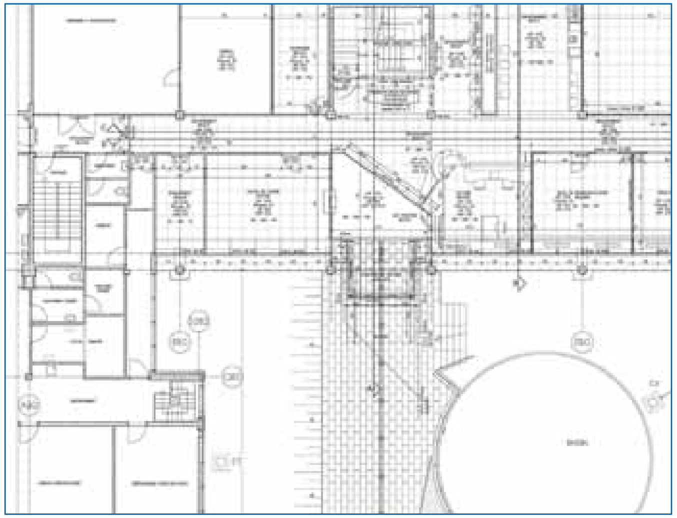
Le site comportait déjà 5 bâtiments qui avaient été construit entre 1988 et 2000. Suite à l'importante progression de NRB, il fallait doubler l'ensemble des infrastructures existantes et déjà prévoir des extensions futures.

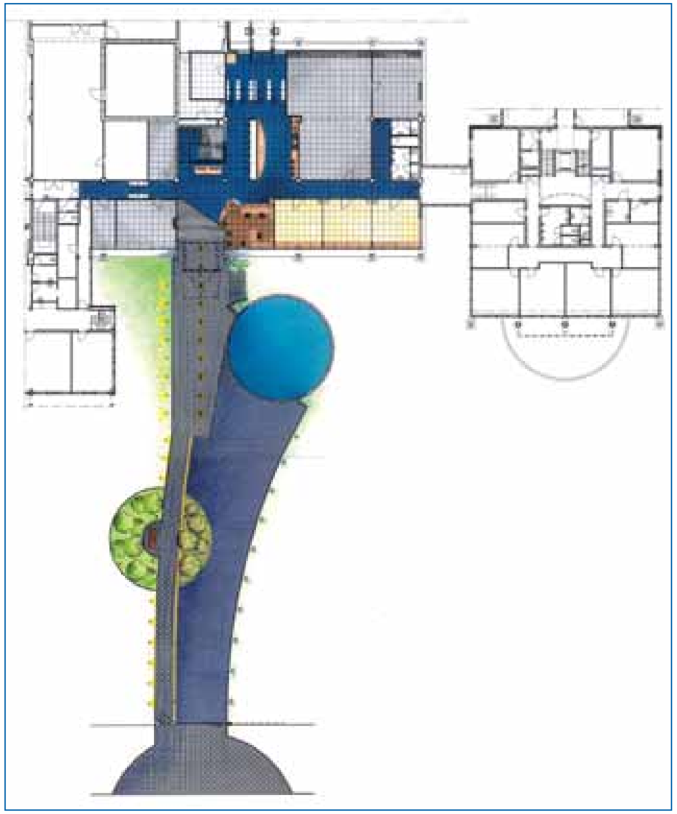
Ce projet s'est articulé autour de

- La construction de 12.500 m² de bureaux ;
- La construction d'un parking de 500 places ;
- La construction des infrastructures nécessaires au fonctionnement du site: restaurant d'entreprise pour 500 personnes, zone de montage PC, stocks, réserves, locaux pour "touch panel", coins "café", locaux pour fumeurs, ... ;
- La rénovation complète du bâtiment d'accueil et de ses accès ;
- La mise en place d'un système de contrôle d'accès hyper-sécurisé du fait de la haute technicité de la société ;
- La réalisation d'un jardin à thèmes avec mise en œuvre d'éléments naturels (eau, pierre, verdure).

Quelques chiffres

- 12.500 m² de constructions (longueur totale des bâtiments : 150 m) ;
- 3 passerelles dont une de 35 m. de long et ce de manière à liaisonner les bâtiments existants avec les nouvelles constructions ;
- Réalisation d'une rue intérieure surplombée par les passerelles et mise au gabarit du Service Régional d'Incendie ;
- 9.000 m² de voiries et 13.000 m² de parkings ;
- Budget total des travaux : près de 20.000.000,00 d'Euros TVA comprise;
- Les travaux sont terminés et réceptionnés depuis Décembre 2004.





Office block for NRB in Herstal

The project concerns offices buildings in Herstal for NRB.
It is about the construction of office buildings for Network Research Belgium s.a. in Herstal, a company with more than 500 employees.
The site already comprised 5 buildings, which had been built between 1988 and 2000. Following the important progression of NRB, it was necessary to double the whole of the existing infrastructures and already foresee future extensions.
The buildings are composed of about 12.500 m² of constructions (overall length of the buildings: 150 m); of 3 footbridges including one with a length of 35 m so as to link the existing buildings with new constructions; the realisation of an interior street by the footbridges; 9.000 m² of roadway systems and 13.000 m ² of carparks.

ADEM

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ADEM est un bureau d'études pluridisciplinaire à la fois actif tant dans les investissements privés et industriels que publics.

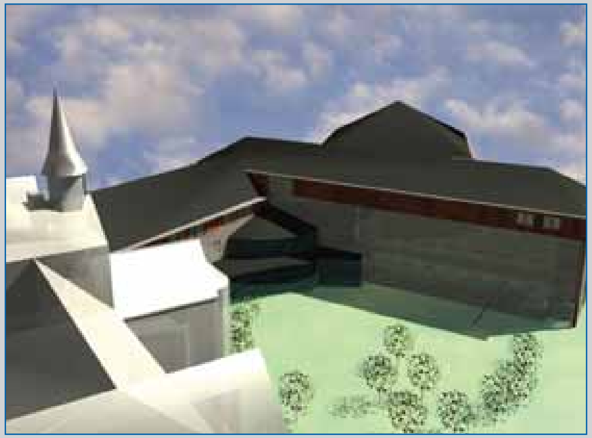
ADEM a acquis au fil des années d'expérience une maîtrise très importante des calculs complexes et des processus d'optimisation, quels que soient les matériaux utilisés (acier, béton, bois ...) et les codes de référence.

Startup issue de la Faculté Polytechnique de Mons, ADEM est constitué principalement d'Ingénieurs civils Architectes et Mécaniciens, ses activités principales sont la maîtrise d'œuvre de projet de construction au sens large et de conception d'installations industrielles.

ADEM intervient ainsi directement pour des Maîtres d'ouvrage ou en sous-traitance de bureaux d'architecture ou d'ensemblier.

Sa réputation a été établie dans l'engineering de détails tel que le dimensionnement par éléments finis de structures, quelques fois complexes, sous des sollicitations diverses (vibrations, séismes, choc, températures élevées ...).

ADEM compte parmi ses clients autant des grands groupes industriels (SOLVAY, AKZO, HOLCIM, CCB, CARSID...) que des PME et des institutions publiques.



Used software • Allplan Architecture

Le projet à été présenté en adjudication avant l'acquisition du programme Allplan. La partie architecture était donc dessinée en 2D avec un autre logiciel de dessin et n'a pas fait l'objet de modification jusqu'à présent.

Par contre pour l'exécution du nouveau bâtiment, la représentation des études de stabilité utilise Allplan 2006.

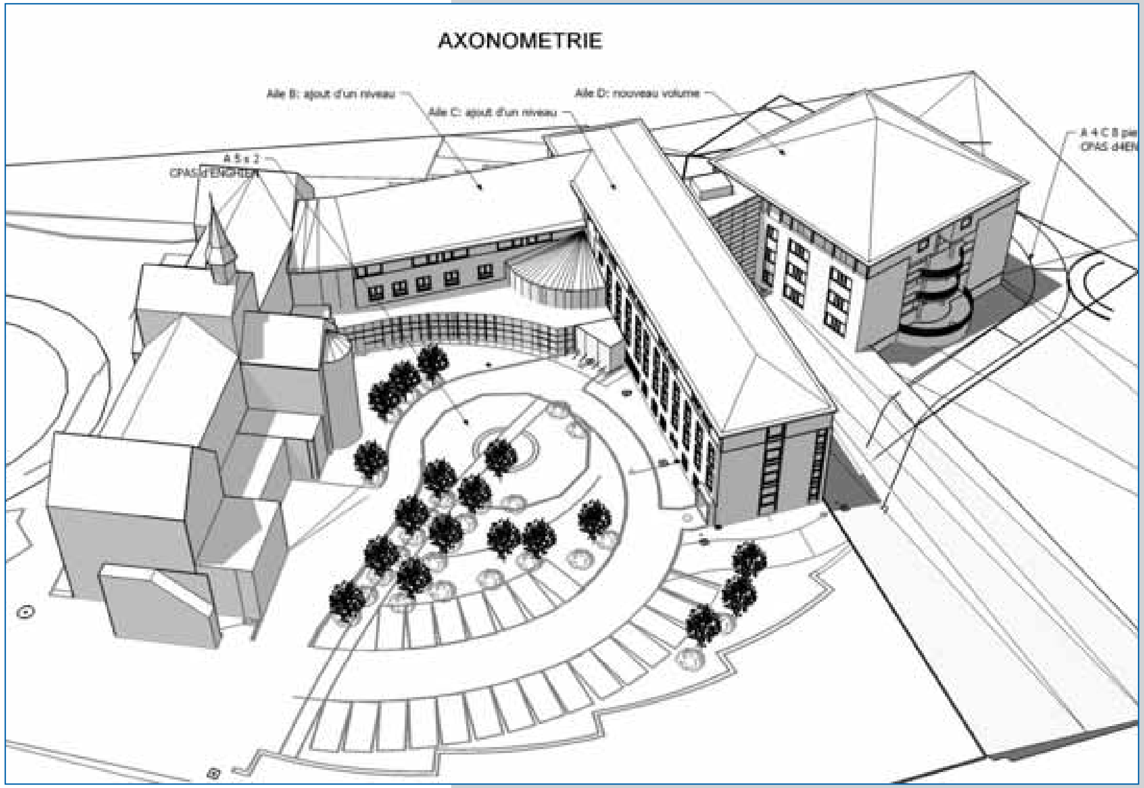
Cela permet de voir en 3 dimensions les différents éléments (murs porteurs, poutres, colonnes, voiles et dalles) et leurs interactions. Chaque élément est répertorié avec une désignation différente et son matériau lors de sa création; cela permet d'annoter rapidement chaque vue ou coupe avec le nom de chaque élément, son niveau inférieur, sa hauteur et sa longueur.

Cela permet d'obtenir également un métré détaillé et rapide.

L'utilisation du module "Vues associatives" nous permet d'obtenir directement la vue "haut plancher" du coffrage de chaque niveau ainsi que des coupes aux endroits critiques. L'avantage de ce module par rapport aux simples coupes est la mise à jour directe de chaque vue dès que l'on modifie un élément. La possibilité de ne pas représenter certains éléments sur certaines coupes pour rendre le plan plus lisible est aussi très appréciable.

Il est cependant dommage que ce module soit actuellement si lent à répondre pour chaque manipulation!

D'autre part, le module ingénierie nous permet de réaliser les plans de ferraillage de tous les éléments en béton avec toutes les coupes nécessaires à l'échelle adaptée pour une compréhension optimale. Chaque endroit critique peut être visualisé en 3 D afin de mieux cerner les possibilités de placement des barres.



Home Saint Nicolas - Enghien

The project concerns the home Saint Nicolas of Enghien. The studies of stability are realised with Allplan 2006. This makes it possible to see in 3 dimensions the various elements (load-bearing walls, beams, columns, walls and plates) and their interactions. Each element is indexed with a different designation and material during its creation; that makes it possible to annotate each sight or cross-section quickly with the name of each element, its lower level, its height and its length. The engineering module enables us to carry out the reinforcement plans of all concrete elements with all necessary cuts at an adapted scale for an optimal comprehension. Each critical spot can be visualized in 3D in order to better determine the possibilities of bar positioning.

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Residence de standing à Arlon

Description du bureau

1999 Fondation du bureau d'architecture – stage & premiers projets personnels

2001 Formation complémentaire à la coordination de sécurité
Travail à mi-temps pour d'autres bureaux et l'autre mi-temps pour nos propres projets

2003 Le bureau tourne à temps plein pour nos projets

2004 Formation spécifique complémentaire de deux ans au développement durable

2005 Premier projet public
Nos projets s'étendent au-delà des frontières belges

2006 Déménagement du bureau dans nos propres locaux

Composition du bureau

Axel CHAMPENOIS et Odette CHANTRAINE, architectes
Bureau complètement informatisé : du relevé à l'impression

Philosophie

Satisfaire nos clients et l'ensemble des intervenants sur chantier en mettant à disposition nos compétences ainsi qu'un matériel professionnel.

Used software • Allplan Architecture

Residence de standing dans l'ancienne caserne militaire Callemeyn à Arlon

Le projet est situé à Arlon, au sud de la Belgique, à 20 minutes de Luxembourg-ville.

Le bloc T fait partie de l'ancienne caserne militaire Callemeyn désaffectée qui comporte 17 bâtiments scindés en deux parties. La nouvelle partie comporte 6 bâtiments construits dans les années 50 et le reste est l'ancienne partie datant de 1898 !

Le bloc T est le quatrième bloc à être transformé en immeuble de standing à appartements. L'immeuble mesure 90m par 17m et comportes 6 niveaux + les combles. Réalisé en moellons, le bâtiment est un écrin idéal pour y réaliser 60 logements allant du studio au duplex traversant 3 chambres. Le sous-sol abrite le parking et les caves. Le bâtiment perd son aspect militaire austère au profit d'un look contemporain et élancé grâce au traitement de façade et aux terrasses de conception unique (de 12 à 40m²). Le bâtiment est entièrement rénové. Le budget avoisine 5.000.000,00 Euro.

Le promoteur luxembourgeois SERMELUX à convenu l'achat du site entier autrefois propriété de la ville d'Arlon. Les projets de réaffectation du site se poursuivront avec le développement d'une résidence service ainsi que l'implantation d'un centre thermo-ludique. Un forage de plus de 100m de profondeur permettra l'alimentation en eau de source de ce centre.

Allplan est le collaborateur efficace indispensable à l'élaboration d'un projet de cette envergure. Une maquette 3D de la situation avant travaux à permis une lecture et une compréhension de la structure complexe. Chaque appartement est conçu indépendamment des autres et est physiquement modélisé sur ses propres calques afin de permettre à chaque utilisateur final de modifier à souhait son nouveau logement. Le logiciel s'est avéré comme à chaque projet, d'une simplicité d'utilisation et d'une efficacité remarquable pour obtenir rapidement des documents graphiques efficaces.

Residence in former military barracks in Arlon

The project is located in Arlon, in the south of Belgium close to Luxembourg.
The T-Block is a part of an old military site. The site is no longer used for this function. There are 17 buildings, 6 of them were built during the fifties and the other ones are very old, from 1898!
This is the fourth building to be re-built in a luxurious apartment house. There will be built 60 apartments, from a simple studio to a full size duplex. The basements provide parking places and private cellars.
A new look, other than the military one, was created by the installation of kingsized façade elements.
The building is completely renewed for about 5.000.000 Euro.
Building contractor, Sermelux, bought the entire amazing site that belonged before to the city.
In the near future also a residence for senior citizens and a relaxation centre are planned.
A drilling of 100 m depth to a well has been effected, this well is going to "feed" this centre.

Atelier d'Architecture du Centre SARL

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Website	www.aadc-architectes.lu

Bibliothèque Nationale de Luxembourg

Historique

La société constituée en 2002 est gérée par deux architectes diplômés et développe des moyens informatiques avancés de production de plans en cao et dao.

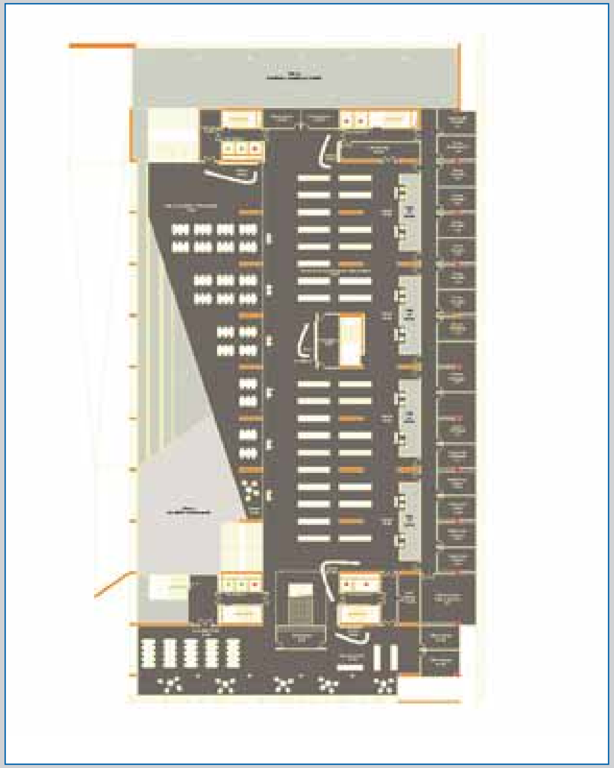
Domaines d'activité

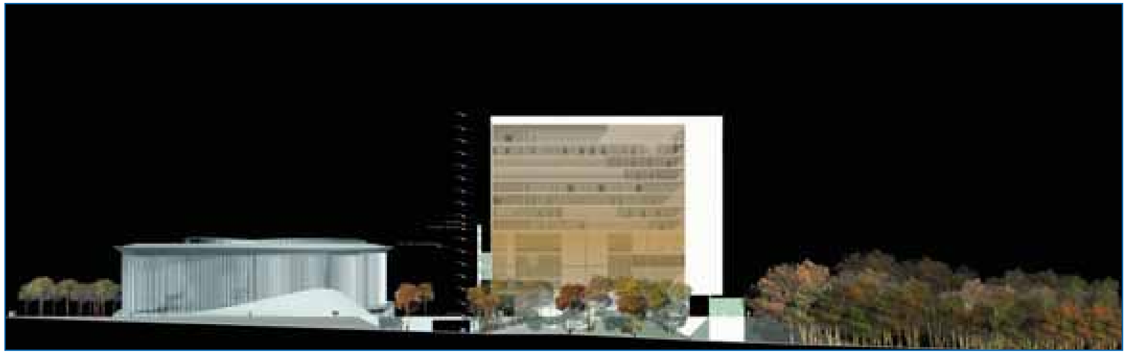
La position centrale de ses bureaux lui permet une capacité d'intervention étendue à l'ensemble du pays dans tous les champs d'activité de la mission de l'architecte.

Architectes associés

Vincent Duvivier, Ir architecte F.P.M's ;
Diplômé de la Faculté Polytechnique de Mons (B) ;
Membre de la F.A.B.I. et de l'A.I.M's ;
Expérience professionnelle en Espagne, en Belgique, et au Grand-Duché de Luxembourg ;
Nationalité belge, 35 ans.

Stéphane Gutfrind, Architecte D.P.L.G. ;
Diplômé de l'École d'Architecture de Nancy (F) ;
D.E.S.S. Pratiques Européennes de l'Architecture (CH-F-P) ;
Études à la Faculté d'Architecture de l'Université de Porto (P) ;
Expérience professionnelle en France, au Portugal,
et au Grand-Duché de Luxembourg ;
Nationalité française, 37 ans.





National library of Luxemburg

The National Library is a monumental construction in the landscape of the tableland of Kirchberg (Luxemburg). It is a building whose L-shape seems to rise gently above the trees. The building yields to emerge from the foliage and forms a visible benchmark of the city. It is a major building while avoiding the impression of an excessive monumentality.
In 2003 it won the 3rd price in an architects' contest

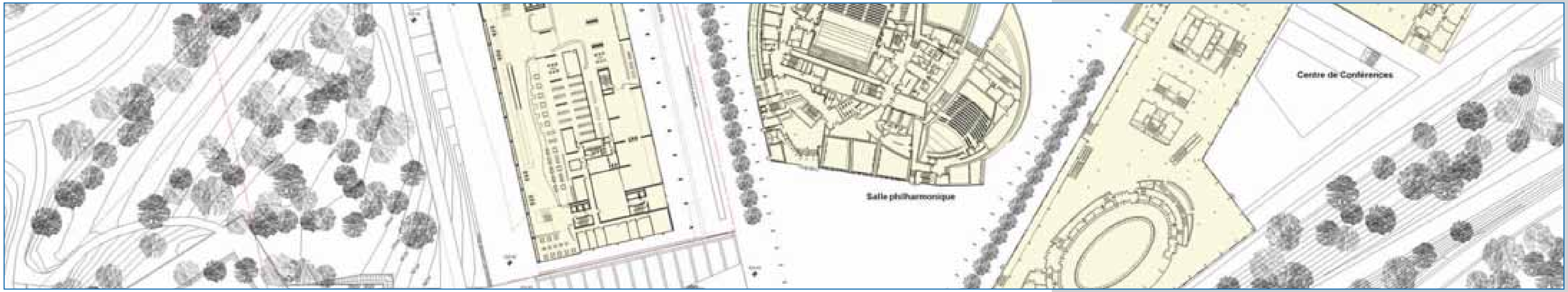
Used software • Allplan Architecture, Cinema 4D

Bibliothèque Nationale de Luxembourg

2003 – 3ème Prix au concours
Bibliothèque Nationale de Luxembourg (Luxembourg - Kirchberg)
Administration des bâtiments publics
Superficie : 30 556 m²
Coût d’investissement estimé: 78 900 000 Euro
Architectes associés : Atelier d’architecture du centre à L-7570 Mersch (Stéphane Gutfrind, Architecte D.P.LG. & Vincent Duvivier, Ir architecte F.P.M’s) ;
ELB Architecture à F-54000 Nancy (Emmanuelle et Laurent Beaudouin, Architectes D.P.L.G.).

Les enjeux d’un site et d’un programme complexe ...

La Bibliothèque Nationale est un signe emblématique du paysage du plateau du Kirchberg. Elle apporte le maillon final dans l’ensemble urbain en cours d’édification. Le projet complète la composition de la place, sans concurrencer la présence des autres bâtiments. La continuité avec la place et le rapport au paysage constitue les deux axes majeurs de la composition. C’est un édifice dont la figure en L semble s’élever doucement au-dessus des arbres. Le bâtiment se plie pour émerger des frondaisons et former un point de repère visible depuis la ville. Il encadre par une fine ligne verticale le bâtiment de la Philharmonie et en préserve l’échelle, en diminuant le long de la place le gabarit du bâtiment existant. Ainsi, la hauteur de la Bibliothèque sur la place ne dépasse pas celle de la Philharmonie. Le projet se présente comme un édifice majeur tout en évitant l’impression d’une excessive monumentalité. Il regarde le paysage autour de lui et se fait voir de loin, sans être pour autant écrasant par rapport à ses voisins. Il marque le paysage par sa présence, mais en respecte la nature. La beauté du site et l’exceptionnelle situation du bâtiment vis-à-vis de la ville de Luxembourg sont exploitées pour donner à l’intérieur le maximum d’agrément. L’ouverture de la Bibliothèque sur la nature d’où émerge la silhouette de la ville est le thème central du projet. Les salles de lecture de la Bibliothèque forment un belvédère devant lequel la forêt se détache en premier plan sur le paysage urbain.



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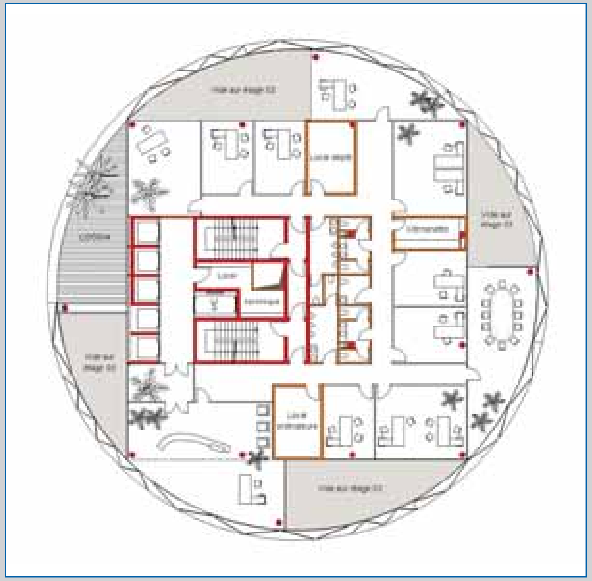
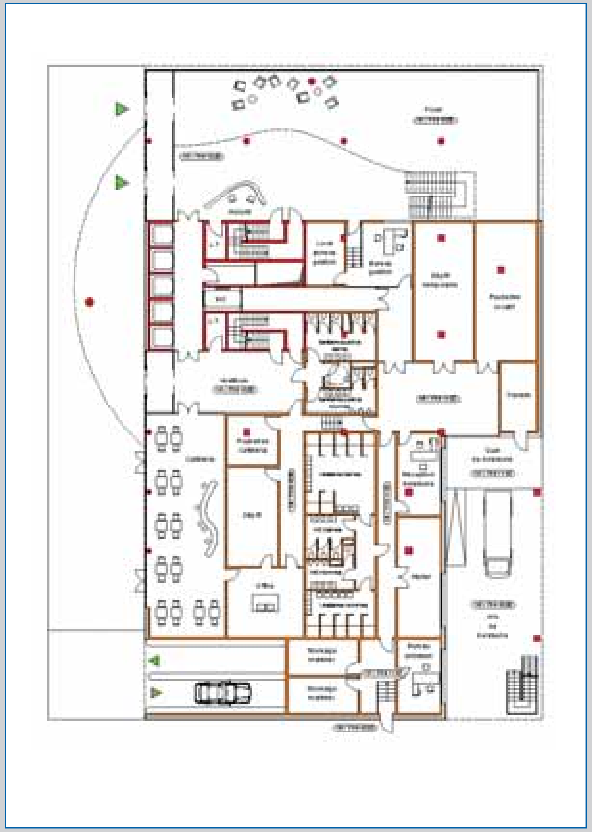
1er Bâtiment Administratif (Belval-Ouest)





Used software • Allplan Architecture, Cinema 4D

2004 – 2ème Mention
1er Bâtiment Administratif (Belval-Ouest)
LE FONDS BELVAL

Superficie : 13.531 m²
Coût d'investissement estimé : 24.333.064 Euros
Architectes associés : Atelier d'architecture du centre à L-7570 Mersch (Stéphane Gutfrind, Architecte D.P.L.G. & Vincent Duvivier, Ir architecte F.P.M's) ;
ELB Architecture à F-54000 Nancy
(Emmanuelle et Laurent Beaudouin, Architectes D.P.L.G.).

Intervenir dans le contexte urbain décrit par le Masterplan avec la connaissance des premières données architecturales nécessite un respect des orientations prises pour définir les espaces du nouveau quartier de Belval. Le très haut niveau retenu pour cristalliser ce chantier, qu'il soit d'ordre socio-économique et culturel quant aux équipement et institutions prévues, ou qu'il soit d'ordre urbanistique et architectural au vu des premiers choix opérés a imposé une approche claire du positionnement de l'édifice et de son gabarit dans le site. L'implantation du Premier Bâtiment Administratif prévu à l'angle sud-est du site lui confère une position d'articulation majeure dans la relation à venir entre les édifices, leur destination et leur hauteur. Cette caractéristique d'articulation est relayée par le développement du site envisageable vers l'Est ; par le rôle que le bâtiment tiendra dans la perspective de la place qu'il borde ; par les liaisons prévues avec le côté Sud, largement entretenues avec l'activité de la nouvelle gare et le raccordement aux nouvelles infrastructures transfrontalières. Le projet décrit par le Masterplan traduit une grande fluidité des espaces et de leurs parcours. Ce constat et la position d'articulation du Premier Bâtiment Administratif a présidé aux choix volumétriques et fonctionnels de l'édifice : une tour de section circulaire autorise toute orientation et confère à l'immeuble son caractère emblématique voulant traduire la position d'une institution résolument ouverte. L'utilisation de techniques innovantes de protection solaire donne à la tour une apparence cristalline qui renforce son rôle de signal dans le paysage de Belval.

De l'extérieur, les vitrages des pare-soleil miroitent suivant le mouvement de la lumière en donnant à l'édifice une vibration qui change en permanence au cours de la journée, alternant des impressions de reflet et de transparence. Le bâtiment semble détaché du socle et se montre comme un cylindre de cristal contrastant avec l'opacité du béton des Archives Nationales. Un rapport de contraste maximum est recherché entre le volume du bâtiment voisin et la fragilité cristalline de la tour, l'un et l'autre se mettant en valeur mutuellement. La tour de cristal donne à l'ensemble du site une dimension de transparence qui équilibre à la fois l'impressionnante présence de l'usine et la force du bâtiment des archives. Le cylindre de la tour n'exclut aucune prise de vues, rassemble tous les horizons. De grands évidements abritant des loggias développées sur double hauteur et disposés dans un mouvement ascensionnels ouvre son volume. La tour repose sur un socle dont la facture, le gabarit et le positionnement observe les caractéristiques du bâtiment des Nouvelles Archives Nationales dans une volonté de continuité du front Est de son grand parvis. Le socle comporte les espaces communs. A l'inverse de la tour, il est traité en continuité de matières avec la partie basse du bâtiment des Archives pour renforcer la cohérence urbaine. L'acier corten est utilisé en lames horizontales qui laissent une transparence visuelle tout en assurant la protection solaire de l'intérieur.

Nous avons cherché à assurer à l'ensemble du site une unité en évitant tout geste architectural qui entrerait en concurrence avec les futurs édifices du site. Ainsi la proposition ne s'écarte pas des orientations volumétriques et altimétriques prévues au règlement tout en affirmant clairement la volonté de ne pas orienter le bâtiment sachant que l'implantation de son socle règle au sol, par son simple positionnement, les relations que l'ensemble doit entretenir avec les espaces et les bâtiments environnants.

First administrative building of Belval

The project concerns the 1st Administrative building of Belval-Ouest.
It seems to be detached from its base and is shown like a crystal cylinder contrasting with the opacity of the concrete of the Public Records Building. A maximum contrast ratio is realised between the volume of the nearest building and the crystalline brittleness of the tower; they emphasize each other mutually. The crystal tower gives to the whole of the site a dimension of transparency and balance at the same time.
We sought to ensure for the whole of the site a kind of unity by avoiding big architectural gestures, which would possibly conflict with future buildings of the site.

Fachhochschule Frankfurt am Main (University of Applied Sciences)

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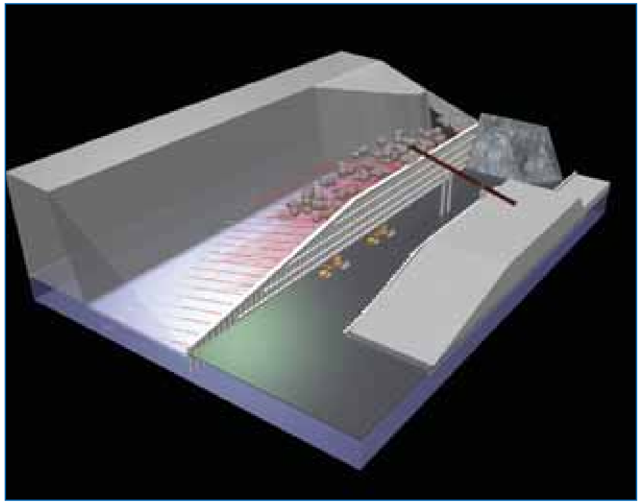
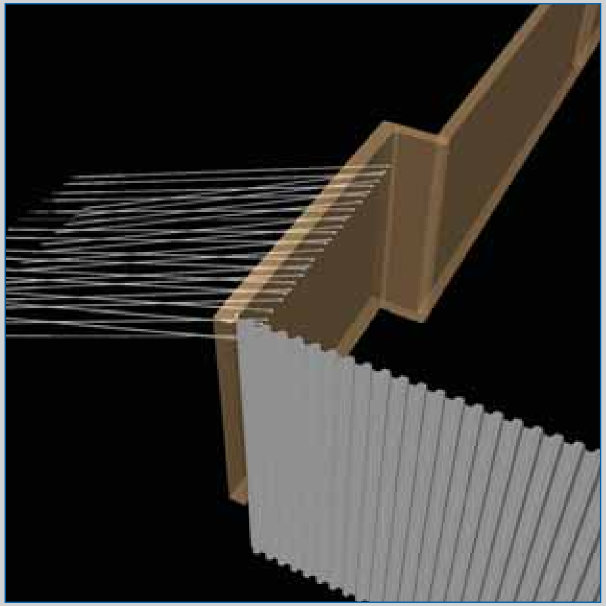
Website	www.fh-frankfurt.de

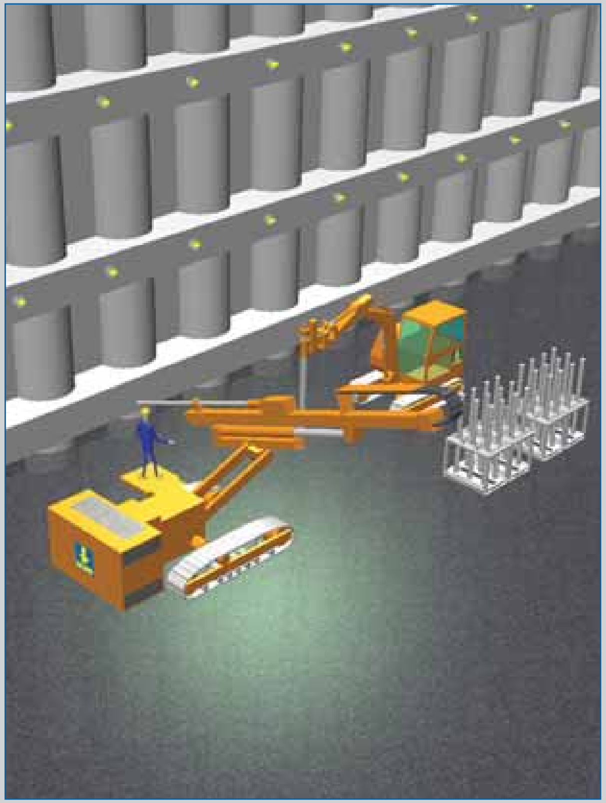
Digitalisierung von Arbeitsschritten im Spezialtiefbau

Fachhochschule Frankfurt am Main is one of the five Universities of Applied Sciences of the Bundesland (Federal State) Hessen in the centre of Germany. It was founded in 1971 as a merger of five vocational schools. About 9000 students within 20 degree courses are studying on the campus. The emphasis lies on practice orientated teaching, research and development work. The staff consists of about 650 lecturers (professors) and 220 administrative employees. Department 1 is one of four departments and includes the following key aspects of activity: Architecture, Civil Engineering, Structural engineering and Geomatik. About 1600 students are actually studying on study courses of Department 1.

Professor Dr.-Ing. Kliesch is the Head of the Geotechnical Group, which is a part of the Structural Engineering courses. Professor Dr.-Ing. Gerster is head of the Structural Engineering Course and expert of construction management. Mr. Sklorz studies Structural Engineering and is experienced in using CAD software. The key aspects of the presented work are foundation engineering and the construction of building pits. One of the present focuses is set on the analysis of procedures during the construction of building pits. Using Allplan Architecture and Cinema 4D software tools, a library of typical procedures/situations on site has been developed.







Used software • Allplan Architecture, Cinema4D

The Research Fund of the Fachhochschule Frankfurt am Main sponsored the presented joint research project in 2005 and 2006. The co-operation partners are the external building company BAUER, Schrobenhausen (Germany), department of anchoring and the Geotechnical group of Department 1, Fachhochschule Frankfurt am Main. The company Bauer, Schrobenhausen is one of the most experienced companies in constructing excavation pits. In practical work they are often confronted with the problem if the chosen tools and the chosen equipment under the presented conditions and under a chosen timetable can realize the designed construction.

The construction firm, here: Bauer, has often tried to explain the chosen way to the building owner, architect, structural engineer or other partner on the project by using drafts and charts. The final design documents are the basis for discussion. Apart from this the surrounding conditions and the size of the chosen equipment and procedure are additional information, which have to be analyzed and presented on the drafts and chart. For this purpose commercial tools have not been developed yet. The Department 1 of Fachhochschule Frankfurt joins the key aspects of activities of architecture, civil-, structural engineering and Geomatik and proposed therefore to use architectural tools in order to create a three-dimensional design library for geotechnical and management purposes. As a basis the work drawings of the equipment for anchoring work were used and implemented into the three dimensional design of really existing building site examples.

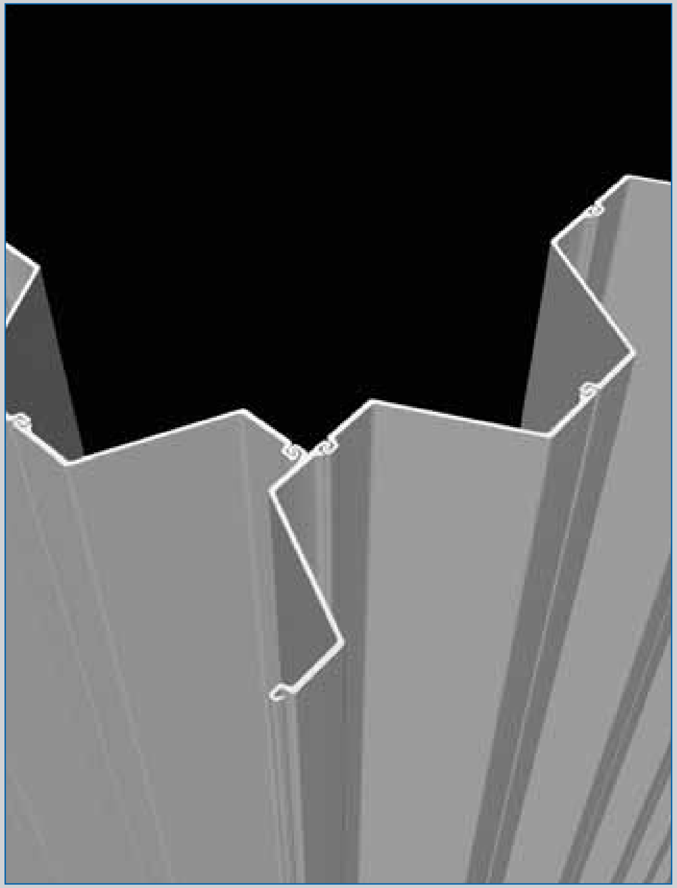
The presented pictures show the drilling implement and the small excavator that are necessarily used to construct wedge yoke anchors during actual commercial support work. The additional pictures show the design of three existing locations. One location is situated on the site "Schleuse Lauenburg", that is the new construction of a sluice near by the city of Lauenburg. Presented is the design of the circular sheet pile wall, that is the excavation pit of the new sluice chamber including the design of the anchors and including the chosen sheet pile locks at one corner of the pit.

Another location is situated on the campus site of Fachhochschule Frankfurt am Main during construction of the new main building in 2005. As a part of the chosen support work a horizontal timber wall (Trägerbohlverbau) was designed and constructed. The design includes all details up to the details of the anchor heads and the surrounding, already existing, building.

The last of the three locations is the building pit of the north entrance area of the new Gotthard tunnel project that is still under construction. Bauer was responsible for the anchor work of the designed retaining wall consisting of a bored diaphragm and of five layers of anchors. Here, the surrounding morphology, the retaining wall, the anchors, the subsoil condition (erratic rocks) and the equipment was designed and jointed.

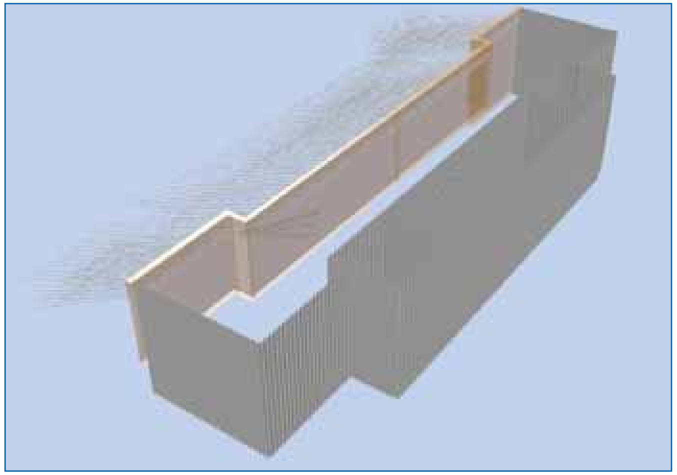
The main practical challenge of the contractor was to compete with the existing erratic rocks during anchoring. By using the presented Allplan design and in addition designing a movie, which leads a virtual visitor across the site up into the borehole of one anchor, the problem for using the equipment (different rock hardness) was obvious even for non-experts.

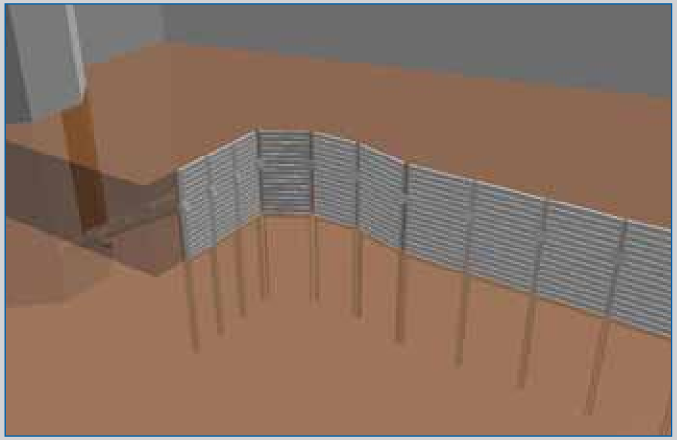
All of these locations were designed using Allplan Architecture and final design documents of each project and of the equipment given by the co-operation partner. All drawings are naturally true to scale. As a further development the self-moving of the equipment to construct anchors has been begun to be designed by using Cinema4D. First movie sequences were developed successfully. Results will be presented later on and research work will be continued.



Excavation pits - digitalized work process

The construction of a building or the excavation of a pit near adjacent properties or under blind bend subsoil conditions is one of the most difficult challenges in present engineering work. Considering all separate interests (given by the building owner, the architect, the structural engineer and the neighbours), the construction firm has to present practical solutions by using three dimensional pictures of the procedures. So, using recent practical examples and final design documents given by the co-operation partner Bauer Spezialtiefbau, Schrobenhausen (Germany) a visualisation of the used equipment and the surrounding geometrical and geotechnical conditions were designed by using Allplan Architecture and Cinema4D to emphasize the special conditions and the problems on the chosen sites.





Georges & Theis Architectes associés

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Website	www.georges-theis.lu

History

Indépendant associé depuis mars1984 l'architecte G. Theis crée en fin d'année 1994 l'actuel bureau
En janvier 2004, l'architecte B. Georges (ancien employé) devient associé dans la société qui porte depuis lors la dénomination «B. GEORGES & G. THEIS, architectes associés Sàrl.»

Company missions

Notre mission consiste dans la conception, la mise en adjudication et le suivi des travaux d'exécution pour :

- Projets privés (maisons unifamiliales, logements collectifs, bureaux, hôtels, ...)
- Projets publics (écoles, centres culturels, cinémas, complexes sportifs, ...)
- Projets hospitaliers (cliniques, centres psychiatriques, maisons de soins, ...)
- Projets s'inscrivant dans une logique de «bio-construction» et de «développement durable»
- Projets d'urbanisme

Vision and philosophy

La philosophie du bureau est résolument tournée vers la Haute Qualité Environnementale.

Organizational structure

Le bureau se compose actuellement de

- Deux architectes associés
- Quatre architectes employés
- Un technicien de chantier
- Deux dessinateurs CAO
- Un ingénieur commercial
- Une secrétaire

En 2005 a été crée une agence complémentaire chargée de simulations énergétiques et de contrôles thermographiques et «blower-door»

Key activities

Projets du secteur hospitalier

Equipment

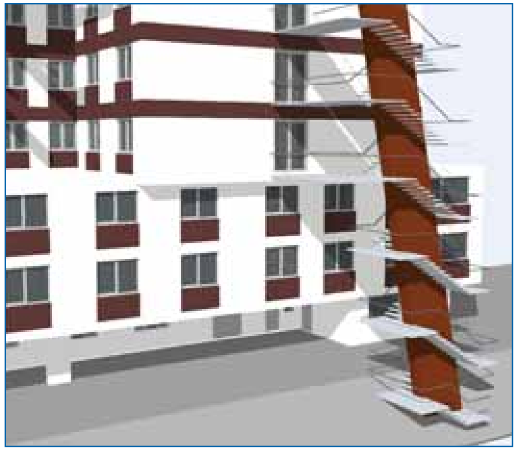
Allplan, Cinéma 4D, Illustrator, Photoshop, Indesign, Premiere pro, Quicktime, ...

Target groups

Ministère des Travaux Publics (Administration des Travaux Publics)
Centre Hospitalier du Nord - Clinique St. Joseph à Wilts
Centre Hospitalier Neuro-Psychiatrique à Ettelbrück
Administrations Communales de Wiltz, Goesdorf, Erpeldange et Bourscheid
Promoteurs privés

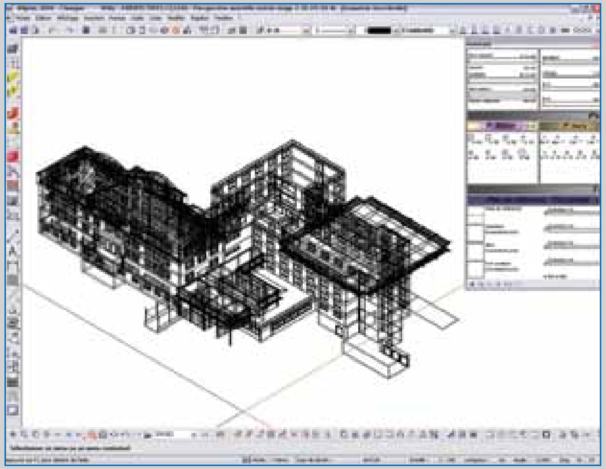
References

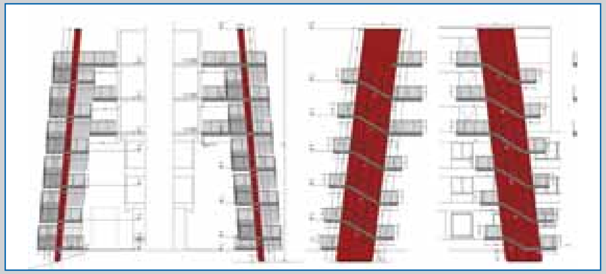
Centre Socio-Culturel à Wiltz
Centre Culturel à Bürden
Hôtel Interkoener à Clervaux
Centre Intégré pour Personnes Agées à Wiltz
Clinique St. Joseph à Wiltz
CHNP à Ettelbrück



Used software • Allplan Architecture

Clinique St-Joseph à Wiltz





Clinic of Wiltz

The hospital «Clinique St. Joseph» in Wiltz saw its beginnings in the Thirties. An extension was carried out at the beginning of the Seventies. This changed the number of beds for general care into 82. Today this hospital is considered for proximity care in the «plan hospitalier» of Luxembourg.
The project has been split into three execution phases, with the first one only now coming to its end of realization: setting up of a scanner - transformation of three surgery rooms - transformation of the maternity ward - installation of a power station and a new analysis laboratory above.
The second phase will include:

- Adding new rooms for patients as well as a new entrance hall.
- Entire transformation of the care units.
- Installation of a landing space for an emergency helicopter .

A third phase will include the renovation of the entire administrative services.

La clinique St. Joseph à Wiltz a vu ses débuts dans les années 30 sous forme de dispensaire, principalement pour malades de la tuberculose. Après occupation par l'armée allemande et puis reconstruction due aux dégâts de guerre de la «Rundstättoffensive» la clinique comportait depuis les années 50 une vingtaine de lits pour soins généraux. Une extension fut réalisée début des années 70 ce qui a porté le nombre des lits de patients à 82, plus 48 lits pour le partie Maison de Soins installée dans le volume initial de la clinique.

La clinique St. Joseph est aujourd'hui classée comme hôpital de proximité dans le plan hospitalier du Grand-Duché du Luxembourg
Suivant premières autorisations ministérielles depuis 1997 le projet de la clinique St. Joseph à Wiltz a subi un certain nombre d'améliorations. Il s'agit notamment de :

- La réorganisation de la médecine interne ;
- l'Aménagement d'un scanner ;
- l'Aménagement d'une nouvelle stérilisation centrale ;
- Le réaménagement du service d'endoscopie ;
- La transformation des trois salles opératoires ;
- La transformation avec agrandissement du service de maternité ;
- l'Aménagement d'une centrale énergétique avec module de cogénération pour la production d'électricité, de chaleur et de froid ;
- l'Aménagement d'un nouveau laboratoire d'analyse ;
- Les protections anti-feu avec aménagement de nouvelles sorties de secours (encore en cours d'exécution).

En ce qui concerne la modernisation et l'agrandissement de la maternité, cette partie du projet a été développée autour de la philosophie de permettre de vivre l'accouchement de la façon la plus naturelle possible et la plus adaptée aux souhaits des futurs parents. Les sages-femmes vous accueillent dans un cadre très familial, propice à la détente. La maternité offre la possibilité également d'accoucher sous eau dans des conditions optimales et en toute sérénité. D'ailleurs le label «Hôpital-Ami des bébés» a été décerné en 2004 par l'OMS et UNICEF, ce qui reflète les efforts quotidiens de la clinique pour promouvoir l'allaitement maternel tout en respectant le libre choix des parents quant à l'alimentation de leur bébé. Le projet a prévu dès lors une «pouponnière» réservée aux soins des nouveaux-nés et lieu destiné à l'allaitement en toute tranquillité sous les conseils expérimentés d'une sage-femme.

Une étape supplémentaire dans la réalisation du complexe hospitalier fut l'occupation en juin 2005 du laboratoire d'analyses médicales. Antérieurement confiné au deuxième sous-sol de la clinique dans un espace de 166m² sans vue vers l'extérieur ni ventilation naturelle, le nouveau laboratoire vient d'être installé au rez-de-chaussée en prolongation de l'ancienne Maison de Soins. Installé dans un volume à l'architecture moderne présentant un espace largement éclairé et avec vues directes aussi bien sur la rue Grande-Duchesse Charlotte que sur la vallée de la Wiltz, le laboratoire dispose aujourd'hui d'une surface totale de 250m².

Pour les aménagements intérieurs, une volonté de se démarquer dans le choix des matériaux et des couleurs s'est présentée et ce en parfaite harmonie avec toute l'équipe du laboratoire. L'utilisation du métal apporte une touche moderne à la zone d'accueil du laboratoire marquant ainsi l'attrait de la clinique pour les nouvelles technologies. L'utilisation de couleurs complémentaires comme le rouge et le jaune (ivoire clair) apporte chaleur, dynamisme et enthousiasme pour le rouge et luminosité, richesse et ouverture d'esprit pour le jaune. L'utilisation du gris sur le métal et les menuiseries intérieures intègre le phénomène d'harmonie dans l'équilibre symétrique des forces. Dans notre appareil sensitif optique, l'harmonie correspond à un état physiologique d'équilibre où, dissimulation et assimilation de la substance visuelle sont d'égale importance. Le gris neutre engendre cet état. L'œil exige cette tonalité pour être satisfait ; on est alors en présence d'un équilibre harmonieux.

Tous les travaux énumérés ci-avant représentent moins de 50 % du projet global pour lequel les étapes suivantes restent encore à être exécutées :

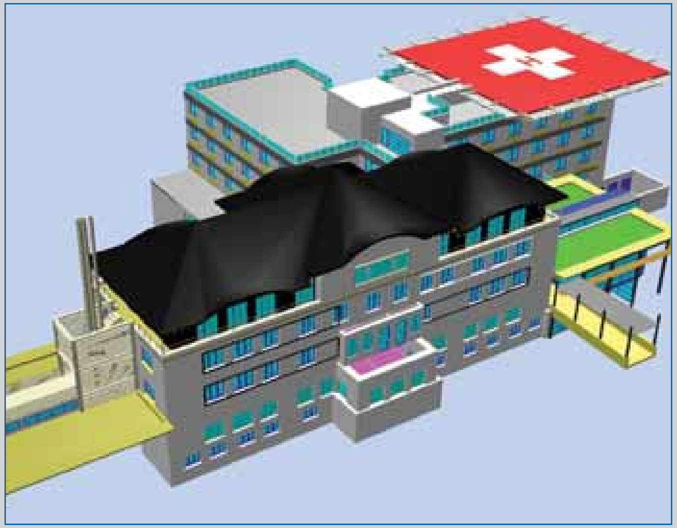
- Ajoute d'une nouvelle aile avec chambres de patients ;
- Ajoute d'un nouvel hall d'accueil ;
- Aménagement d'un héliport sur la toiture plate du bâtiment ;
- Transformation de la station des «intermediate care» ;
- Aménagement d'un «hôpital de jour» ;
- Transformation de la pharmacie ;
- Transformation de la cuisine centrale ;
- Rénovation des chambres des patients ;
- Réaménagement de l'ensemble des services administratifs.

La future extension est actuellement en cours de développement et marquera la prochaine étape de l'évolution essentielle à la viabilité de la clinique. Elle comprendra la nouvelle entrée avec réception plus adaptée permettant la séparation physique de l'entrée principale visiteurs et de l'accès en cas d'urgence qui actuellement sont communes. Cette entrée se situera de plain-pied avec la rue principale permettant des facilités d'accès aux personnes à mobilité réduite. Cette partie de projet comprend également la mise en œuvre de «l'hôpital de jour» sur la base de l'arrivée, du traitement ou petite opération et sortie des patients lors d'une même journée. Lors de cette prochaine étape la réalisation de l'héliport sera également exécutée afin de permettre les départs et arrivées directs dans la structure même de l'hôpital. Temps gagné qui peut s'avérer essentiel lors d'une urgence.

Utilisation du logiciel Allplan pour ce projet :

Outre l'utilisation du support informatique pour toutes les étapes du dessin, depuis l'encodage de la situation existante jusqu'à la réalisation de tous les documents nécessaires à l'exécution, il y a lieu de relever son importance comme support de présentation du projet aux décideurs.

En effet il faut se rendre compte de la difficulté que les projeteurs peuvent rencontrer alors qu'il faut convaincre du bien-fondé des partis proposés par les architectes et ingénieurs face à une multitude de personnes qui doivent émettre un avis ou autoriser le projet. On peut nommer le Project-Manager, le Conseil d'Administration (+/- 6 personnes), les responsables de la Commission Permanente pour le Secteur Hospitalier (+/- 12 personnes), le bureau de contrôle chargé de conseiller le Ministère et «last but not least» Monsieur le Ministre de la Santé. Nous estimons qu'il n'a été possible d'obtenir les autorisations nécessaires qu'à travers des vues en 3D les plus réalistes possibles, différentes propositions de couleur simulées par informatique et incrustations réalistes des parties de projets dans les photos du site.



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Données de la société

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Téléphone :	081/58.24.13
Télécopie :	081/58.24.73
Contacts :	Jean-Paul Menten, Thierry Geldof, administrateurs délégués
Année de création :	1995
Effectifs :	16 architectes; 1 ingénieur techniques spéciales ; 1 ingénieur constructions ; 1 géomètre ; 30 dessinateurs ; 3 métreurs ; 1 secrétaire ; 3 employés administratifs
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3. Vision & Philosophie
   Notre ambition est non seulement de continuer à développer nos points forts, mais également de développer d'autres activités comme l'imagerie de synthèse, les métrés automatisés, ...

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Used software • Allplan Architecture

Maison de la Petite Enfance à Barvaux

Description du projet

Le site, un parc paysager, se caractérise par sa position dans un tissu urbain de type traditionnel de faible gabarit (R+2) construit en ordre discontinu.
Le terrain jouxte celui de l'Administration communale, bâtiment à forte valeur patrimoniale et historique.
Le parc est joliment arboré et constitue un havre de paix pour les riverains. Des sentiers de promenade permettent de cheminer dans ce cadre enchanteur.
Nous avons opté pour une architecture d'intégration, tant au niveau des gabarits que de la typo morphologie et des matériaux avec pour conséquence directe, la conception de deux bâtiments permettant, grâce à leur implantation respective, de profiter pleinement du parc et de ses attraits.

Parti architectural

Les deux bâtiments s'articulent sur une petite placette circulaire regroupant les entrées. Celles-ci sont accessibles aux personnes à mobilité réduite grâce des différents plans inclinés qui contribuent à l'aménagement global des abords. La placette est également desservie par de larges escaliers et s'agrémente d'une petite fontaine.
L'implantation des deux bâtiments permet ainsi de profiter pleinement du parc et de ses attraits.
Les entrées sont protégées et mises en évidence par deux auvents en verre.
Les volumes sont volontairement simples pour répondre à la fois à des impératifs économiques dictés par la commune et à un souci d'intégration et de respect du site existant. Les rez-de-chaussée sont traités en murs de moellons de pierre calcaire de la région, l'appareillage étant réglé par arasement.
Le mur de la crèche s'ouvre largement sur le parc par des baies semi-circulaires reprenant la symbolique d'un pont, petit clin d'œil à la présence de l'Ourthe toute proche.
Les étages sont traités de manière plus légère et sont presque entièrement vitrés permettant à la vue de circuler librement sur le paysage.
Des claustras permettent de réguler l'apport de lumière et de chaleur à l'intérieur des étages. Ils permettent également de sécuriser les espaces accessibles aux jeunes enfants.
Le traitement des volumes tend à donner une expression architecturale particulière et forte à ce bâtiment à vocation publique.

Le projet proposé est conforme au CWATUP, au RGBSR, aux normes d'accessibilité des personnes à mobilité réduite et aux normes ONE.

Le mot-clé du projet est la polyvalence. Effectivement, le principe constructif (structure centrale de colonnes) permet de dégager entièrement les plateaux de tout mur porteur. Ainsi on préserve la réadaptation des lieux dans le futur suivant les besoins.
Le chauffage par le sol, la conception des faux-plafonds et de l'éclairage contribuent également à la flexibilité globale des espaces.

Options techniques et choix des matériaux

L'isolation, le chauffage, l'ensemble des techniques du bâtiment ont été minutieusement étudiés de façon à optimiser non seulement le confort mais également les coûts d'exploitation.

Les matériaux utilisés sont la pierre, le crépi, l'ardoise, le zinc, le bois, ... des valeurs sûres qui assureront la pérennité du bâtiment et son intégration dans le site.

Nursery in Barvaux

House of the small childhood.
Both buildings are situated at a circular square grouping together entrances.
The volumes are voluntarily kept simple to answer at the same moment to economic imperatives dictated by the municipality and a concern of integration and respect for the existing site.
The ground floors are treated in walls of stones.
The wall of the day-nursery opens widely on the park by semicircular bays, symbolizing a bridge and reminding the presence of the nearby river Ourthe.
Floors are treated in a lighter way and are almost completely glazed allowing the sight to circulate freely on the landscape.
The insulation, the heating, all the techniques of the building were studied so as to optimise not only the comfort but also the costs of operation.

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Hôtel de Police à Fléron

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Used software • Allplan Architecture

Description du projet

Le site, d'une superficie de 3000 m², se caractérise par sa position en zone d'habitat dans un tissu urbain de type traditionnel de faibles gabarits (R+2) et construit en ordre discontinu.
Il est localisé à l'angle de deux voiries.
En fond de perspective, un espace dégagé où se dessinent un pylône GSM et un hall omnisports, entouré d'emplacements de parking.
Le terrain jouxte celui de la bibliothèque communale, qui a été aménagée dans une ancienne demeure de l'époque des charbonnages de Werister ce qui apporte une valeur patrimoniale et historique au lieu.
Jusqu'il y a peu, un autre témoin du site charbonnier n°65 se trouvait toujours sur le site, le terril dit : des "Onhons". Celui-ci a aujourd'hui disparu, et avec lui, une végétation considérée avec beaucoup d'intérêts par les riverains.

Parti architectural

La configuration du terrain, les particularités du programme, les prescriptions imposées et la volonté de ne pas faire de parking en sous-sol, nous ont amenés à un mode d'implantation et à un plan bien précis.
Nous avons voulu un bâtiment à la fois simple sur le plan constructif afin de répondre à des impératifs d'ordre économiques, mais aussi par sa volumétrie par souci d'intégration dans le bâti existant. Même si le RCU nous permet des volumétries de 5 niveaux, un R+2 nous paraît mieux correspondre à l'environnement direct. La toiture plate, elle correspond à la tendance de la zone qui est d'utiliser de très faibles pentes de toiture, ce qui permet aussi dans le cadre du programme demandé de mieux lui répondre et de ne pas se retrouver avec des espaces difficilement exploitables.

Le projet qui en découle se présente donc sous forme de deux parallélépipèdes rectangles, placés en croix.
La volumétrie comprend donc un niveau de sous-sol et trois niveaux hors sol.
Un volume bas, composé principalement des box fermés pour les véhicules de police, referme la propriété en fond de parcelle.

Un parking à ciel ouvert a été préféré pour son côté pratique et économique.
Une première zone, fermée et sécurisée est destinée aux véhicules de fonction ainsi que pour une partie du personnel.
Une deuxième zone de parking est aménagée entre l'enceinte policière et le hall omnisports.
Elle permet de servir au personnel de la police en journée, tandis qu'elle devient une zone de parcage publique en soirée et durant le week-end.
L'aménagement de cette partie du site permet de redessiner la zone en la structurant.

Une attention toute particulière a été portée sur le maintien ou la création d'espaces verts afin de minimiser l'impact des structures bâties et de compenser la perte du terril des "Onhons".
Le souhait de conserver la haie remarquable longeant l'Avenue de l'Espace Sport est respecté puisqu 'elle est maintenue.

Optimisation du coût du bâtiment

Les gabarits et les dimensions choisis permettent des solutions techniques économiques tout en préservant une capacité de réadaptation des lieux dans le futur (cloisons légères).
Les installations techniques nécessitent un renouvellement, leur accessibilité doit donc le permettre.

Options techniques

Chauffage centralisé pour l'ensemble du complexe, une unité centrale permet d'optimiser la régulation et le rendement de la production, une conversion à un autre type de combustible en fonction de l'évolution des techniques et du marché de l'énergie reste possible.

Accessibilité des gaines techniques
Simplifiant la conversion future des installations vers d'autres technologies, ce principe participe à la pérennité des éléments structurels tout en assurant une capacité d'évoluer vers les techniques les plus contemporaines.

La ventilation de l'air dans son ensemble sera assurée par des groupes de pulsions et d'extraction.
Le réseau de distribution d'air en pulsion et extraction se fera par gaines métalliques placées en général, dans les trémies, faux plafond et décaissés.

Récupération d'eau pluviale
Afin de limiter au maximum les consommations en eau froide des bâtiments, nous avons prévu l'installation de citernes eau de pluie. La récupération d'eau de pluie permettra d'alimenter les robinets d'entretien (nettoyage des communs, des abords et des véhicules).

Police headquarters of Fléron

The landscape, the peculiarities of the program, the prescriptions and the desision not to make a car park in the basement, brought us to make a very precise drawing of the project.
We wanted, at the same time, a simple building to answer to all economic imperatives, but also a perfect integration in the existing buildings.
The flat roof corresponds to the standards of the zone where weakly sloping roofs are used and its also sees to a better exploitation of the spaces.
The project appears in the form of two parallelepipeds rectangles, placed in cross. The volumes include a basement and three upper levels.

Building bridges in the construction industry

Nemetschek and SCIA develop integrated software solution for structural engineering

Today, engineers expect to be able to complete their tasks as quickly as possible with the help of their software tools. This relates not only to the tasks to be carried out within an application, but also the most effective integration of the system as a whole. Up to now, individual programs were tailored to suit specific tasks, and the exchange of information between them was only possible with limitations. In practice, this meant that engineers first had to manually implement or at the very least modify the data provided by the architects. In a subsequent step, structural design and analysis were carried out on the basis of this data. A large portion of the information required here has to be input again in the CAE software. The results of the calculation then formed the basis for the design and detailing, e.g. of formwork and reinforcement. The smooth exchange of data between the planning partners and the applications involved was often impossible. This meant additional work, even though the actual work processes are very closely related to each other. Nemetschek and SCIA have therefore developed an integrated solution that seamlessly merges the CAD system Allplan Engineering and the CAE software SCIA • ESA PT. This new solution is known as Round-Trip Engineering.

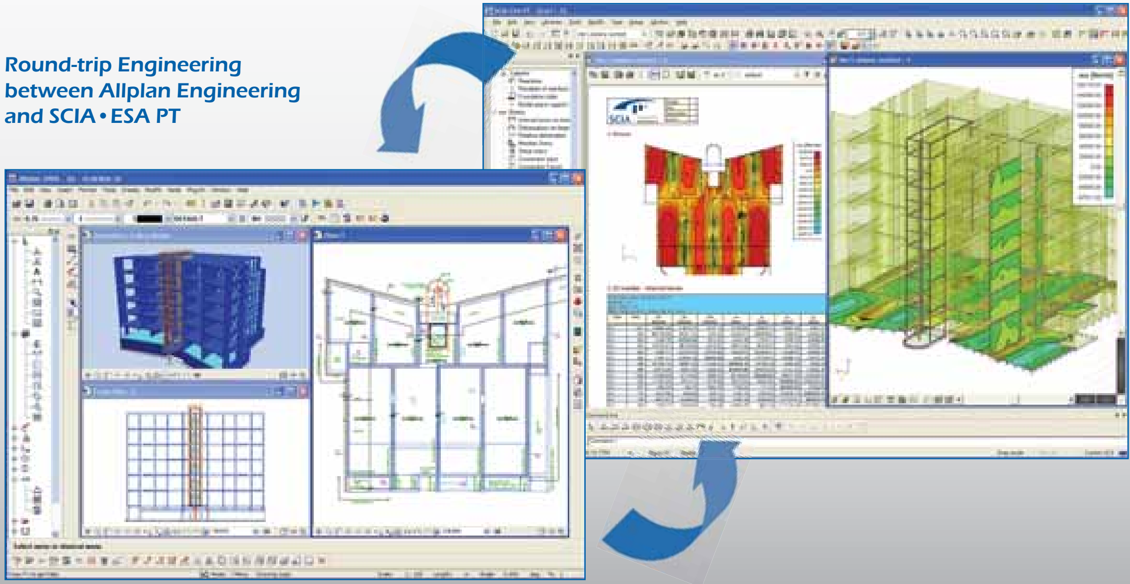
Perfect interplay between CAD and CAE software

In Round-Trip Engineering, data is synchronized between the CAD and CAE software, meaning that time-consuming and error-prone multiple data entry is a thing of the past. In the first step, the load-bearing components are selected in Allplan and transferred to SCIA • ESA PT. A dimension-reduced structural system then needs to be generated from the three-dimensional components. That may sound simple, but requires a great deal of experience and was previously only possible with lengthy manual work. Now, though, the structural system can be derived for the most part automatically. For this, the components are first reduced to their centerlines and midplanes. The lines and planes are then linked with each other in such a way that a valid structural system is produced. The structural engineer only needs to determine whether the automatically generated proposal meets expectations or whether changes and further idealizations need to be carried out.
Once the material properties, support conditions and loads have been defined in the usual way, the calculation can begin.
As a rule, the structural analysis is not a one-time operation but must be continually adjusted in line with design modifications.

Greater efficiency in day-to-day work

Previously, changes to the design had to be laboriously implemented by hand in the CAD and CAE software. In the case of major changes, users were sometimes forced to abandon the data already entered and carry out completely new calculations. The new update mechanism greatly improves efficiency. If a change is made to the architectural or structural model, the load-bearing components are simply transferred again from Allplan Engineering to SCIA • ESA PT. The CAE software contains a graphical display of the points at which changes have been made to the previous status. The structural engineer merely decides whether to adopt or ignore each change. Where necessary, the structural system is modified accordingly. As the remaining analysis information is still available, the calculation can be performed again immediately.
Round-Trip Engineering significantly increases the efficiency of structural engineering workflow. It makes it possible to deliver high-quality results sooner than before, and to work quickly and profitably despite frequent changes to the design. To use the new working method, users need the current versions of Allplan 2006.2 Engineering and SCIA • ESA PT 2007.

Round-trip Engineering between Allplan Engineering and SCIA • ESA PT



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NEMETSCHEK
BUILDING THE FUTURE
SCIA scientific software

Category 2

CAD Engineering (Allplan Engineering and Allplan Precast)

PT Baja Engineering Indonesia and SC Engineering BV

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Fax	+62 21-84303690
Contact	Mr ing. J. Grasmayer
Email	baja.eng@cbn.net.id

Category 2 Winner CAD Engineering

PT BAJA INDONESIA

STRUCTURAL CONCRETE DETAILING

SC Engineering BV, Nijkerk, the Netherlands, and PT Baja Engineering Indonesia, Jakarta, Indonesia are established in 2003. Our companies prepare detail calculations and detail drawings of reinforced- and prestressed concrete structures.

In our office in the Netherlands we acquire projects and manage project scope progress.

We maintain contacts with the client during execution of our works to discuss any project related matters such as scope interpretation, possible solutions of details to choose from, progress, etc.

In our engineering department in the Netherlands we prepare structural calculations, based on final design calculations provided by the client.

In our office in Jakarta Indonesia, we prepare detail drawings of structural concrete structures, mainly bridges, tunnels and industrial complex structures.

In our office we use Allplan Engineering.
All our drafting is done in 3D. The contract drawings we receive from the client, most in 2D, autocad format, are imported into the Allplan software.

This information is than transformed into 3D objects, from which dimension drawings are prepared.

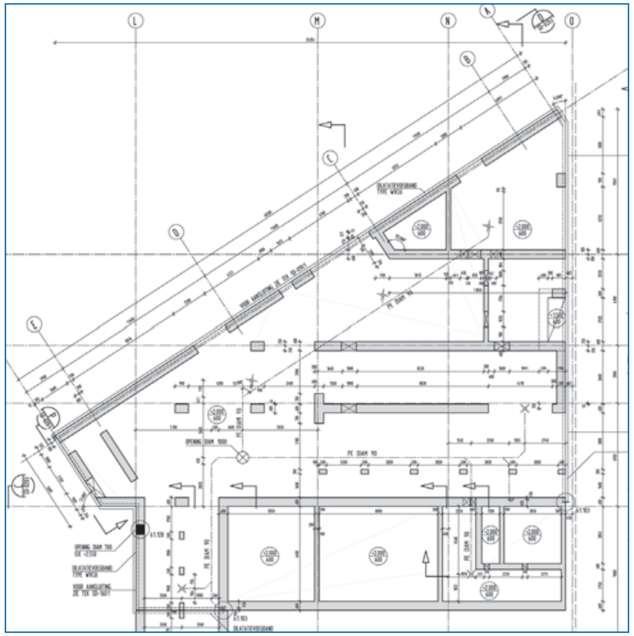
After approval of the dimension drawings the 3D models of rebar are prepared.
From these models the rebar drawings are generated, including bending schedules.

During the project execution we maintain close contact with our office in the Netherlands and with the client. With the client we discuss possible details such as construction joints, bar shapes, splices, cast in items, etc.

Both our offices have excellent knowledge of International standards (Dutch/British/European/American) and more than 30 years experience with civil, marine, industrial and building structures.

In our office in Jakarta we prepare drawings to any international standard or client desired settings for drawings.

Most of our clients are contractors for civil structures such as Ballast Nedam, Heijmans, Koop Tjuchem, Van Spijker and design offices such as HasKoning, IC+E, Oranjewoud.

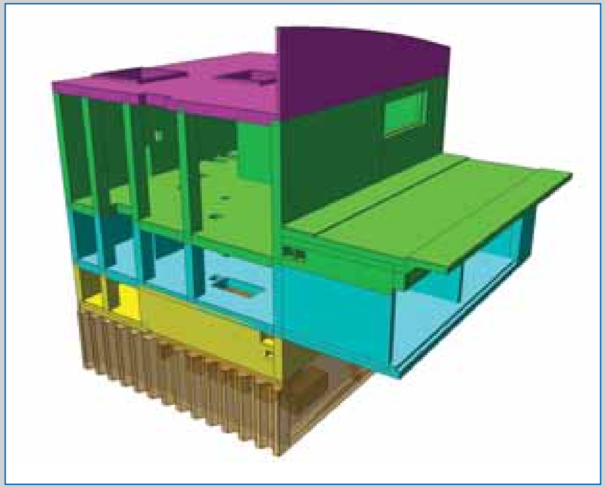


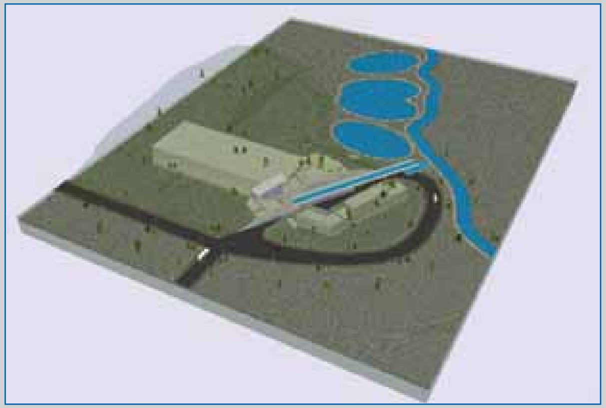
Quote of the jury:

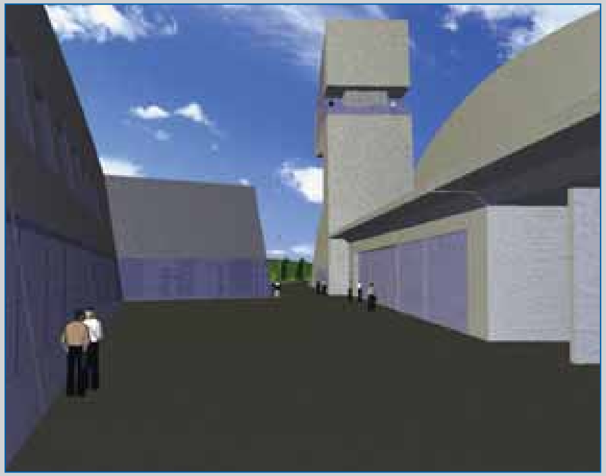
"The concept of the whole project (tower and other buildings) is a good example of the capabilities of Allplan. The project is well integrated in the surroundings. By modelling the structure in 3D, Allplan was used to its extents. The presentation by means of a movie shows the interaction of the construction with the country-side and vice versa."

Used software • Allplan Engineering

Hilversum RWZI







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Introduction

On the outskirts of Hilversum (NL), an area called "Anna's Hoeve" is situated next to a protected park "Goois Natuurreservaat".
The municipality of Hilversum has decided to renovate and intensely clean up this area, in order to provide an area suitable for housing and recreation.

Pollution

The development of this area is very important as it is contaminated to such a high level that soil and water reservoirs (ponds) must be cleaned thoroughly.
If not cleaned, the area is a threat to the people that live there as the groundwater will be contaminated as well.

Housing projects

In the "Anna's Hoeve" area, several housing projects will be realized in harmony with the existing nature. The housing projects will partly finance the renovation and clean up works for this area.

Waste water treatment plant

Also in this area an existing waste water treatment plant will be replaced by a new and modern one. This plant is designed in accordance with the latest technology for waste water treatment, so more space for housing is left.

Recreation

With new sport facilities and places for recreation in a well designed landscape, future residents will find themselves in an agreeable environment.

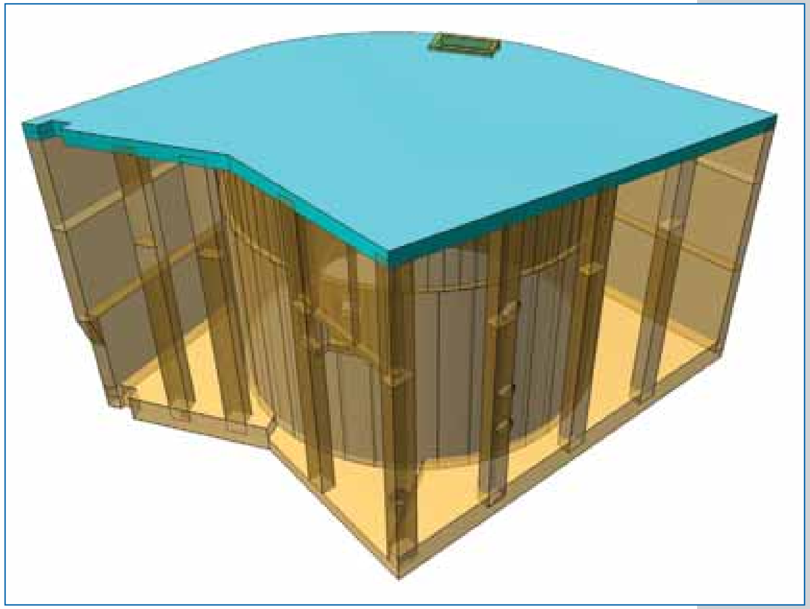
RWZI Hilversum

The department for research and projects of Waternet has designed a modern waste water treatment plant. The civil structures of this project are designed by Royal Haskoning and Snelder architects.
As a result, a set of 2D contract drawings has been issued for detailing.
Assigned by Royal Haskoning, SC Engineering BV and PT Baja Engineering Indonesia have prepared 3D models of the concrete structures and dimension drawings for the construction with Allplan Egineering.

The 3D models were made to facilitate 3D calculations with SCIA • ESA PT. Here we followed the comprehensive instructions from the client, so the 3D models of the structures could successively be used in the SCIA • ESA PT software.

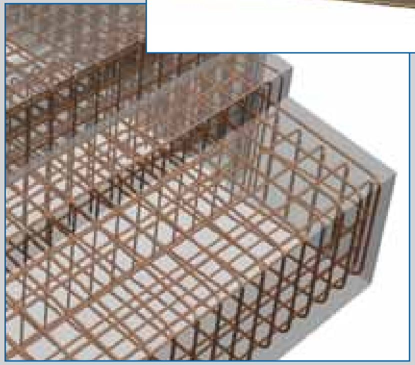
The waste water treatment, the so called "membrane bioreactorship", is conducted inside large concrete structures. This complex of structures is placed inside a hill. Only the control tower is exposed.

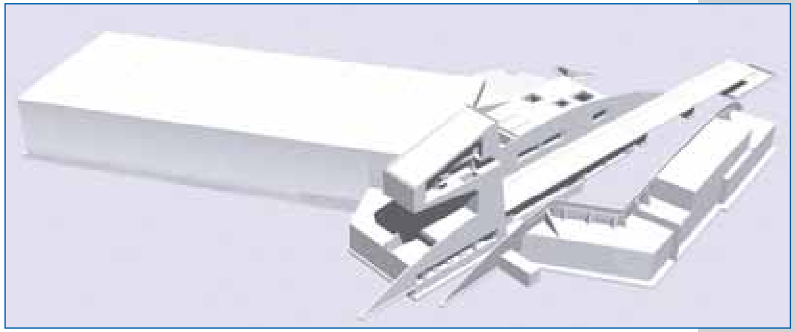
The results of the calculations will be used to automate rebar design with Allplan Engineering again.

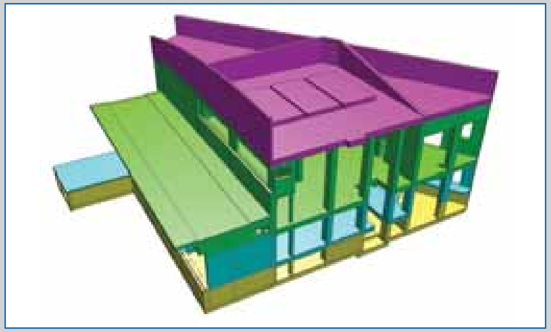


Waste water treatment plant in Hilversum

Assigned by Dutch design office Royal Haskoning, SC Engineering BV and PT Baja Engineering Indonesia have designed 3D models and dimension drawings of a modern waste water treatment plant in Hilversum (NL).
The client used the 3D models to prepare structural concrete calculations in 3D with SCIA • ESA PT.
The dimension drawings are prepared for construction.
After the calculations are finalized the results will be used to automate rebar design with Allplan Engineering.







ADEM

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adem
Bureau d'études

NOMINATION NOMINATION NOMINATION NOMINATION

ADEM Bureau d études - Profil

ADEM est un bureau d'études pluridisciplinaire à la fois actif tant dans les investissements privés et industriels que publics.

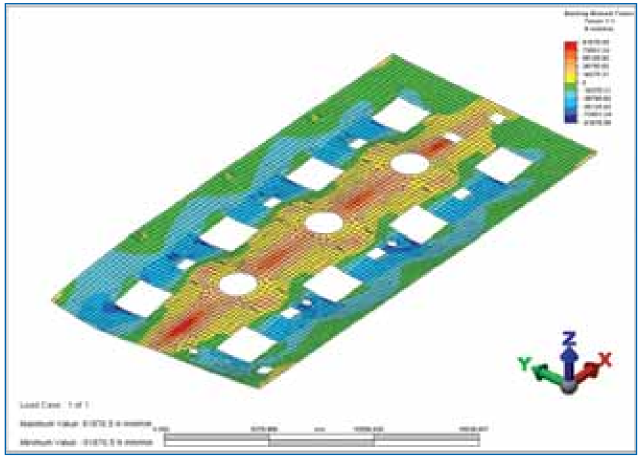
ADEM a acquis au fil des années d'expérience une maîtrise très importante des calculs complexes et des processus d'optimisation, quels que soient les matériaux utilisés (acier, béton, bois ...) et les codes de référence.

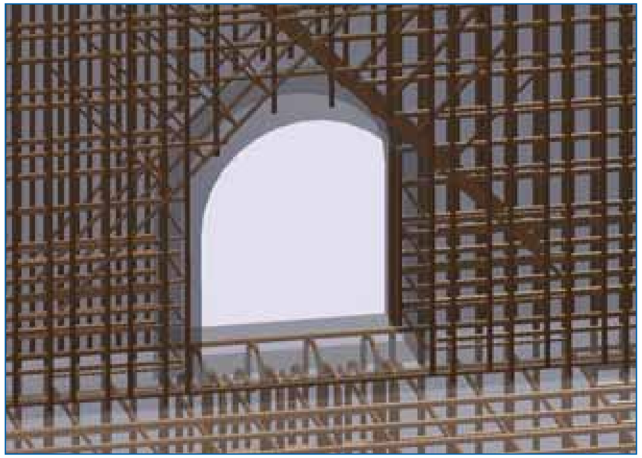
Startup issue de la Faculté Polytechnique de Mons, ADEM est constitué principalement d'Ingénieurs civils Architectes et Mécaniciens, ses activités principales sont la maîtrise d'œuvre de projet de construction au sens large et de conception d'installations industrielles.

ADEM intervient ainsi directement pour des Maîtres d'ouvrage ou en sous-traitance de bureaux d'architecture ou d'ensemblier.

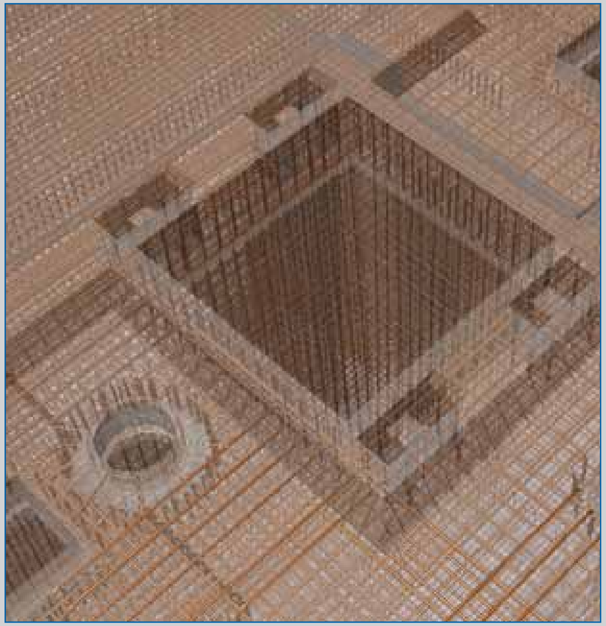
Sa réputation a été établie dans l'engineering de détails tel que le dimensionnement par éléments finis de structures, quelques fois complexes, sous des sollicitations diverses (vibrations, séismes, choc, températures élevées ...).

ADEM compte parmi ses clients autant des grands groupes industriels (SOLVAY, AKZO, HOLCIM, CCB, CARSID...) que des PME et des institutions publiques.





Cuve d'attaque - Maroc Phosphore



Used software • Allplan Engineering

Le projet concerne la réalisation d'une cuve d'attaque pour la production d'acide phosphorique à construire pour la société Maroc Phosphore à Jorf Lasfar au Maroc.

Le projet entre dans le cadre d'un revamping de la plupart des unités d'acide phosphorique du Groupe OCP, permettant d'augmenter sensiblement leur capacité de production

La mission de Adem comprenait le dimensionnement et la réalisation des plans de coffrage et ferraillage pour le compte de SNC Lavalin Europe.
La cuve d'attaque est en fait une cuve de réaction chimique. Le procédé de fabrication consiste en l'attaque du phosphate minéral par un acide fort (acide sulfurique).

La forme générale de la cuve est un parallélépipède rectangle dont les dimensions sont : longueur = 31.4 m ; largeur = 14.0 m ; hauteur = 10.8 m. La cuve comporte des cloisons intérieures divisant le volume en 8 compartiments. L'épaisseur des voiles varie de 40 cm à 60 cm de béton auquel s'ajoute un revêtement de protection anti-acide constitué d'une maçonnerie en carbone. Le volume total de béton est égal à 1022 m³ pour un poids d'armatures d'acier de 228 tonnes (soit une densité de 220 kg/m³).

De façon à permettre les dilatations thermiques, la cuve est simplement posée sur ses fondations.

De nombreux équipements sont nécessaires au procès. Ils sont installés sur le toit de la cuve. Celui-ci comprend donc des ouvertures, rehausses et réservation pour les boites d'ancrage.
Les pentes nécessaires à la vidange correcte s'ajoutent à la complexité de la géométrie.
Cette structure est soumise à des sollicitations assez spécifiques. En plus des charges habituelles de poids morts, charges d'équipements, poussées hydrostatiques et surcharges climatiques, la cuve peut être sollicitées par des actions sismiques et des sollicitations d'origine thermique. Les actions sismiques agissent notamment sur le contenu de la cuve, entraînant des effets de vagues.

Tank for phosphoric acid - Maroc Phosphore

The project is about the realization of a tank for the production of phosphoric acid, it was ordered by the company MAROC PHOSPHORE in Jorf Lasfar (Morocco).
The assignment of Adem included the design and the realization of the plans of the reinforced concrete for the account of SNC Lavalin Europe.
The tank is a chemical reactor with the following dimensions: length = 31.4 m; width = 14.0 m; height = 10.8 m. The tank comprises 8 compartments.
The total volume of concrete is equal to 1022 m³ for a weight of steel reinforcements of 228 tons (reinforcement density = 220 kg/m³).

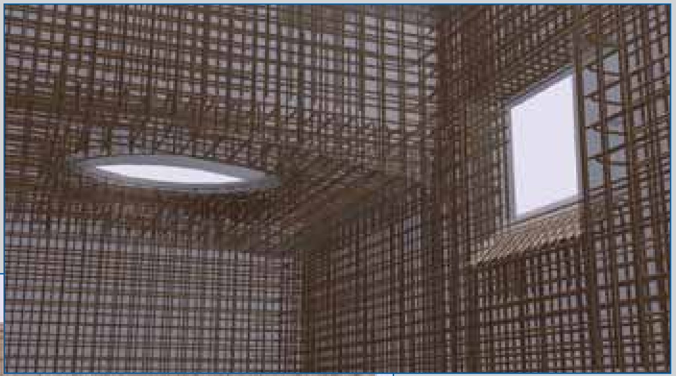
Les actions d'origine thermique sont les complexes à appréhender. Elles sont dues notamment au remplissage par un mélange chaud (40°C) et par l'augmentation progressive de la température jusqu'à 90°C en 24 heures. Le calcul prend en compte la variation de température à travers l'épaisseur des voiles mais également la variation temporelle de celle-ci.

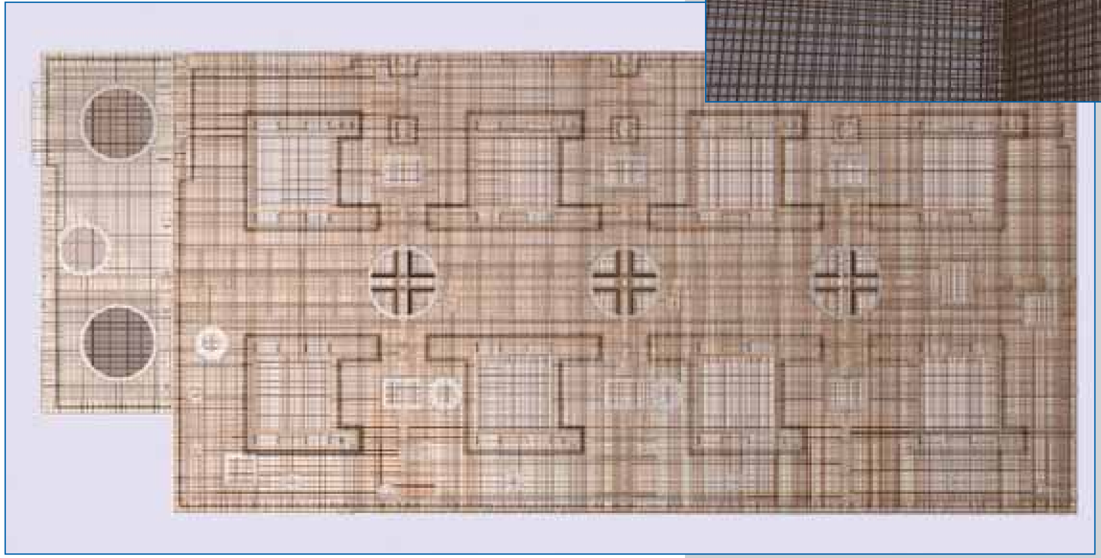
Les calculs des sollicitations ont été réalisés à l'aide de modèles numériques. Les sections des armatures en acier sont déterminées conformément à la méthode des états limites (Règles BAEL91).

Le dessin du béton armé a été réalisé à l'aide du logiciel Allplan. Un modèle tridimensionnel a été réalisé pour représenter le coffrage et le ferraillage de la cuve. Compte tenu de la grande complexité du ferraillage, ainsi que de sa densité particulièrement élevée, le modèle constituait d'une maquette virtuelle apportant une aide appréciable à la conception.

En effet, il s'est avéré assez délicat de disposer l'ensemble des armatures nécessaires pour la reprise des charges. De plus, la difficulté était accrue par les nombreuses ouvertures, pentes et renforcements locaux. Le fait de pouvoir générer dynamiquement n'importe quelle coupe dans le modèle de coffrage constitue une aide particulièrement importante.

Pour le bureau Adem, il s'agit d'une expérience inédite pour l'étude de ce type de structure. Les études de ces cuves, assez particulières, étaient jusqu'alors réalisées par des outils 2D. Par rapport à ces études réalisées dans le passé, l'utilisation de Allplan a apporté une très grande précision, et une grande facilité de production des plans d'exécution ainsi que des bordereaux des aciers.





DECOMO

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DECOMO architectural precast concrete

One Coleman Street

One Coleman Street

The Decomo Ltd's Project at One Coleman Street, London, in the heart of the city's financial centre, is both unusual and striking in appearance. The building was designed by David Walker Architects in association with Swanke Hayden Connell and is ovoid in shape.
It is realised in polished Precast Architectural Concrete columns and spandrels.
The building clearly has its own impressive identity, but it is still very much in harmony with its surroundings.

Located in Mouscron (Belgium), S.A. DECOMO is a member of RVM-Group that specialises in the design and production of pre-cast architectural concrete. Decomo maintains a strict quality philosophy and has been ISO 9001 (version 2000) certified since 1993. Decomo also holds the Belgian SME production certificate, is BENOR-approved and complies with the requirements of the German "Baustoffüberwachung".

The company has established an organised business network in six European countries (Belgium, the Netherlands, Luxemburg, France, Germany and the United Kingdom). Just recently, Decomo landed its first contract in Moscow; a prestigious building project in the town centre of Moscow.

Decomo has a large production capacity, enabling it to respond perfectly to the most exacting of quantity requirements and delivery dates.

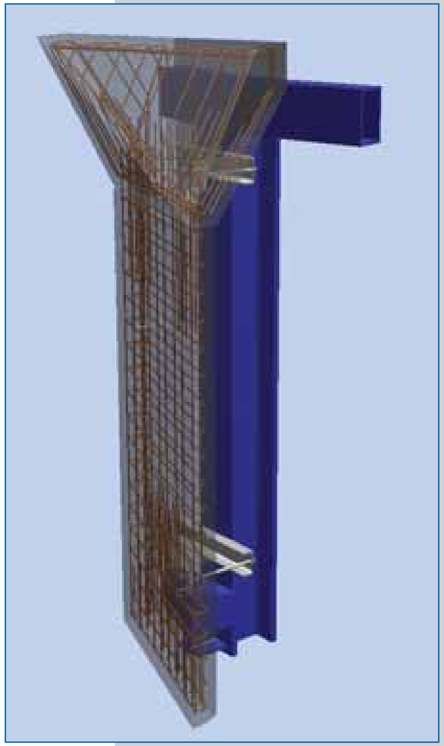
Decomo can provide customised, prefabricated concrete elements that can be single or double-skinned, structural or decorative. With regard to the finishing, a full range of architectural concrete: smooth, washed, acid etched, sandblasted or polished is offered. Brickwork, tiles and slabs of natural stone, also can be incorporated as a finish to the panel. In addition to cladding panels, Decomo also manufactures columns, beams, balconies, stairs and landings, both practical and aesthetic in purpose.

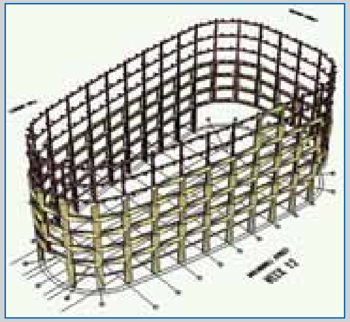
All elements are manufactured in a workshop under the best possible conditions, fully finished, inspected and delivered to the construction site on a just-in-time basis. With architectural concrete it is possible to produce and erect high-quality elements in a relatively short period of time.

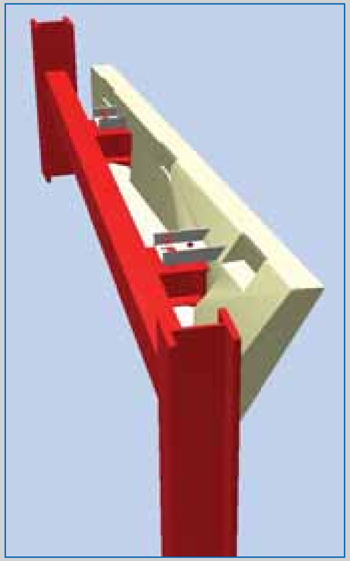
With regard to weight and dimension, Decomo offers a complete range of possibilities:

- Production of individual elements to 16 tons (exceptionally even up to 22 tons);
- The size of the elements is limited by transport:
  - Transport on flat trailers up to 13 m in length (max. width: 2.55 m);
  - Up to 3.70 m in height for panels of max 8 m in length.

If desired, the elements can be assembled and post-treated by Decomo.







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Used software • Allplan Engineering & Allplan Precast

One Coleman Street

The Decomo Ltd's Project at One Coleman Street, London, in the heart of the city's financial centre, is both unusual and striking in appearance. The building was designed by David Walker Architects in association with Swanke Hayden Connell and, on plan, is ovoid in shape. In keeping with many of the surrounding buildings, the original design, visualised the use of natural Portland Stone or Reconstructed Stone. The final solution, however, actually incorporates quite deeply ground and polished Precast Architectural Concrete columns and spandrels resulting in a more prominent degree of aggregate exposure. Whilst the building clearly has its own impressive identity, it is still very much in harmony with its surroundings.

During 2005, representatives of the Client, along with key members of the Design Team, visited a number of specialist Precast Architectural Concrete Companies and their respective facilities both in the UK and on the Continent. The purpose of these visits was to find and select a 'Partner' who was able to provide the technical expertise and manufacturing quality required on such a prestigious Project.

Decomo, clearly, 'fitted the bill' and was proud to have been awarded the order for the works. In arriving at their final selection, the Client and Design Team, placed much emphasis, not only upon the Company's overall expertise and reputation for quality, but, in particular, upon the level of confidence, which they had felt, in Decomo's ability to interpret the complexity of the building's geometry and to develop this into a practicable and effective solution.
At the core of this feeling of confidence were the demonstrable capabilities of Decomo's, in-house' Design Office and their use of the AllPlan drawing programme. This was used to 'crack the geometrical code' and to produce a 3-Dimensional simulation of a typical bay on the building.

Once the Project got underway, much hard work and many meetings were required in order to translate the whole of the building into a complete 3-Dimensional model, thus ensuring that all lines, angles and interfaces could be accommodated, within the design and detailing, without mistakes and oversights, and that once, on site, the 'pieces of the puzzle' could be fitted together without problems. This especially applied to the steel backing structure, which was also modelled in 3-Dimensions to highlight any potential clashes with the rear faces of the Precast components and to avoid these within the final design/detailing.
In all, the interesting shape of the building, together with the complex angular geometry of the individual elements, meant that, of the 425 No units, no single element was repeated more than six times. The largest elements were the 'double storey' columns, which were over 6.5 Metres high and weighed over 7.5 Tonnes.
Each element type had to be detailed on 'Production' drawings, from which they were manufactured in Decomo's factory. These were produced by, again, utilising the global 3-Dimensional model and 'lifting off' the individual components and creating fully dimensioned sections and views. The reinforcement design also had to be incorporated and, here, the All Plan programme proved invaluable. As the bending schedule is automatically generated, by the programme, the unique shapes required for the bending of links and the like could be clearly and accurately shown, without the need for the draughtsman spending much time on lengthy and tedious calculations, which could be prone to error.

The Allplan programme was also used to create information incorporated into presentations, given by Decomo, to the Project Team to demonstrate how the components would be transported and installed.

For the manufacture of the components, Decomo had to design and develop adjustable moulds that could be adapted for the casting of each element. The steel moulds consisted primarily of two main bottom shutters that could be fixed on a sub-frame in varying positions and planes to suit the unique angular geometry of the individual elements.

Once cast, the components were ground and polished in the main Decomo's automated polishing machines. Where necessary, small areas were finished using hand-held equipment. The Company also developed special rotisserie-like revolving frames to hold the components perfectly vertical or horizontal during polishing: this was critical to ensure consistency in the depth of grinding/polishing and hence uniformity of appearance.

The shape of the building, coupled with the individuality of the precast elements, placed much emphasis on the importance of accurate setting out and positioning of the units on the structure. This was carried out by erection specialists PCE Ltd, on Decomo's behalf, using an 'EDM Total Station' working to coordinates generated by the Allplan programme.

After installation, which was completed ahead of programme, the position of each element was checked relative to allowable tolerances, as was the width of each unit to unit joint. Following these checks, final grouting of connections took place and sealant works were undertaken.

Comprehensive procedures were put in place for recording and hand over of the 'as built' situation appertaining to each window opening and this information was passed on to the glazing subcontractor for whom Decomo had cast fixing inserts into the units. A minimum period of 21 days was required from sealant application to installation of the windows to allow for curing of the sealant prior to loads being applied to the precast units.

Decomo UK Ltd is very pleased to have been associated with this most prestigious building, which they firmly believe exemplifies exactly what can be achieved with the use of Architectural

Concrete, when initial vision and coordinated design development, with a specialist sub-contractor, combine at an early stage in a project.

Decomo UK Ltd's works were completed ahead of programme and without the occurrence of any unforeseen problems, either within the fabrication or the, on site, installation of the components. This was due, in no small part, to the benefits of using the Allplan programme in the interpretation, design and detailing of Decomo's works package.

Client: Stanhope plc
Architects: David Walker Architects Ltd/Swanke Hayden Connell Architects
Engineer: Arup Façade Engineering
Contractor: Bovis Lend Lease
Precaster: Decomo Ltd
Erector: PCE Ltd

Witteveen+Bos

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Witteveen+Bos project specialists

Reliable, professional, innovative and friendly: these are the four characteristics that qualify Witteveen+Bos, the consulting engineering company that has been involved with innovative and high-profile projects in the Netherlands and abroad for more than sixty years. Witteveen+Bos supplies consulting and engineering services for projects in the water, infrastructure, environment and construction sectors. Typically we use a multi-disciplinary approach where specialists from various sectors work jointly on the solution of complex assignments.

Clients

Our clients are governments, commerce, industry and various types of joint ventures. We serve them from eight branches in the Netherlands and five abroad (Indonesia, Kazakhstan, Latvia, Romania and Serbia). Our 700 employees are all specialists who are able to deploy all their expertise in their work. For us, partnership is the keyword. Personal and fundamental development are also key issues, because our work continually calls for new knowledge and new responsibilities.

Specialisms

The collaboration between specialists and the pooling of knowledge, experience and management expertise provides our clients with substantial added value. To enable us to continue to guarantee this added value we make substantial investments in the development of our employees' expertise. This is the only way we can realise our ambition: to be at the top of the market.

High-profile projects

Examples of high-profile projects where Witteveen+Bos has been involved are the North/South metro line in Amsterdam, the development of man-made islands for oil and gas winning in the Caspian Sea, land reclamation in Indonesia, the Amsterdam-West sewage water purification project, construction of the Delft railway tunnel, development of systems to allow the passage of fish alive at pumping-stations, the master plan for the centre of Amsterdam International Airport, creating space for the River projects, various large and diverse contracts in Central and Eastern Europe and a large number of other projects in the Netherlands and abroad.

Innovation

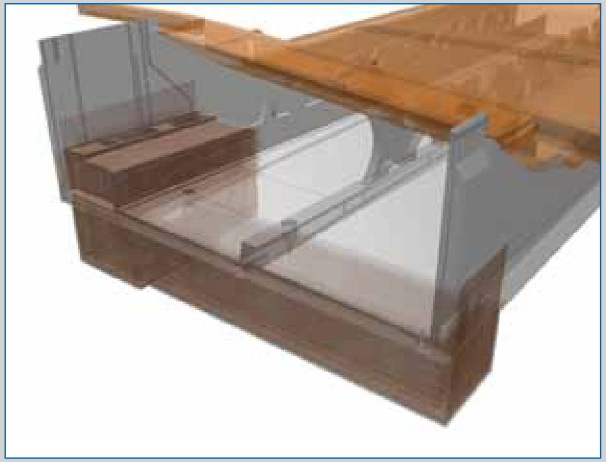
Innovation in projects has been one of the most important foundations of the success of Witteveen+Bos. A few examples of innovative developments are the social costs and benefits analysis, 'Charted Dutch safety levels', 'Partners for Roads', UV water treatment in Andijk and Berenplaat and the decontamination of soil at railway yards.

Realisation Geeuwaquaduct Sneek

The structural 'Geeuw' project is divided into ten subway sections, one water cistern, two prefab traffic viaducts, one railway viaduct and one aqueduct with the connecting pieces and caps.
The subway will consist of U-shaped concrete troughs for the two access roads and a closed section with at least 2.2 m depth of water from the river Geeuw running over it. Close to the deepest point of the aqueduct, a rainwater cistern will be constructed. The concrete cellar will be divided into a wastewater section, from which the water will be pumped to the sewage system, and a rainwater section from which the water will be pumped to the river Geeuw during heavy rain. Both viaducts over the western access to the aqueduct will consist of inverted prefab T sections with a cast-in-situ compression zone.

Used software • Allplan Engineering

Realisation Geeuwaquaduct Sneek



Introduction

Anyone driving from Heerenveen to the Afsluitdijk over the A7 will discover that Sneek is still a considerable hindrance - the A7 motorway is interrupted by a 4-kilometre stretch of the N7 bypass to the south of Sneek. This situation will last until mid-2008 when the last section of N7 will have been upgraded to the A7 motorway.

The eastern half of this southern bypass section will be upgraded over the existing route. About midway along the existing N7 section, the river Geeuw, the railway line from Sneek to Stavoren, the arterial road Sneek-IJlst and a dikeroad will be crossed by the route of the new A7 motorway. In this new situation there will be an aqueduct under the Geeuw, at which over the access road on the west side viaducts will be constructed for the railway, the Sneek-IJlst road and in addition a local road that runs over the Alde Himdyk. The western half of the new A7 branches away from the existing N7 from the aqueduct and goes round the business park De Hemmen for which there are expansion plans.

Geeuw project

The structural Geeuw project is divided into ten subway sections, one water cistern, two prefab traffic viaducts, one railway viaduct and one aqueduct with the connecting pieces and caps. All in-situ concrete structures were detailed by Witteveen+Bos. The detailing for the railway viaduct was carried out by TCE (Transport Consultant and Engineers), see previous page.

Subway

The subway will consist of U-shaped concrete troughs for the two access roads and a closed section with at least 2,2 m depth of water from the river Geeuw running over it. Where possible at the ends of the two access roads a change will be made to a sheet (plastic) construction that will be built above water level at a maximum excavation of approximately -7 m below NAP (Normal Amsterdam Water Level). This transition will be determined by the bursting criterion of the reasonably well sealing layer of loam in the subsoil, which occurs between approximately -20 m and -16 m NAP.
Screw injection piles will provide the foundation for the concrete construction that supports the structural floor. An underwater concrete floor will be used in the deepest section of the tunnel due to this bursting criterion. This will also be retained by the screw injection piles. The concrete construction will consist of 10 sections, of which the middle two will comprise the closed tunnel section. A steel cover plate will be placed over the section joints of the closed section to protect it from being damage by ships' anchors.
The floor and wall thicknesses of the U troughs will vary with the depth from 0,50 to 1,10 metres. The closed section will have a floor and wall thickness of 0,80 m and a roof thickness of 0.65 metres.
The sheet sections will use 1,5 mm HDPE. In addition to the top sheet constructions at the two ends of the access, sheet constructions will also be used on both sides of the four eastern concrete sections. This is intended to keep the concrete outer walls low and to create an open view.

The entire subway will be constructed inside sheet piling walls; large sections in a temporary polder construction. Consideration was given to making (partial) use of permanent polder constructions, but pumping tests showed that the degree of sealing of the layer of loam was insufficient for this and that also relatively salty seepage water was to be expected.

Water cistern

Close to the deepest point of the aqueduct, a rainwater cistern will be constructed for both the concrete and the sheet constructions. The concrete cellar will be divided into a wastewater section, from which the water will be pumped to the sewage system, and a rainwater section from which the water will be pumped to the river Geeuw during heavy rain. There will be an overflow between the two cistern sections with a screen to catch floating materials to prevent any possible floating oil or waste reaching the Geeuw.

Viaducts for road traffic

Both viaducts over the western access to the aqueduct will consist of inverted prefab T sections with a cast-in-situ compression zone.

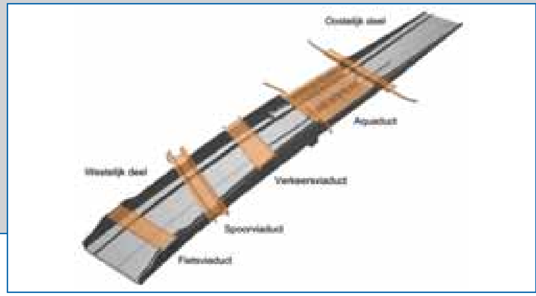
Project strategy

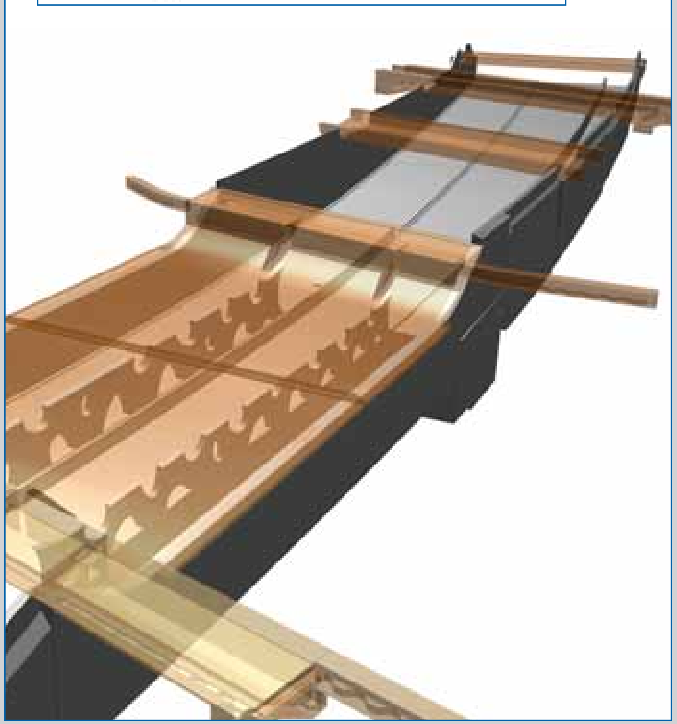
The detailing of the in-situ concrete structures included the modelling (dimensioning) and reinforcement of these sections in Allplan and subsequently making the working drawings, for which translation from 3D to 2D was required. Of the ten sections, the four most easterly sections are straight and the remaining six sections are curved, both in their vertical and horizontal axes. This made the modelling particularly difficult. A so-called bridge and tunnel modeller that could handle this type of twisted section was used for this. This module made it possible to make the model with great accuracy. This was advantageous when the detail drawings were made. However complex the shape, every cross-section made is precise and you do not have to worry about the model anymore. You just have to concentrate on the layout of the detail drawings. The quality of the final product is thus many times greater, because there are no mistakes in the cross-sections.
Furthermore, immediate insight is provided into areas of conflict that arise during the modelling of the aqueduct. A solution can be found promptly, because conflicts arising in a detailed design can be quickly visualised. Modifications can now be made during the design process, while formerly in many cases these would not have been discovered until construction, leading to potential delays and extra costs.

At the time of writing this article the project is still under construction. Reinforcement of the aqueduct is being done at the moment. This is being done per section in conformance with the contractor's construction plans. The reinforcement for the water cistern, which is located at the deepest point, has already been placed. The working drawings for this part have been completed and are ready for the construction.

Project technical data

Project name: Construction of Geeuw aqueduct Sneek
Principal: The Province of Friesland
Location: Sneek
Length: 239,24 m
Width: int. 23,85 m
Quantity of concrete: approx. 8750 m³
Quantity of steel reinforcement: approx. 1.170.000 kg





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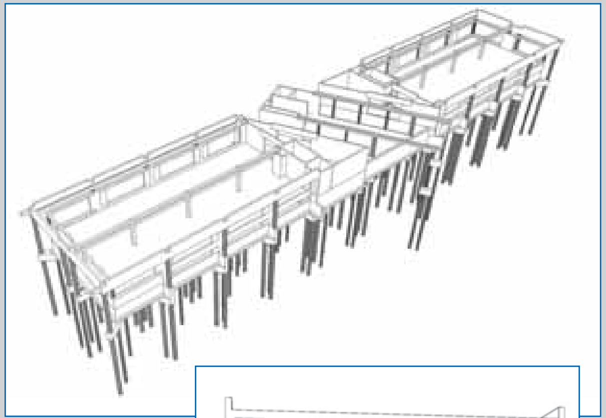
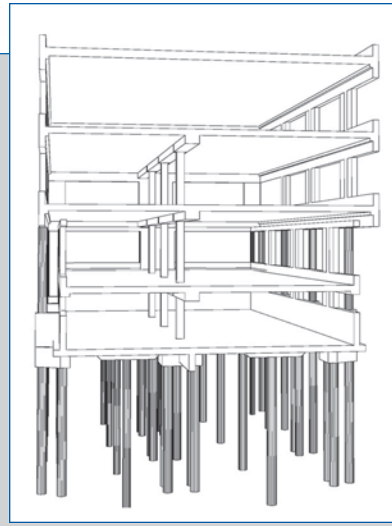
Bureau d'études

Espace Wallonie Picarde





ADEM Bureau d études - Profil

ADEM est un bureau d'études pluridisciplinaire à la fois actif tant dans les investissements privés et industriels que publics.

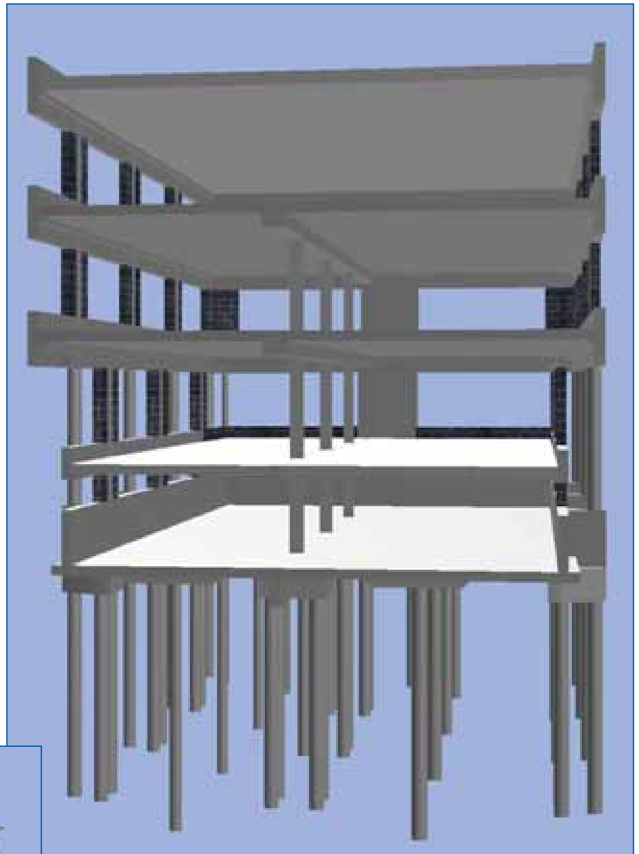
ADEM a acquis au fil des années d'expérience une maîtrise très importante des calculs complexes et des processus d'optimisation, quels que soient les matériaux utilisés (acier, béton, bois ...) et les codes de référence.

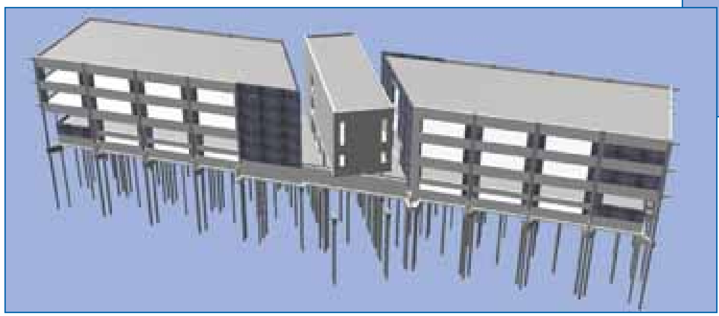
Startup issue de la Faculté Polytechnique de Mons, ADEM est constitué principalement d'Ingénieurs civils Architectes et Mécaniciens, ses activités principales sont la maîtrise d'œuvre de projet de construction au sens large et de conception d'installations industrielles.

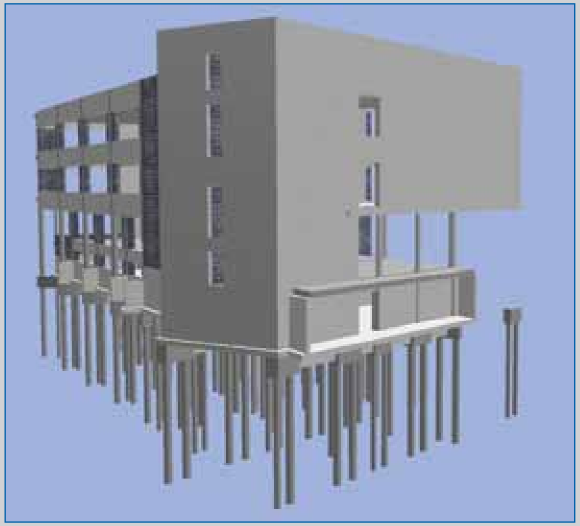
ADEM intervient ainsi directement pour des Maîtres d'ouvrage ou en sous-traitance de bureaux d'architecture ou d'ensemblier.

Sa réputation a été établie dans l'engineering de détails tel que le dimensionnement par éléments finis de structures, quelques fois complexes, sous des sollicitations diverses (vibrations, séismes, choc, températures élevées ...).

ADEM compte parmi ses clients autant des grands groupes industriels (SOLVAY, AKZO, HOLCIM, CCB, CARSID...) que des PME et des institutions publiques.







Used software • Allplan Engineering

Symbole de la nouvelle dynamique régionale, l'Espace Wallonie Picarde permettra aux différents acteurs du développement territorial d'y siéger et de s'y rencontrer.
Situé sur le site de Tournai Expo, cinq millions d'investissements permettront la construction d'un bâtiment de quatre étages de plus de 5600 m². Outre les bureaux, ce complexe comportera une infrastructure modulaire pouvant accueillir diverses réunions et évènements, un auditorium de 100 places, un espace multimédia et des cuisines. Véritable vitrine technologique, ce projet sera aussi pilote en matière d'optimalisation sur le plan des énergies durables et renouvelables.

Le souhait est de loger sous un même toit les organisations et les institutions de la région qui contribuent au développement socio-économique.

La pose de la première pierre est prévue pour le début de l'année 2007 tandis que l'occupation du bâtiment est quant à elle envisagée pour sa fin.

Architecturalement, le bâtiment se veut être une vitrine de la région. Des matériaux d'entreprises locales seront donc utilisés. Le bâtiment est composé de deux ailes dont le plan est entièrement ouvert. Au centre on trouve un élément fort, habillé de pierre bleue, qui sera sans nul doute le point d'accroche de ce bâtiment.

Meeting space Wallonie Picarde

The « Espace Wallonie Picarde » will be the regional symbol of the new economy of the construction sector and the place to be for all actors in the local development. It will be able to establish offices in this building or to meet other professionals
Located on the site of Tournai Expo, five millions of investment money will allow the construction of a four storey building of a surface of more than 5600 m².
In addition to the offices, this complex will comprise a modular infrastructure being able to accommodate various meetings and events, an auditorium of 100 places, a multi-media space and kitchens.
This project will also promote durable and renewable energies.
The wish is to place under the same roof the organizations and the institutions, which contribute to the socio-economic development of the area.

Ce bloc de pierre est posé sur deux enfilades de colonnes et se termine par un impressionnant porte-à-faux. L'entrée se fait via cet élément flottant qui regroupe les fonctions évènementielles.

La structure du bâtiment sera réalisée en béton. Les infrastructures, les noyaux centraux et le bloc central reposant sur des colonnes avec un porte-à-faux de plus de 8 m seront réalisés en béton coulé in situ. La superstructure du bâtiment sera quant à elle réalisée en éléments préfabriqués en béton précontraint. Certains remplissages interfaces seront réalisés en éléments silico-calcaire.

L'ensemble sera édifié sur pas moins de 160 pieux. On coulera sur ce site 1000 mètres cubes de béton et on y placera 2000 mètres cubes d'éléments préfabriqués dont 1500 mètres cubes de plancher.
Les plateaux seront très libres puisque la trame structurelle est une maille de 8 m par 8 m sur trois files de colonnes.

La modélisation du bâtiment pour la représentation des études de stabilité a été réalisée avec Allplan 2006. Les plans sont établis avec le module architecture. Le logiciel au-delà du dessin permet de décrire clairement les éléments selon leur type de réalisation. Les isométries et vue en 3D permettent de comprendre aisément la réalisation du bâtiment et permet une meilleure lisibilité pour les entreprises.

Il est possible de fournir à chaque corps de métier une vue des éléments qu'il doit réaliser. Les plans, qui sont avant tout un outil de communication, sont illustrés d'axonométries. Les détails les plus complexes peuvent ainsi être facilement expliqués.

Le fait de le «construire» en 3D a permis également la réalisation du métré en quelques clics.

Pour les éléments préfabriqués, le fait de pouvoir créer des annotations personnalisées a rendu la création du plan plus aisée et permet de lier à chaque élément son numéro d'identification, sa section, hauteur et position.

Le module ingénierie permettra par la suite, sur cette base 3D, de réaliser les plans de ferraillage des éléments coulés in situ.

La vitesse de concrétisation d'idées grâce au logiciel utilisé est exceptionnelle.

La hauteur libre du premier étage a du être augmentée en cours d'étude, l'utilisation des niveaux de référence a permis en une seule manipulation de faire ce changement en 3D directement, ce qui modifia également le métré. Un exemple typique de l'utilité de la conception orientée objet !

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Ar Boudailliez – Ar Michez
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7500 Tournai

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Société fondée en 1986, le Bureau GESPLAN est actif dans les domaines du génie civil, du bâtiment (Immeubles de bureaux, bâtiments industriels, publics et privés) et des infrastructures. Le bureau s'occupe également des problèmes d'environnement, d'égouttage et de voiries.

Gesplan s'occupe aussi de missions de coordination sécurité - santé.

Le bureau comprend actuellement

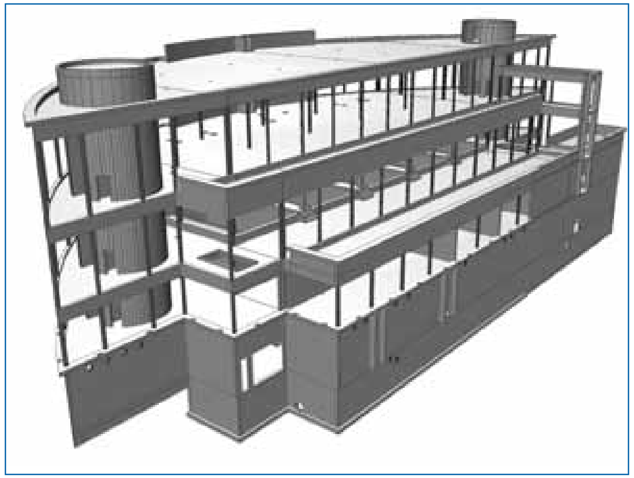
- 1 Ingénieur Civil des constructions.
- 1 Ingénieur Agronome (Génie rural)
- 1 Ingénieur Industriel
- 4 Dessinateurs (gradués en construction)

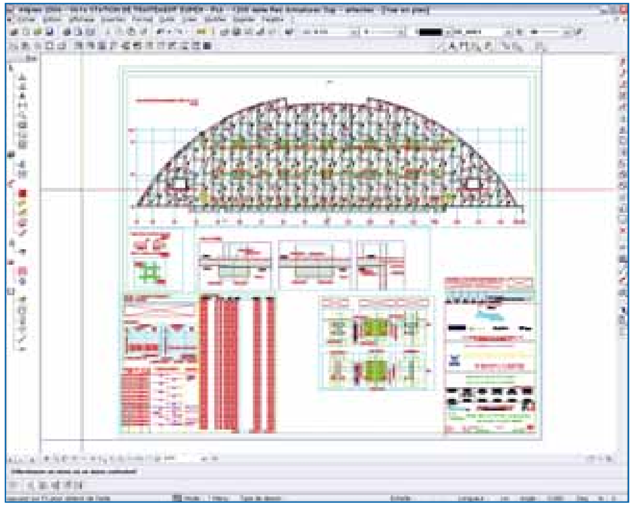
Matériel

- Serveur + Stations de travail P4 + PC Portables – Plotter et imprimantes – Tireuse de plan – connexion Internet ...

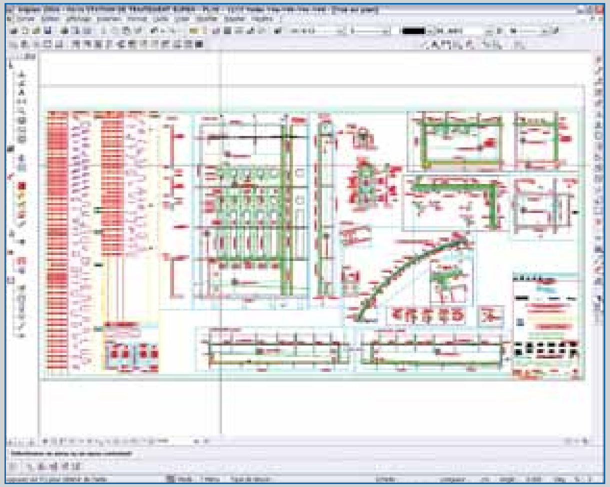
Références

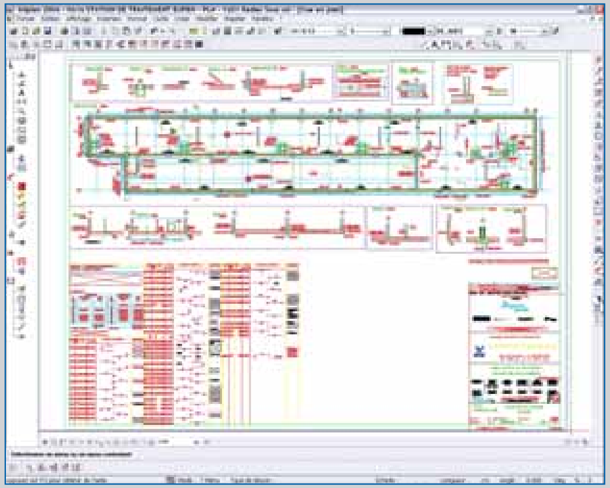
- Chimac Agriphar (Immeuble de bureaux).
- Banque Nationale d'Arlon.
- Immeuble de bureaux + hall de stockage - S.W.D.E. (Liège).
- Batiments justice place St Lambert à Liège - etude realisee en association (aml3 Liège) - Régie des Bâtiments.
- Plusieurs station d'epuration.
- Fondations de machines et halls industriels.





Station de Traitement des eaux de Eupen (SWDE)





Used software • Allplan FT, ESA-Prima Win

Chantier d'aménagement des stations d'épuration d'eau potable à Eupen et Stembert

Il s'agit d'un investissement de 40 millions d'euros à charge de la SWDE (Société Wallonne de Distribution des Eaux) destiné à améliorer la qualité de l'eau de distribution.

L'objectif de ce projet est de diminuer le taux de matières organiques (présents dans l'eau) en améliorant la filtration. Cette filtration supplémentaire (Nanofiltration) est réalisée grâce à des membranes percées de trous d'un diamètre de l'ordre du millionième de millimètre.
Après cette étape, il est nécessaire de reminéraliser l'eau sur des filtres à sables.
La capacité pour ces 2 stations sera de 110.000 m³/jour
C'est l'association Degrémont Suez – Duchêne – Galère – Wust - Balteau qui a obtenu le marché.

Le projet présenté ci-après est le complexe d'Eupen (Extension de la station existante)

La mission de notre bureau d'études (pour le compte des entreprises de génie civil) était de réaliser les plans de coffrages et de ferraillage du bâtiment à partir des plans d'architecture réalisés par la SWDE.

A l'aide du logiciel Allplan, nous avons modélisé le bâtiment en 3D, et réalisé facilement les plans de ferraillage, qui s'avéraient pourtant complexes, surtout dans la zone des filtres.
La structure du bâtiment est la suivante :

- Au sous-sol et rez : La citerne, la salle des pompes, les principales tuyauteries et équipement techniques.
- Au-dessus : 5 nouveaux filtres à calcite.
- Aux étages : la nanofiltration et différents services. Tous les équipements sont en liaison avec les équipements existants.

La décomposition du bâtiment suivant les différents plans de construction, a permis à l'entrepreneur de mieux cerner les phases d'exécution (préfabrications, etc.) et l'élaboration de son planning.

Les travaux ont débuté en mai 2006.
Ils devraient être terminés fin 2008.

L'utilisation des modules suivants a été utile pour la réalisation des plans :

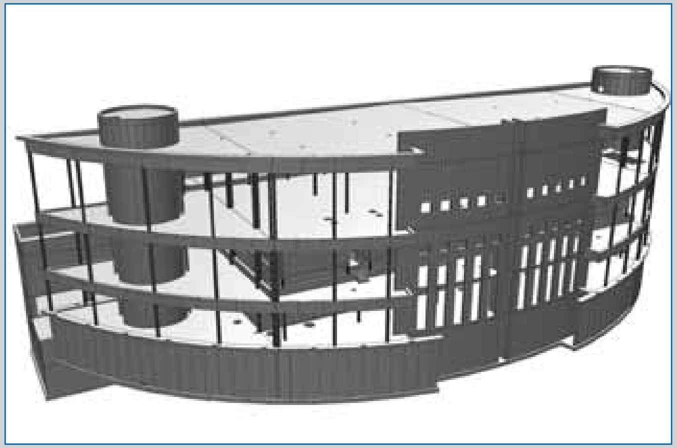
- Tout d'abord les modules d' «Architecture» et de «volume 3D» pour la réalisation du modèle 3D (style de maquette), le premier pour les volumes simples (radier, dalle, voiles, poutres et colonnes), le second pour les volumes plus complexes ou difficiles à modéliser (renfort sous dalle, console ...).
- Ensuite les modules «Vues et coupes», «armature par barres» et «armatures par treillis soudés» pour réaliser le ferraillage en 3D.
- Enfin le module de «mises en page» et les «modules généraux» pour la réalisation des présentations en plans et l'ajout de quelques détails.

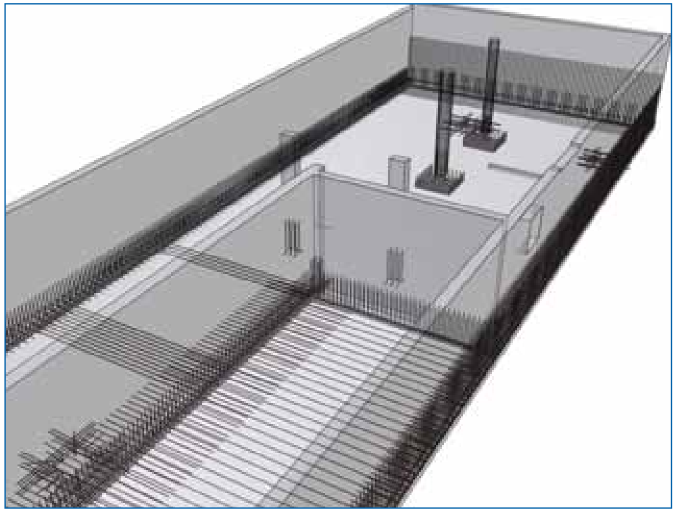
Vu la taille du bâtiment, la division en calques des différents volumes a été nécessaire, ce qui a permis de réduire l'utilisation de la mémoire de l'ordinateur.

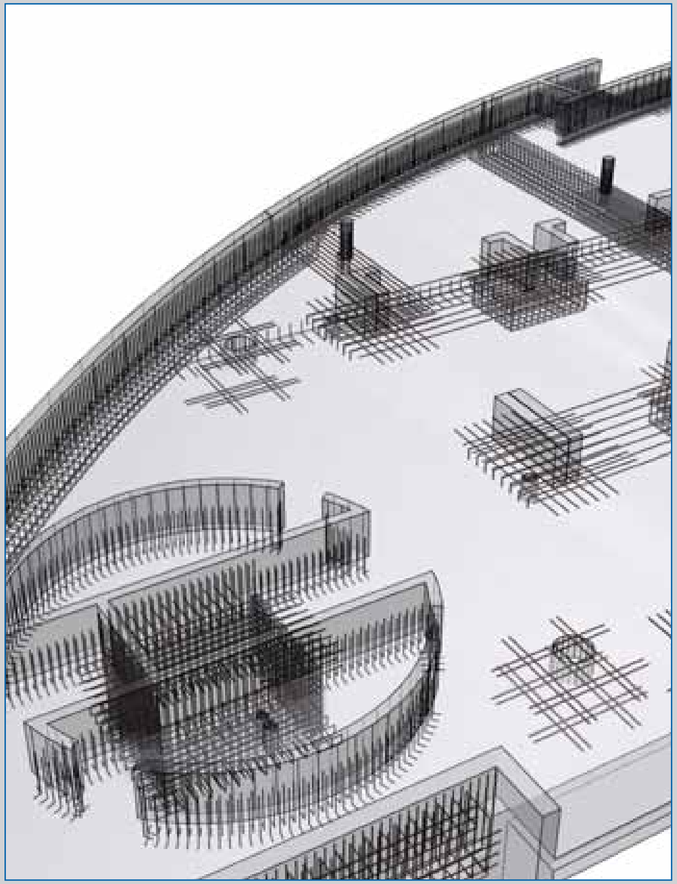
L'utilisation du logiciel Allplan a permis (après quelques réglages et un temps d'apprentissage) de réaliser, dans un premier temps, des aperçus de la structure en 3D (pour une meilleure compréhension du bâtiment) et dans un second temps, des plans de ferraillage complets.

Water treatmant plant in Eupen

The aim is to increase the quality of the water by a system of nanofiltration (membrane filtration).
The modelisation of the whole structure was realised by using Allplan Engineering.
This 3D model also allows the contractor to better manage the planning and the realisation (precast building) of the building work.







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Bassin d'orage à Andenne

INASEP : intercommunale et organisme d'épuration agréé

Activités

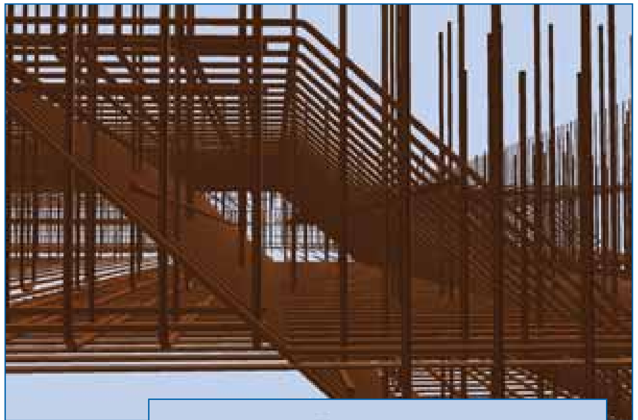
- Collecte et traitement des eaux usées pour les 38 communes (planification, construction et exploitation)
  - Programme d'investissement 2000-2004 suivant DE 91/271: 120 M Euro, + 150.000 EH
- Producteur distributeur d'eau potable pour 10 communes
- Laboratoire d'analyse d'eau
- Bureau d'études de travaux publics (routes, égouttage, distribution d'eau ...)

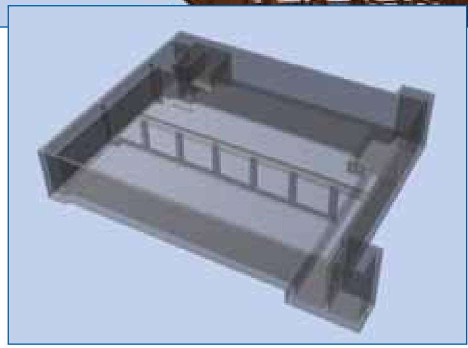
Ressources Humaines

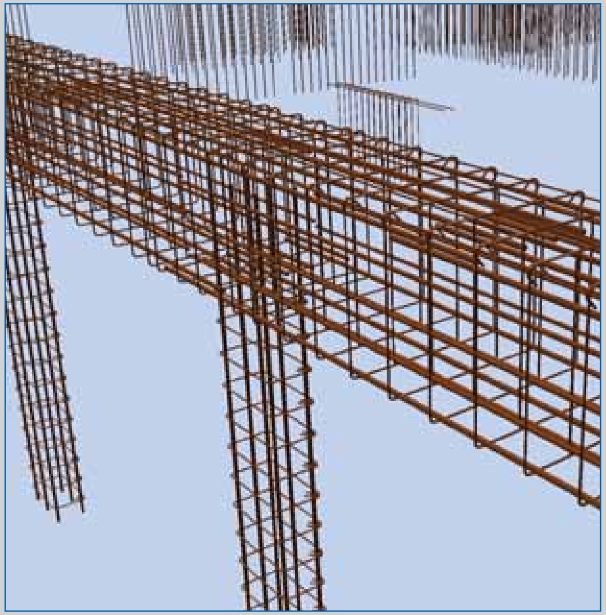
- 236 personnes (2005)
  - 30 ingénieurs
- Exploitation des ouvrages d'épuration des eaux usées : 60
- Service de distribution d'eau : 55
- Laboratoire : 10
- Bureau d'études : 45

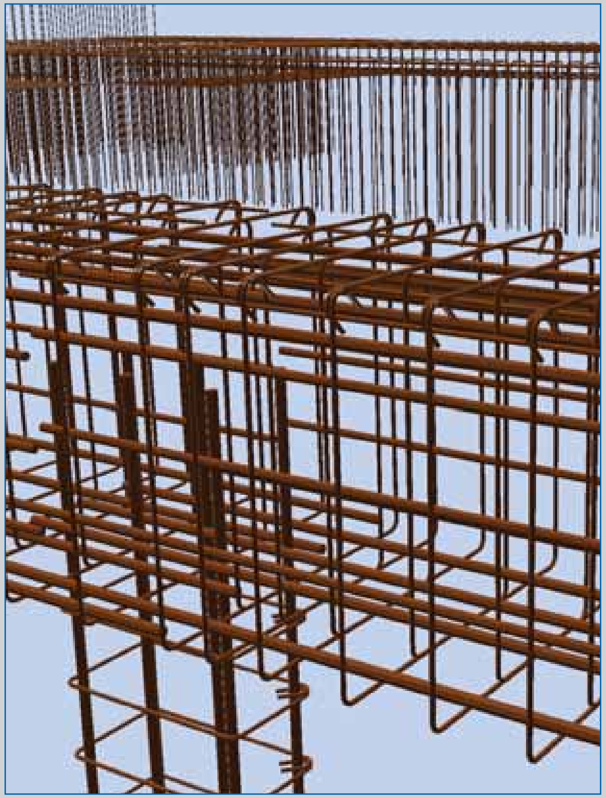
Objet social actuel de l'INASEP

- Epuration des eaux : organisme d'épuration agréé partenaire de la SPGE sur le territoire de la Province de Namur (38 communes)
  - Planification, études de conception et réalisation de nouveaux réseaux et stations d'épuration par programmes quinquennaux
  - Exploitation actuelle (2003) de 85 st.ép., 60 s.pomp. Et 225 km de collecteurs pour 172.500 EH de capacité, soit environ 12.500.000 m³ /an d'eau usée traitée
  - Intervention comme constructeur d'égouts financés par la SPGE et les communes dans le cadre des contrats d'agglomérations
- Distribution d 'eau en zone rurale : 33.000 abonnés (11 communes)
  - Production, adduction, distribution de 2.700.000 m³ /an
- Services aux associés (36 communes affiliées)
  - Bureau d'études d'équipements publics : voirie, égouts, bâtiments...
- Laboratoire d'analyses agréé (38 communes affiliées)
  - Contrôle interne
  - Service au public (anc. Institut provincial d'hygiène public)









Used software • Allplan Engineering

Bassin de stockage et de décantation des eaux d'orage sur le collecteur de Seilles

Objectifs

Afin de minimiser l'impact d'un événement pluvieux sur le milieu récepteur et les problèmes sur le collecteur lors des débordements d'égouts, nous avons prévu un décanteur d'orage constitué de deux bassins.
Ces bassins sont prévus à un endroit où se joignent deux égouts de diamètre 800 mm et le collecteur amont de Seilles et de Landenne de diamètre 400 mm.

Dimensionnement du bassin de décantation

Le bassin de décantation a été dimensionné pour reprendre toutes les eaux du collecteur, des quartiers de Monthessal, du Gouverneur et du Moulin pour une période de retour de 10 ans.
Un premier bassin de reprise des eaux usées d'un débit max. de 180 l/s pour un stockage de 150 à 120 m^3 et pour un débit sortant de 60 l/s est prévu. Ce qui correspond à un stockage de 16 minutes de 20 Q18. Les 20 Q18 correspondant, pour les agglomérations à forte population, au débit polluant à traiter.

Un deuxième bassin de 650 m^3 sera prévu pour les débits supérieurs à 20 Q18 afin d'éviter les problèmes d'engorgement du réseau d'égout en amont, et récupérer dans le réseau d'eaux usées la décantation de ces eaux.

Disposition de l'ouvrage

Le bassin de décantation sera divisé en deux .

Le premier bassin de 150 m^3 est prévu pour les eaux de début d'événement pluvieux supérieur à 10 Q18. Les eaux du collecteur amont y sont stockées et décantées ainsi que les eaux venant des deux égouts collectés mais avec une limitation à 180 l/s, ce qui correspond à 20 Q18. Les eaux contenues dans ce bassin s'évacuent à un débit limité à 60 l/s vers le collecteur aval (diamètre 400 mm) et retournent ainsi vers la future station d'épuration en étalant l'effet de la pluie, ceci permet de limiter le diamètre du collecteur et de limiter la pollution des débuts d'événement pluvieux sur le milieu récepteur.

Si l'événement pluvieux devient plus important, un trop-plein de débordement envoie les eaux vers un bassin de décantation et de stockage de plus grosse capacité de 650 m^3. Ce bassin permet la décantation des eaux supplémentaires qui sont très chargées par le curage des surfaces imperméables et du collecteur. L'évacuation des eaux de ce bassin se fait vers la Velaine à un débit limité à 60 l/s de manière à limiter le problème d'engorgement des égouts en aval et assurer la décantation des eaux stockées. Un trop-plein de sécurité est toutefois prévu en cas de débit trop important (by-pass du limiteur de débit par débordement haut).

Evacuation des sédiments

Lorsque l'événement pluvieux est terminé et que l'évacuation des eaux usées reprend son cours normal en passant par le premier bassin de décantation, un système de rinçage par vague déferlante nettoie les matières décantées dans les deux bassins et les envois vers le collecteur aval afin que la pollution s'évacue vers la future station d'épuration pour être traitée. De plus, ce système de rinçage évite en assurant la propreté de l'ouvrage le développement d'autres nuisances telles qu'odeurs, développement de bactéries,...

Le Système de rinçage se fera par réservoir sous vide :
Ce système est basé sur le principe de la constitution d'une réserve d'eau de rinçage prélevée dans le bassin et maintenue en charge par un dispositif de mise sous vide.
Le réservoir d'eau de rinçage est en communication avec le bassin de décantation par sa partie basse. Les autres côtés sont entièrement fermés, y compris en partie supérieure de manière à renfermer une poche d'air lors du remplissage. La dalle de fermeture supérieure du réservoir est munie d'une valve raccordée à une pompe à vide, permettant ainsi la mise en dépression du réservoir et son remplissage.
Lors de la vidange complète du bassin, le niveau bas est détecté par une sonde à ultrasons et enclenche la mise à pression atmosphérique de la partie supérieure du réservoir d'eau de rinçage. De ce fait, le volume d'eau contenu dans celui-ci est libéré, provoquant une vague déferlante qui emporte les matières qui se sont déposées sur le radier du bassin.

Le dimensionnement de l'ouvrage

Le dimensionnement de l'ouvrages est calculé dans les cas de charge les plus défavorables, à savoir :

- Ouvrages pleins non remblayés ;
- Ouvrages vides, remblayés et nappe phréatique au niveau le plus haut, au minimum le niveau du terrain fini ;
- Ouvrage remplis en alternance si plusieurs bassin ;
- ...

Stocking pond on water collector of Seilles

The project regards a stocking pond and the settling of water due to excessive rain on the collector of the Seilles.
The objectives were to minimize the impact of a rainy event on the receiving environment and the problems on the collector during the water excesses in sewers, we foresaw a decanter of thunderstorm established by two ponds.
The dimensions of the structure are calculated for the most unfavourable load cases.
The concrete used for the realization of the construction: class of resistance C35 / 45, EE4 EA3, class of consistency S3, nominal dimension max of granulates 20 mm.

Pour la vérification de la stabilité au soulèvement des ouvrages, il est imposé un coefficient de sécurité de 1,10. La charge stabilisante apportée par les terres ne pourra être considérée que verticalement.

Conformément aux règlements en vigueur, l'ouverture des fissures est limitée à 0,1 mm. Pour les faces des ouvrages en contact avec les eaux usées et les eaux claires y compris les eaux de la nappe aquifère. Pour les armatures de diamètre inférieur à 20 mm. Dans le cadre d'une fissuration préjudiciable, aucun justificatif à la fissuration n'est demandé à condition que la contrainte de calcul des aciers soit limitée à 170 N/mm^2. Dans le cas contraire il faudra utiliser les nouvelles normes en vigueur pour justifier la limitation des fissures à 0,1 mm.

Le béton utilisé pour la réalisation de l'ouvrage :

Classe de résistance C35/45, EE4 EA3, classe de consistance S3, dimension nominale max. des granulats 20 mm et moins si la réalisation l'exige.

ingénieurs bct

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Fax	+32 4 349.56.10
Contact	M. Michel Marek
Email	bct.lg@bct.be
Website	www.bct.be

Immeuble Britannia à Forest

Fondé en 1977, ingénieurs bct est un bureau d'études actif dans les secteurs du bâtiment, du génie civil, des infrastructures, de l'eau et de l'industrie.

Pour chacun de ces secteurs d'activité, ingénieurs bct est à même d'assurer la pluridisciplinarité des études. La qualité de cette pluridisciplinarité est assurée par des équipes intégrées, composées d'ingénieurs spécialistes de leur discipline (ingénieurs structure, thermiciens, électromécaniciens, hydrauliciens, énergéticiens ...) et de dessinateurs expérimentés, placés sous la responsabilité d'un chef de projet polyvalent.

Le staff de la société est composé de plus de septante personnes hautement qualifiées qui ont tout animitées la culture du service de qualité non seulement du point de vue technique, mais également en matière de respect des budgets et des délais.

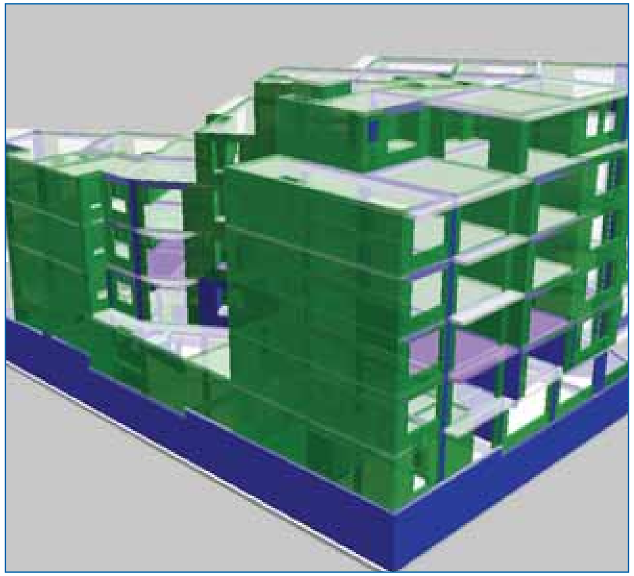
Depuis longtemps sensible au concept actuel de développement durable, ingénieurs bct possède également une large expertise en matière d'études technico économiques et d'ingénierie liés aux domaines de l'énergie et de protection de l'environnement, et ce aussi bien dans le cadre de ses missions bâtiments que dans celui de ses missions industrielles.

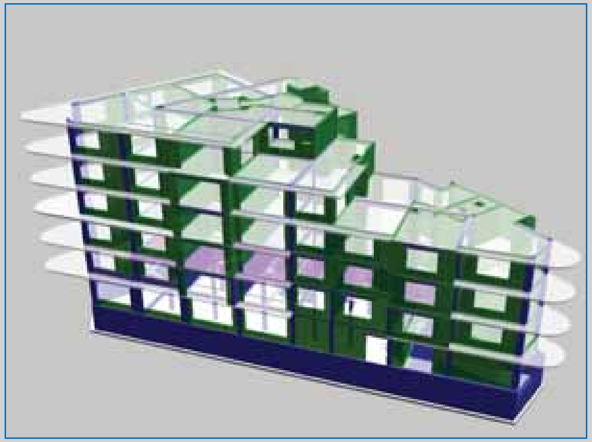
Dans ce contexte ingénieurs bct a obtenu l'agrément de la Région Wallonne pour la réalisation d'audits et d'études de préfaisabilité d'investissements énergétiques.

ingénieurs bct est une société indépendante, membre de l'ORI (Ordre des Ingénieurs-Conseils et des bureaux d'ingénieurs de Belgique), et de l'OAI (Ordre des Architectes et Ingénieurs Conseils du Grand Duché de Luxembourg).

Enfin, de par la qualification de certains de ses collaborateurs, ingénieurs bct est habilité à mener des missions de coordination sécurité-santé.

ingénieurs bct est une Scrl dont la totalité du capital social est détenue par les fondateurs, garantissant ainsi une totale indépendance de la société vis à vis des entrepreneurs et des fournisseurs.





Used software • Allplan Engineering & Allplan Precast

Introduction

Le but de ce projet est la construction d'un immeuble à l'angle de l'avenue Van Volxem et du Boulevard de la Deuxième Armée Britannique. L'immeuble se compose de logements aux étages et d'un rez-de-chaussée commercial. Un parking est réalisé au sous-sol.

Maître de l'Ouvrage: Neufchâtel sprl
(Rue de Neufchâtel, 14 • 1060 Bruxelles)

Architecte: Symetry Architects
(Rue de Neufchâtel, 14 • 1060 Bruxelles)

Bureau d'études stabilité: ingénieurs bct scrl
(Quai de la Boverie, 25 • 4020 Liège)

Entrepreneur: Franki Construct
(Rue Grétry, 196 • 4020 Liège)

Données techniques

La mission d'ingénieurs bct consistait à dimensionner l'ossature de la structure constituée de:

- En fondation, un radier avec surprofondeurs au droit des colonnes en béton soutenant les étages.
- Aux étages, un système de voiles en béton armé en lieu et place des murs de séparation des différents appartements du 1er étage. Ces voiles permettent alors aux étages supérieurs de retrouver des murs porteurs en maçonnerie traditionnelle ou en blocs silico-calcaires. Ce système porteur est accouplé à un réseau de poutres et de colonnes.
- L'ensemble des charges est ainsi ramené sur les voiles du 1er étage via un réseau de maçonneries, poutres et colonnes. Les voiles, eux-mêmes, portent sur un réseau de colonnes qui descendent jusqu'au radier.

Les planchers du rez, du 1er et de la toiture sont réalisés en hourdis, tandis que les planchers séparant deux niveaux d'appartements sont réalisés en prédalles afin d'assurer un meilleur confort acoustique.

Utilisation de Allplan

La structure portante ne se superposant pas nécessairement entre chaque niveau, l'utilisation d'un logiciel 3D tel que Allplan fut très enrichissante. En effet, tant pour le dessinateur que pour l'ingénieur, la vision globale du bâtiment nous a permis de déceler et d'éviter d'éventuels problèmes. Et donc, ces problèmes étant pris en compte dès le départ, nous avons évité certaines complications ultérieures sur chantier.

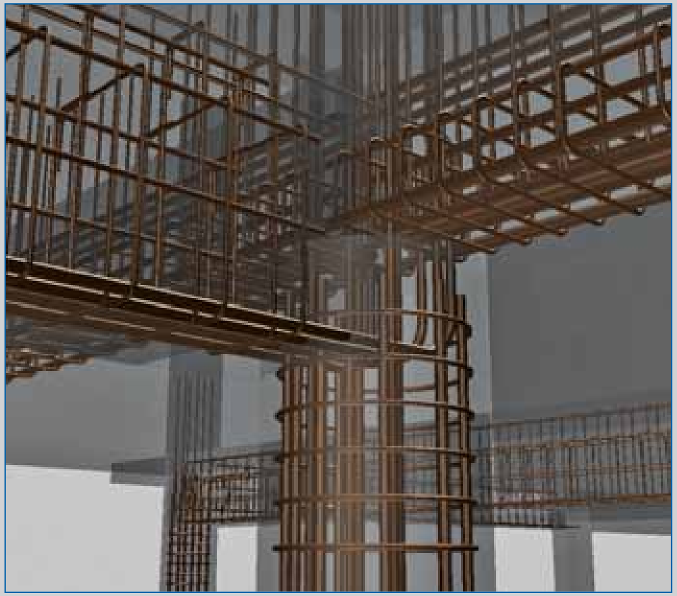
Le bâtiment étant relativement complexe, notamment au niveau de la structure portante, ce programme a permis d'élaborer une complicité efficace entre le travail du dessinateur et de l'ingénieur. Comme exemple concret, le dessin du ferraillage des nœuds de liaison entre poutres, colonnes et voiles a pu être visionné rapidement en trois dimensions par l'ingénieur afin d'éviter tout conflit entre armatures.

Building and commercial block

This project concerns the construction of a building with residences in a different levels, with a ground floor for commercial surface including parkingspace in the underground.
The scope of "Ingénieurs BCT" was to design the main structure:

- A foundationslab with local overthickness right under the concrete columns supporting the building.
- The first floor is made of a reinforced concrete wall system erected as separation walls. These walls allow the upper floor and their traditional masonry (or silico-limestone brick) to be supported from the base.
- The overall loads are in that way directed to reinforced concrete wall of the first floor by the way of masonry, beams and columns. The concrete walls are supported by a grid of columns which brings the loads back to the slab

Since the structure couldn't be superimposed between the different levels, the use of Allplan was helpful. The global vision facilitates the work as much for the engineer as for the drafter, it allows anyone to easily detect any problem. The advantage to foresee problems in the beginning of the project prevents complications in the execution. The building was relatively complex, in particular concerning the main structure, this programs allowed to work out complicity between the engineer and the drafter. For example, the engineer has quickly reviewed the drawing of the reinforcement in the connection nodes between beams, columns and walls in 3D in order to avoid any interference.



PT Baja Engineering Indonesia and SC Engineering BV

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Email baja.eng@cbn.net.id

PT BAJA INDONESIA
STRUCTURAL CONCRETE DETAILING

SC Engineering BV, Nijkerk, the Netherlands, and PT Baja Engineering Indonesia, Jakarta, Indonesia are established in 2003. Our companies prepare detail calculations and detail drawings of reinforced- and prestressed concrete structures.

In our office in the Netherlands we acquire projects and manage project scope progress.

We maintain contacts with the client during the execution of our works to discuss any project related matters such as scope interpretation, possible solutions of details to choose from, progress, etc.

In our engineering department in the Netherlands we prepare structural calculations, based on final design calculations provided by the client.

In our office in Jakarta Indonesia, we prepare detail drawings of structural concrete structures, mainly bridges, tunnels and industrial complex structures.

In our office we use Allplan Engineering.
All our drafting is done in 3D. The contract drawings, we receive from the client, most in 2D, autocad format, are imported into the Allplan software.

This information is than transformed into 3D objects, from which dimension drawings are prepared.

After approval of the dimension drawings the 3D models of rebar are prepared.
From these models the rebar drawings are generated, including bending schedules.

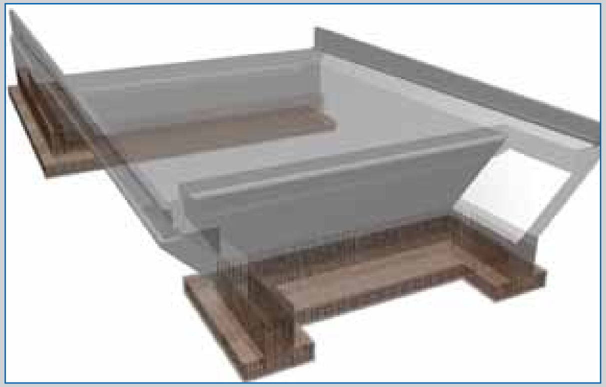
During the project execution we maintain close contact with our office in the Netherlands and with the client. With the client we discuss possible details such as construction joints, bar shapes, splices, cast in items, etc.

Both our offices have excellent knowledge of International standards (Dutch/British/European/American) and more than 30 years experience with civil, marine, industrial and building structures.

In our office in Jakarta we prepare drawings to any international standard or client desired settings for drawings.

Most of our clients are contractors for civil structures such as Ballast Nedam, Heijmans, Koop Tjuchem, Van Spijker and design offices such as HasKoning, IC+E, Oranjewoud.

Den Bosch Groote Wielen



Used software • Allplan Engineering

In Den Bosch, in the south of the Netherlands, a new housing project is developed. It is named "De Groote Wielen", designed by the famous Dutch architect Hubert de Boer. In the next few years more than 4000 houses will be built.

The project consists of six different estates with each a unique theme and structure.

Besides housing, this project also contains development of schools, malls, sport facilities, medical centers and a complex for light industrial business.

The project is designed in and around existing water reservoirs. This gives this project special possibilities for recreation.

The Department for Civil Works of the city of Den Bosch has designed several bridges to accommodate traffic in the housing project over a wide spread system of brooks, canals and ponds.

Assigned by Dutch contractor Zeiderveld, SC Engineering and PT Baja Engineering Indonesia have prepared the detail design for the bridges "Vlinderlaan" and "De Grote Rede"

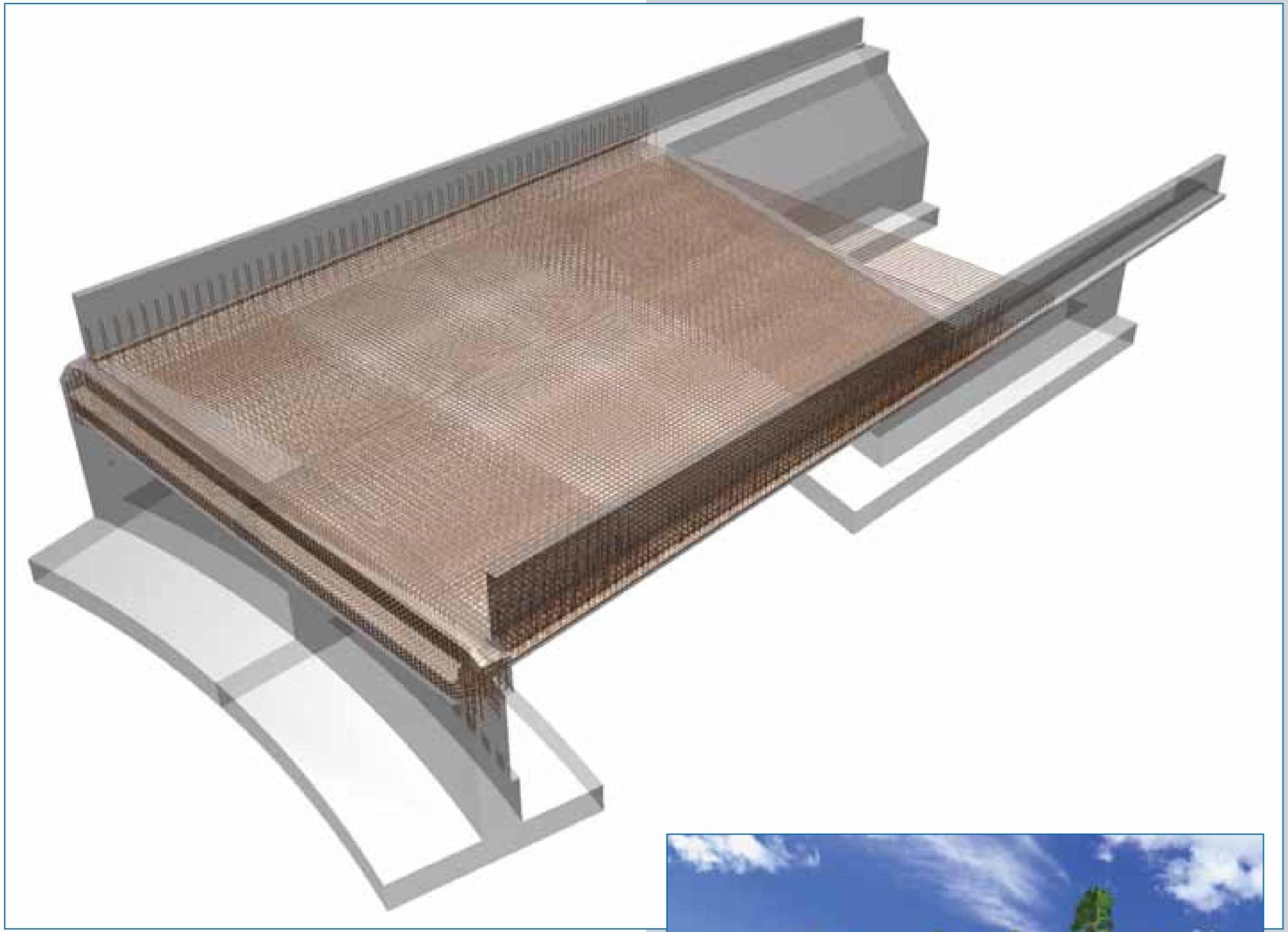
In the Dutch based engineering office of SC Engineering, the calculations for structural concrete are prepared.

In the engineering office in Jakarta of PT Baja Engineering Indonesia the dimension and rebar drawings are prepared, all in 3D with Allplan Engineering.

Besides the traditional dimension and rebar drawings, we provide our client with isometric drawings which show the structures in 3D.

Furthermore we issue 3D views of complex rebar details to inform the rebar installation crew on site.

For this project we designed more than 135 ton of rebar.



Bridges for housing project 'Groote Wielen'

In this project SC Engineering BV and PT Baja Engineering Indonesia prepared the calculations as well as the dimension and rebar drawings for several bridges and retaining walls.
This project was assigned by the Dutch contractor Zeiderveld.
The project comprises two bridges with a retaining wall structure called "De Grote Rede" and 2 bridges with retaining wall structures next to a roundabout called "Vlinderlaan".
The 3D designs were developed from 2D digital information provided by the client.
In total more than 135 tons of rebar was detailed.

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PT BAJA INDONESIA
STRUCTURAL CONCRETE DETAILING

Enschede 3 bruggen

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In our engineering department in the Netherlands we prepare structural calculations, based on final design calculations provided by the client.

In our office in Jakarta Indonesia, we prepare detail drawings of structural concrete structures, mainly bridges, tunnels and industrial complex structures.

In our office we use Allplan Engineering.
All our drafting is done in 3D. The contract drawings we receive from the client, most in 2D, autocad format, are imported into the Allplan software.

This information is than transformed into 3D objects, from which dimension drawings are prepared.

After approval of the dimension drawings the 3D models of rebar are prepared.
From these models the rebar drawings are generated, including bending schedules.

During the project execution we maintain close contact with our office in the Netherlands and with the client. With the client we discuss possible details such as construction joints, bar shapes, splices, cast in items, etc.

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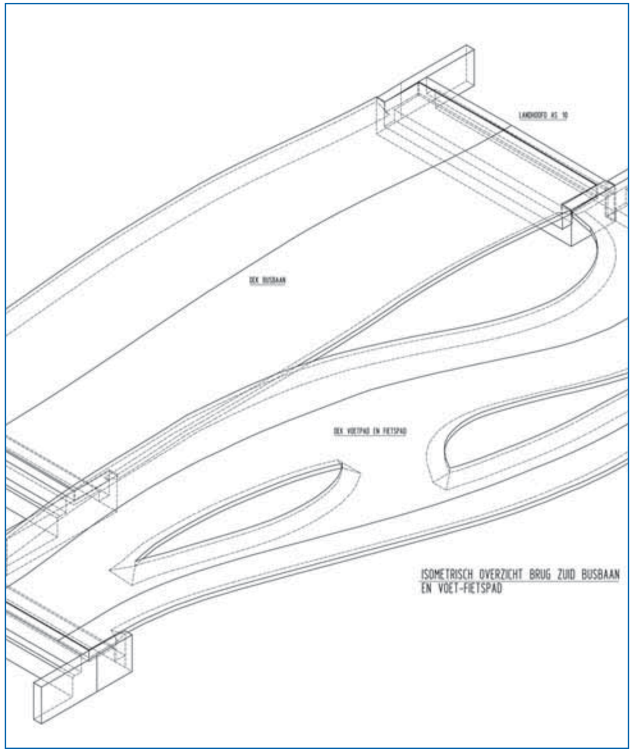
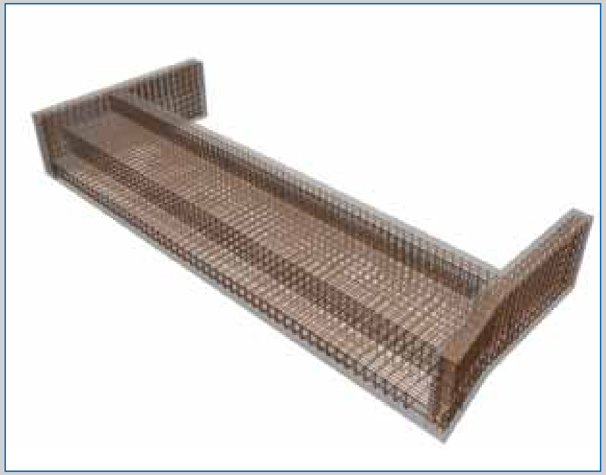




Used software • Allplan Engineering

Assigned by the Department of Civil Works in Enschede, 3 bridges across the Glanerbeek are constructed.
The bridges are projected at the "Appololaan" and the "Atlanta Glanerbrug".
With the HOV bridge south (HOV means high quality public bus lane) comes a separate bridge for pedestrians and cyclists.

The bridges are designed by Next Architects Amsterdam and further developed with design office ABT in Velp and H+N+S Architects for landscaping in Utrecht.
Design office DHV in Amersfoort has prepared the structural design of the bridges.

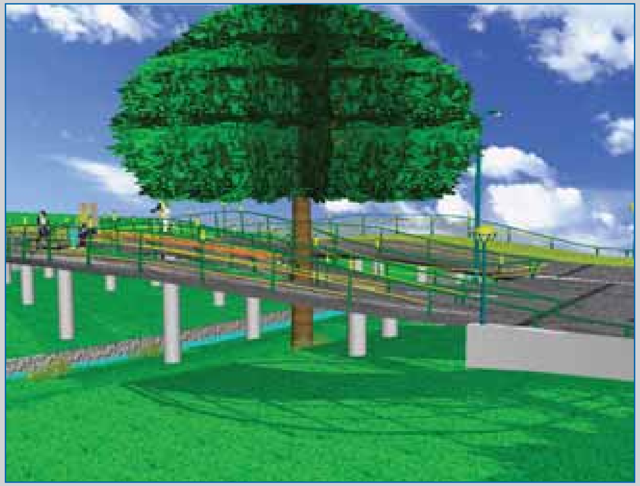
SC Engineering BV in the Netherlands and PT Baja Engineering Indonesia in Jakarta have prepared the detail design assigned by the Dutch contractor Van Spijker.
In the Dutch based office the structural calculations are prepared, while in the office in Indonesia the dimension- and rebar drawings are prepared.

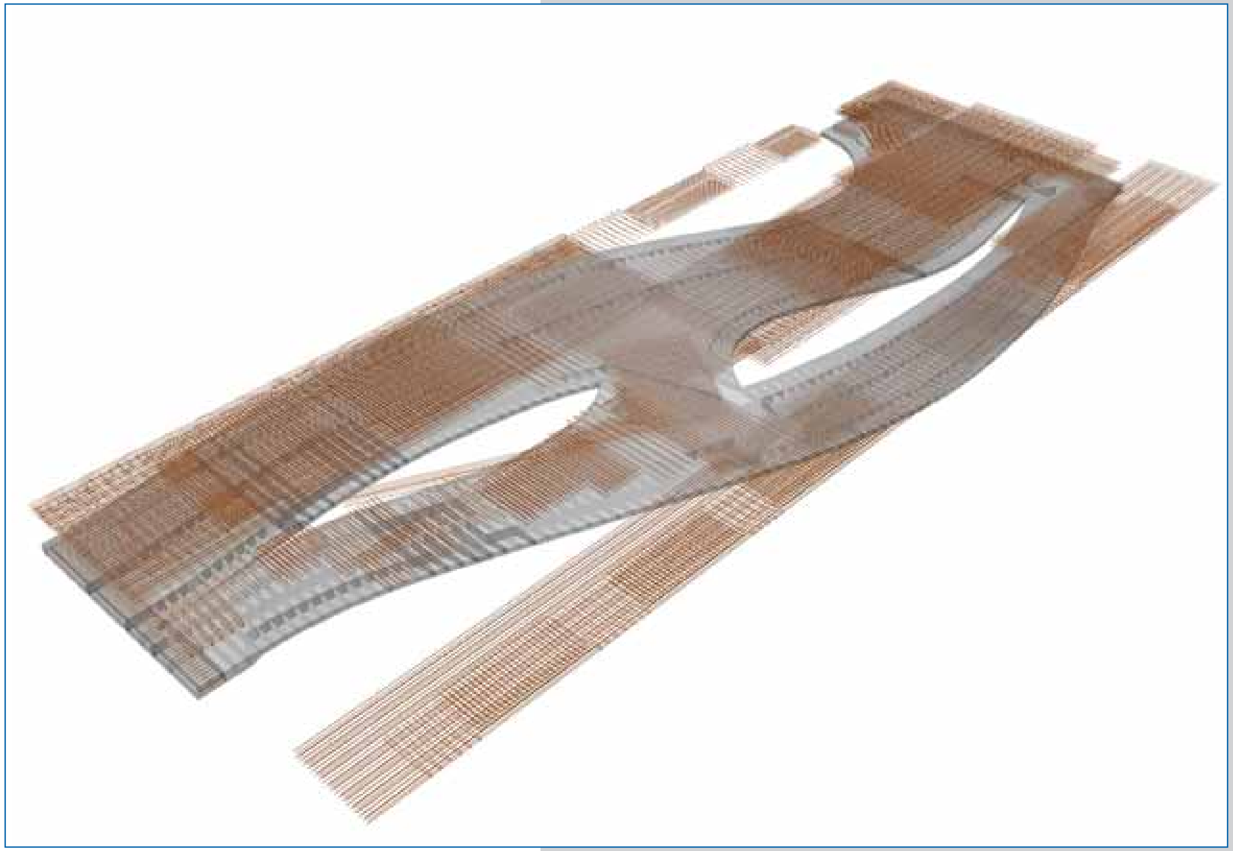
For this we use the Allplan Engineering software.
All our drawings are prepared in 3D, based on 2D digital information.

Besides traditional dimension- and rebar drawings we offer the client isometric drawings that show 3D images of the structures.
Furthermore we issue 3D views of complex rebar details to assist the rebar installation crew on site.

Three bridges in Enschede

In this project SC Engineering BV and PT Baja Engineering Indonesia prepared the calculations , detailing and rebar drawings for 3 bridges across the Glanerbeek in Enschede.
The project comprises three curved, odd shaped bridges, which gave us a maximum challenge to make sound 3D models for concrete- and rebar shapes.
The bridges have abutments at both ends and intermediate random placed supports.
The 3D designs were developed from 2D digital information provided by the client.





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PT BAJA INDONESIA

STRUCTURAL CONCRETE DETAILING

Duoduct

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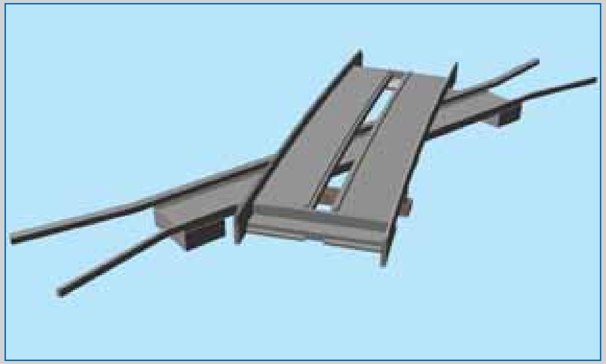
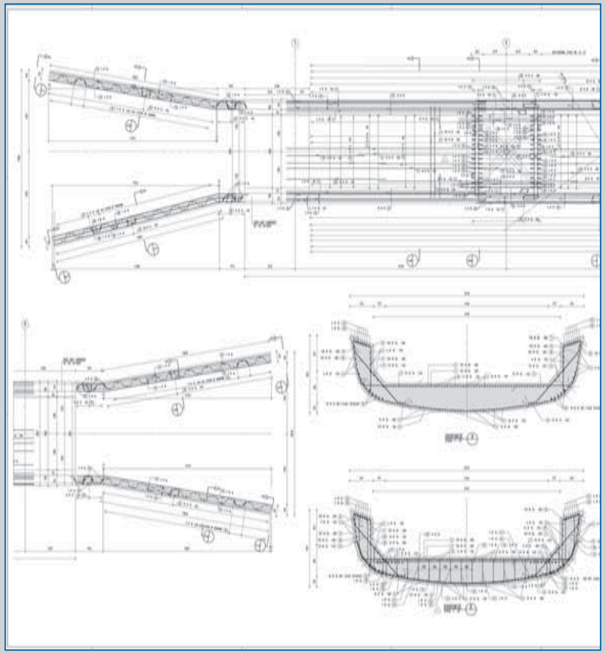




Used software • Allplan Engineering

In the Netherlands, the traffic on main roads between Delft, Rotterdam and Zoetermeer has increased intensively.
This is mainly due to developments of large-scale housing projects indicated locally as “Vinex”. Furthermore a great number of industrial areas are developed in the region.
As a result, congestions on the roads occur more and more.

The development of highway N470, has realized a new and safe connection between Delft and Zoetermeer and a link to Rotterdam. With this new highway, the existing surrounding roads become less congested.

Description of the bridge, duoduct

This bridge is designed by “architektenbureau Marius van den Wildenberg”, it was assigned by the Public Transport Department of the province of Zuid-Holland.
In fact, this bridge consists of a bridge and an aqueduct, that is why it is called a ‘duoduct’.
This structure bridges the highway N470 over the aqueduct, which itself bridges the “Windaassloot”, a water reservoir over another water reservoir “Groenblauwe Slinger”.
This is a typical Dutch situation in the west of the Netherlands where different water systems exist, each at their own level.

The aqueduct comprises of:

- Sheet pile structures;
- Concrete pile foundations;
- Abutments and intermediate supports;
- Aqueduct water containing structure over de substructures.

The bridge structure comprises of:

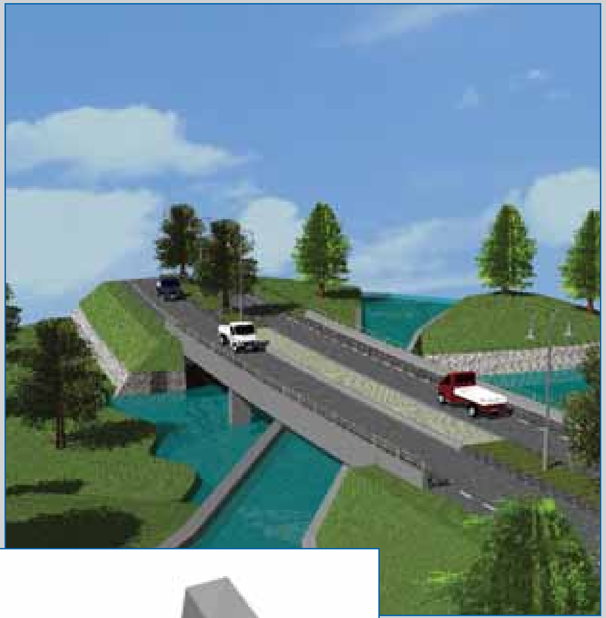
- Sheet pile structures;
- Concrete pile structures;
- Abutments and intermediate supports;
- Bridge deck from prefab beams.

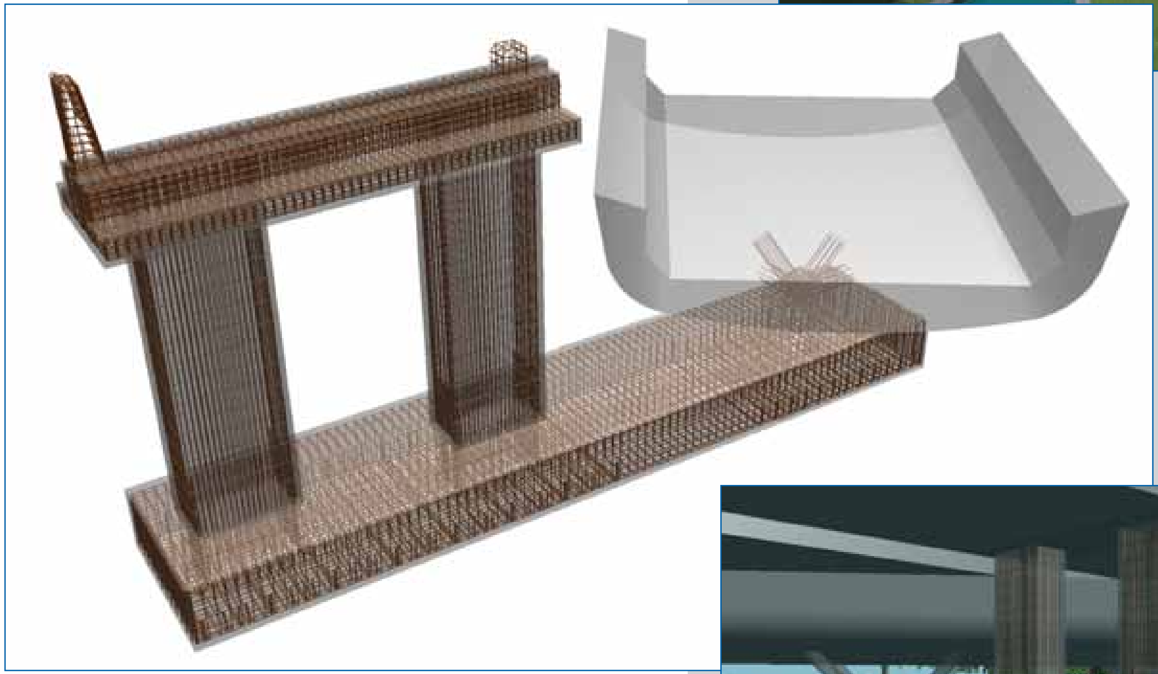
Detail engineering

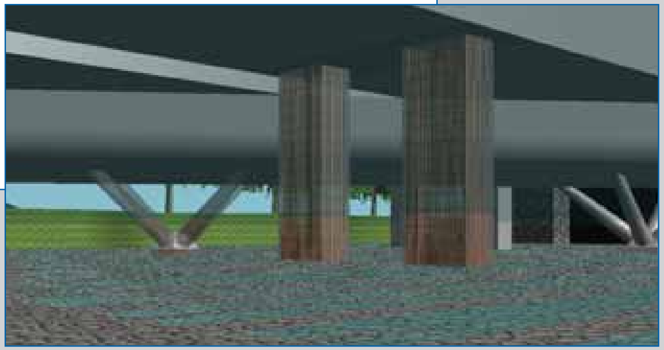
We received from contractor Koop Tjuchem Betonbouw the assignment for the detail engineering of 7 bridges and tunnels, of which the duoduct was a part.
This object was prepared in 3D with Allplan Engineering, based on 2D digital information.
From 3D dimension and rebar models, the dimension and rebar models were generated as well as the bending schedules.
In total 215 tons of rebar was modeled.
In addition to the traditional dimension drawings, our offices provide our clients with isometric drawings that show the objects in 3D as well as a set of 3D views of rebar details, which have proven to be very useful to the rebar installation crew on site.

Duoduct

This bridge is situated in the new developed N70 in the west part of the Netherlands, it consists of a bridge on a highway over an aquaduct structure. The name ‘duoduct’ points out the unique nature of this structure, namely 2 different functions for integrated transport .
With Allplan Engineering software, our offices prepared in 3D the dimension- and rebar drawings, based on 2D digital information.
Client: Koop Tjuchem Betonbouw, the Netherlands.
Rebar: 215 tons of rebar modeled.







Transport Consultants and Engineers

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Email info@tce.nl
Website www.tce.nl

Transport Consultants and Engineers

Realisation Geeuwaquaduct Sneek - Spooraquaduct

Witteveen+Bos and DE-Consult: together TCE. Two independent engineering companies have joined forces for railway infrastructure projects under the name Transport Consultants and Engineers (TCE).

Witteveen+Bos is leading in the Netherlands in the areas infrastructure, water, construction and the environment and as a Dutch company understands the particular characteristics of the Dutch country. The German DE-Consult is best known as a specialist in railway infrastructure, with extensive international expertise in the areas of track design and railway operation. TCE is recognised by ProRail and is authorised to carry out track related design work for track and above ground structures, safety, traction and power facilities (overhead wires) and concrete and steel structures.

Complete package of services

TCE offers a complete railway infrastructure service package for integral projects. Our specialists, with their experience, technical know-how and expertise, are capable of the professional management of a complex railway infrastructure project from the first concept to the commissioning of the system.

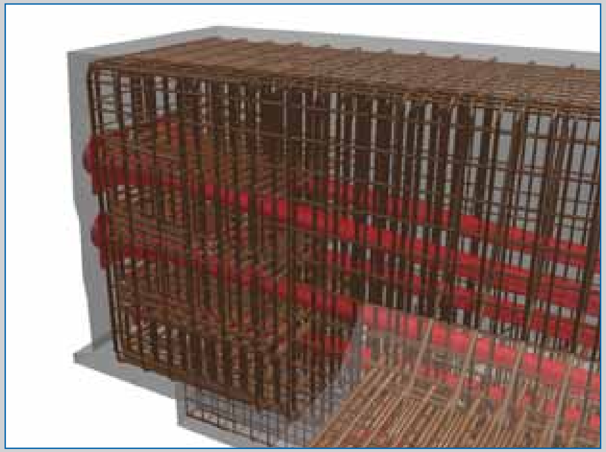
With its expertise and years of experience in the development of rail, tram, metro and regional rail transport and its knowledge of local town and district transport, TCE is capable of developing a tailor-made transport system for any client.

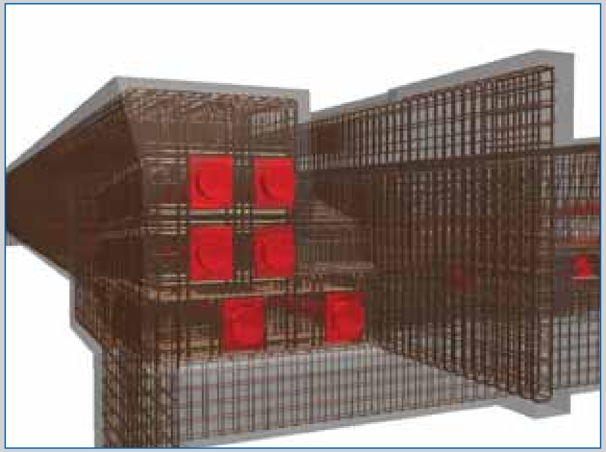
Project teams

TCE's project teams involve closely cooperating specialists in various rail-oriented disciplines, reinforced where necessary with other specialists from Witteveen+Bos and DE-consult. Our approach focuses on short lines of communication with the client, flexible working methods and open communication. Working in small teams makes us an attractive employer and provides plenty of opportunity for personal development.

High-profile projects

- The railway zone in Delft.
- The Heart of Dieren, where the existing railway line and secondary road running next to it were laid in a sunken trough and tunnel respectively.
- The extension to the IBIS hotel above Amsterdam Central Station.
- Prior to the commissioning of the IJzeren Rijn (the Iron Rhine), TCE handled the route memorandum / the environmental impact assessment and the preparation of the finalised route plan.
- Work for the development of a large railway marshalling yard in Rezekne (Latvia). The first Latvian railway project to be financed by the EU. This began operating at the beginning of 2006.





Used software • Allplan Engineering

Introduction

Anyone driving from Heerenveen to the Afsluitdijk over the A7 will discover that Sneek is still a considerable hindrance - the A7 motorway is interrupted by a 4-kilometre stretch of the N7 bypass to the south of Sneek. This situation will last until mid-2008 when the last section of N7 will have been upgraded to the A7 motorway.

The eastern half of this southern bypass section will be upgraded over the existing route. About midway along the existing N7 section, the river Geeuw, the railway line from Sneek to Stavoren, the exit road Sneek-IJlst and a dikeroad will be crossed by the route of the new A7 motorway. In this new situation there will be an aqueduct under the Geeuw, at which over the access road on the west side viaducts will be constructed for the railway, the Sneek-IJlst road and in addition a local road that runs over the Alde Himdyk. The western half of the new A7 branches away from the existing N7 from the aqueduct and goes round the business park De Hemmen for which there are expansion plans.

Geeuw project

The structural Geeuw project is divided into ten subway sections, one water cistern, two prefab traffic viaducts, one railway viaduct and one aqueduct with the connecting pieces and caps. All in-situ concrete structures were detailed by Witteveen+Bos, see next page. The railway viaduct was detailed by TCE.

Railway viaduct

The Sneek-Stavoren line is a single-track, non-electrified railway. The railway viaduct over the entrance to the aqueduct is constructed as a pre-stressed trough beam. The beam was placed directly on the corners (without intermediate abutments) on four bored piles. The piles were placed at night when the line was out of service.

Railway of 'Geeuw' aquaduct

The project concerned a railway viaduct for the Sneek-Stavoren line, this is a single-track, non-electrified railway. The railway viaduct is constructed as a pre-stressed trough beam. The beam was placed directly on the corners (without intermediate abutments) on four bored piles. The piles were placed at night when the line was out of service. These concrete piles are 1.2 metres in diameter and are approximately 36 metres deep. They are reinforced over the top 14 metres.
The rail trough is completely separate from the aqueduct. Only the final transverse restraint of the trough is carried by the outer walls of the underlying aqueduct. The railway trough was constructed next to the railway dike and was slid into place in September 2006, with the railway being out of service for less than a weekend.

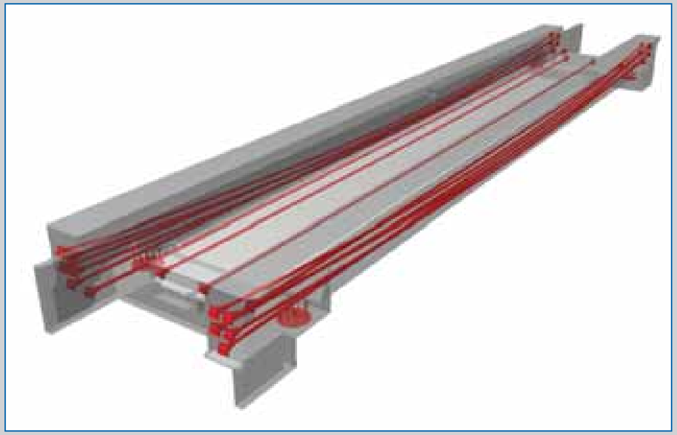
These concrete piles are 1.2 metres in diameter and are approximately 36 metres deep. They are reinforced over the top 14 metres.
The rail trough is completely separate from the aqueduct. Only the final transverse restraint of the trough is carried by the outer walls of the aqueduct. The railway trough was constructed raised next to the railway dike and was slid into place in September 2006, with the railway being out of service for less than a weekend. Following this, the construction of the aqueduct that runs underneath was begun.
The aqueduct crosses the railway at an angle of approximately 67°. The bored piles under the railway trough are positioned at right angles to the railway line at each end of the trough viaduct. The spanning of the trough is approximately 33 metres, at a construction height of 2.15 metres. The floor screed is 0.65 metres thick.

Project strategy

The railway viaduct is a slender design with relatively thin trough walls. Thus the percentage of reinforcement in the walls and floors is high. A large amount of reinforcement comes together at the end of the trough beams. The distribution of forces from the prestressing anchors results in a quantity of split reinforcement. The encasement tube for the prestressing cables runs through the split reinforcement. The split reinforcement is crossed by reinforcement from the floor. This reinforcement functions as a tension rod between the two walls. In addition, the walls of the trough beam are reinforced by transverse braces, torsion braces, flank bars, suspended reinforcement for the floor and compression reinforcement. Compression reinforcement is required to meet the ultimate limiting condition for the compression zone height to prevent brittle failure of the structure. This quantity of reinforcing steel can lead to problems if the position of the bars is not carefully worked out. The use of Allplan enabled a number of conflict points to be solved immediately by making certain bars a different shape. Checking the complex reinforcement is now much easier for the structural engineer, because the reinforcement can be seen on a 3D animation screen. A three-dimensional image in combination with two-dimensional cross-sections gives a good picture of the actual situation. This manner of working has helped to avoid a large number of conflict points during construction.

Project technical data

Project name: Construction of Geeuw aqueduct Sneek
Principal: Province of Friesland / ProRail
Location: Sneek
Length: 38,95 metres
Span: 32,95 metres
Width: 7,45 metres
Height: 1,95 metres
Quantity of concrete: approx. 310 m³
Quantity of steel reinforcement: approx. 53,000 kg

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CAE Civil works (ESA)

3

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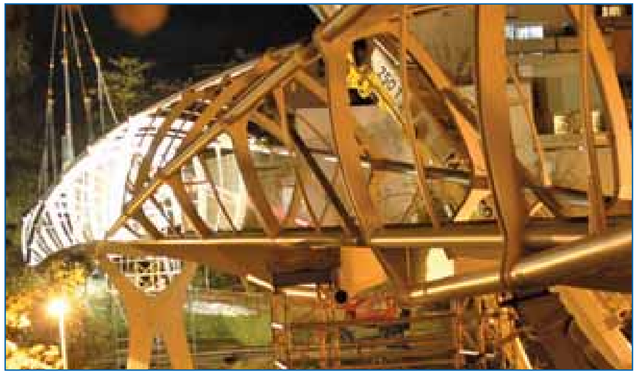
Passerelle d'Evry



Société fondée en 1961, Schroeder & Associés s.a. est active dans tous les domaines du bâtiment, du génie civil, des infrastructures ainsi que dans certains domaines apparentés.

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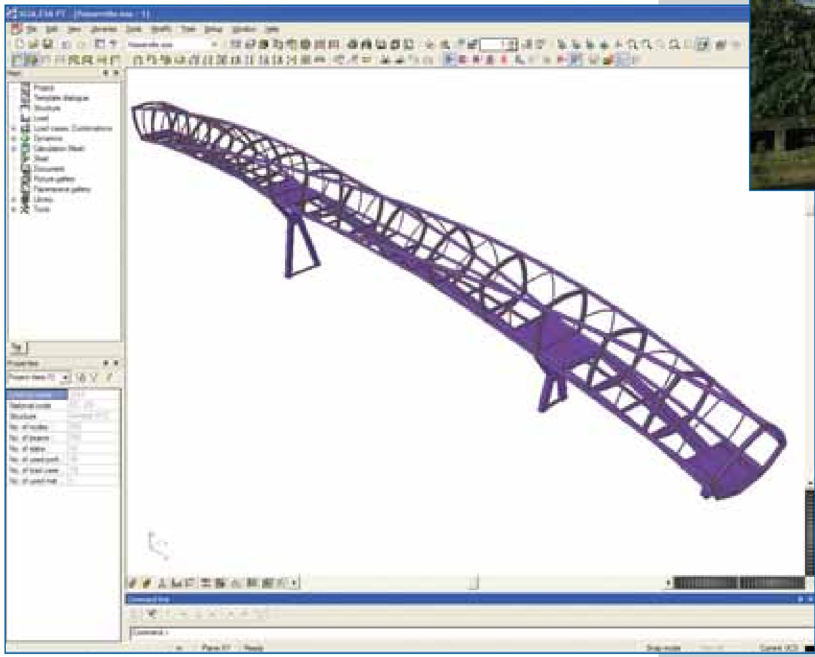


Quote of the jury:
"The aesthetics and techniques of this project are marvellously in equilibrium. We noticed a very original design, especially when it comes to taking up the torsional effects, while also achieving a good dynamic control"

Used software • SCIA • ESA PT, ESA-Prima Win

Le projet concerne la reconstruction d'une passerelle place des Miroirs au quartier des Pyramides sur le territoire de la commune d'Evry. La passerelle relie la place des Miroirs au quartier des Pyramides au sein d'un cheminement piétonnier. L'ouvrage survole la rue des Galants Courts et une voie de transport en commun.

La transparence de la nouvelle passerelle permettra de rapprocher visuellement les usages du site environnant et d'obtenir un ouvrage plus léger que le précédent, afin de pouvoir conserver ses fondations sans les renforcer.

La passerelle en structure métallique crée un volume englobant les piétons. Ce volume permettra la mise en place de protections anti-vandalisme sur les côtés ainsi qu'un éclairage en partie supérieure.

La structure portante de la passerelle est composée d'une série de diaphragmes, reliés par 4 faisceaux de tube en forme d'hélice. Cette structure d'une longueur de 62 m et d'une largeur de 3 m, porte sur 3 travées avec des portées de 24,4 m, 26,3 m et 11,3 m. Les piles intermédiaires en forme de X sont constituées en caissons métalliques soudés. L'ensemble des structures métalliques portantes comprend environ 55 tonnes d'acier S355. Les appuis sur les culées sont du type appuis en élastomère fretté avec des butées de blocage dans le sens transversal du tablier.

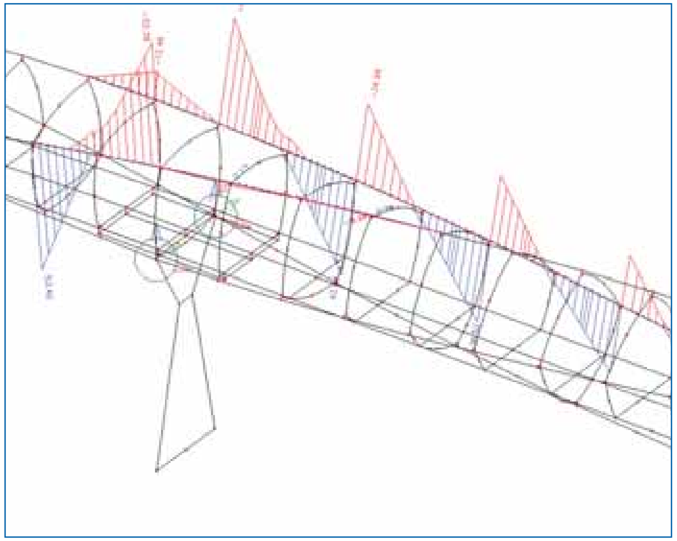
La modélisation et l'analyse statique de la structure principale ont été réalisées avec un modèle global d'éléments finis à l'aide du logiciel SCIA • ESA PT et ESA-Prima Win. Le modèle englobe la structure portante de la passerelle avec les piles intermédiaire et en tenant compte des caractéristiques des appuis. La définition géométrique de l'ouvrage s'est basée sur les plans de la société DVVD ingénieurs architectes designers (www.dvvd.fr) et a été élaborée à l'aide d'AutoCAD. La structure filaire 3D a été reprise en format DWG dans SCIA • ESA PT. La vérification des états limites ultimes a été réalisée suivant Eurocodes à l'aide d'une analyse globale élastique. Sur base des combinaisons déterminantes dans la vérification des diaphragmes et membrures une analyse de la stabilité globale a été réalisée.

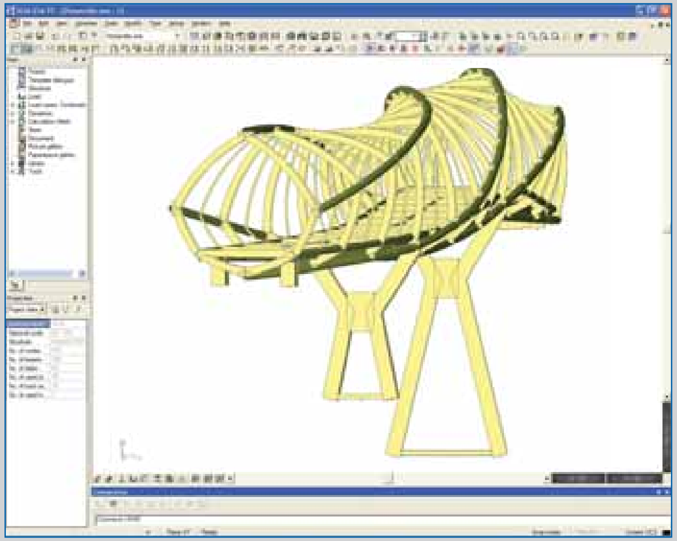
Pour l'analyse temporelle du comportement dynamique le logiciel ESA-Prima Win a été employé. Les 6 premiers modes propres ont été calculés, les modes suivants ont une fréquence propre supérieure aux fréquentes de la course de piétons c.-à-d. > 4 Hz. L'évaluation de la réponse en accélération s'est basée selon ISO 2631-1 sur une valeur efficace de l'accélération pondérée, c.-à-d. sur base d'une accélération moyenne avec un certain intervalle de temps. La limite de cette réponse est de 0.9 m/s^2, ceci pour un piéton ainsi que pour un groupe de 6 piétons traversant la passerelle en marche ou en course.
Le chargement dynamique a été modélisé avec une charge oscillatoire d'un piéton qui marche en forme d'une série de Fourier pendant le temps théorique de passage sur la passerelle. Vu les modes propres de la passerelle l'analyse s'est limitée à la marche avec une fréquence du pas de 2.9 Hz (2e mode) et à la course avec une fréquence du pas de 3.75 Hz (5e mode). Les résultats de l'analyse ont démontré que le comportement dynamique est acceptable, aucun renforcement ni un dispositif d'amortissement n'ont été prévus.

La facilité et les capacités de modélisation du logiciel SCIA • ESA PT, particulièrement l'importation de la définition filaire 3D en format DWG ainsi que les barres à section variable ont contribués à la bonne finalisation de la conception et des calculs.

Pedestrian bridge of Evry

The reconstruction of the pedestrian bridge « Place des Miroirs » in Evry near Paris consists of a steel structure of helicoidally formed tube members connected with diaphragms. The footbridge has a total length of 62 m, a width of 3m and has 3 spans of 24,4 m, 26,3 m and 11,3 m. The intermediate piers have a X-shape and are built of boxed steel sections. The whole structure is composed of 55 tons of steel S355. The design calculations and the serviceability limit checks (deformations and dynamic behavior) have been done both with SCIA • ESA PT and ESA-Prima Win.





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abt studiebureau stabiliteit

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Algemeen

Ons bureau, ABT België is een zelfstandige dochteronderneming van ABT, toonaangevend sinds 1953, in Nederland met vestigingen in Velp en Delft.
Vanuit Antwerpen worden stabiliteitsstudies aangeboden.
ABT heeft in totaal 350 medewerkers waarvan 14 bij ABT in Antwerpen.
Op 14 oktober 1996 nam ABT het gerenommeerde studiebureau Lipski te Brussel. Op 1 september 2002 verhuisde ABT-Lipski naar Antwerpen. In 2003 veranderde de naam ABT-Lipski naar ABT België.

Bureaufilosofie

Visie:
Door de zowel in omvang als in technische moeilijkheidsgraad bijzondere bouwprojecten te kunnen beheersen en bereid te zijn de grenzen van het mogelijke hiervoor te verkennen, zal ABT in staat zijn voor alle opdrachtgevers kwaliteit op maat te kunnen leveren.

Missie:
- Het steeds opnieuw leveren van een inventieve en creatieve inspanning samen met een integrale benadering van het ontwerp- en bouwproces.
- Een projectmatige aanpak gericht op een beheersing en optimalisering van de aspecten kwaliteit, tijd en kosten.

Ontwerpfilosofie
ABT beschouwt het ontwerpen van gebouwen als een creatief proces in nauwe samenwerking met de architect, opdrachtgever en bouwers.

Kernactiviteit stabiliteit

Het zwaartepunt van ons advieswerk ligt bij het ontwerpen van draagstructuur en fundering van bouwwerken, van zowel utiliteit- en woongebouwen als civiele werken. ABT beschikt over ruime ervaring in beton, staal, hout, steen, aluminium, textiel en glas constructies.

Opdrachtgevers

In de private sector zijn het onder andere grote institutionele beleggers, woningbouw verenigingen en projectontwikkelaars, maar ook architecten en aannemers.
In de niet-private sector zijn onze opdrachtgevers bijvoorbeeld gemeentes, maar ook besturen van zorginstellingen, musea en overige openbare voorzieningen

Beknopt overzicht referenties

St. Gillis-voorplein
Renovatie en nieuwbouw van een plein, appartementen en een bankagentschap boven de metro-ingang
Opdrachtgever: Gemeente St. Gillis

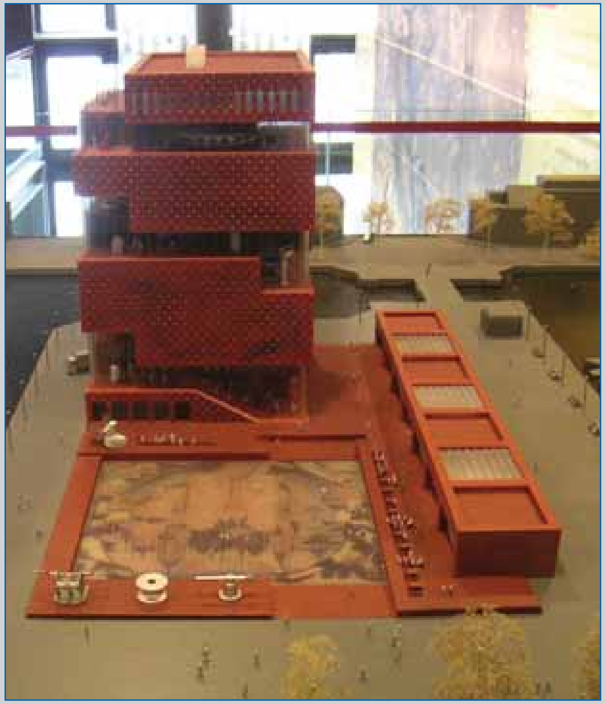
North Gate Brussel
Nieuwbouw van kantoorgebouwen en parkings
opdrachtgever: VGC

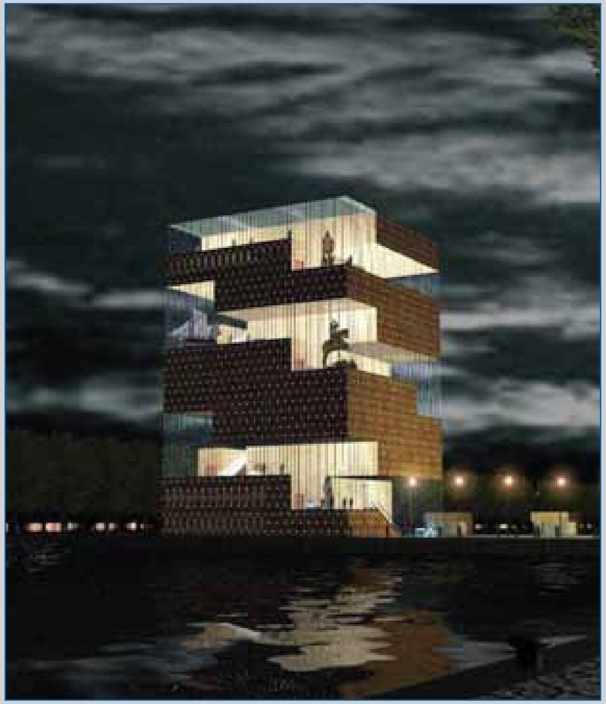
Postkantoor Scherpenheuvel
Uitbreiding van een kantoorgebouw met een gevel in spuitbeton, vloeren in blauw beton en wanden in oranje beton.
Renovatie van het bestaande gebouw
Opdrachtgever: De Post

Museum aan de Stroom
Een toren van 60 meter met een complexe betonstructuur met grote overkragingen.
De glasgevel bestaat uit 12 meter hoge ongesteunde, gekromde glasplaten
Opdrachtgever:Stad Antwerpen

Jeugdtheater Bronks
Inpassing van een nieuw te bouwen jeugdtheater in een reeds bebouwde omgeving.
Het theater heeft o.a. een theaterzaal, een grote repetitieruimte en een bar.
Een groot deel van de constructie bestaat uit wanden en vloeren in zichtbeton
Opdrachtgever: VGC

Museum aan de Stroom te Antwerpen





Used software • ESA-Prima Win

Bouw van een museum

Het ontwerp, van de gerenommeerde Nederlandse Architect Willem-Jan Neutelings, voor het Museum aan de Stroom is het resultaat van een internationale competitie, georganiseerd door de Stad Antwerpen.

Het project bestaat uit een museumgebouw in de vorm van een circa éénenzestig meter hoge toren op de Hanzestedenplaats in Antwerpen. De buitenruimte rond het gebouw is integraal deel van het project en bestaat uit een museumplein, een paviljoenen-gebouw en de publieke kades langs de dokken.

Het gebouw is opgevat als een stapeling van tien gesloten dozen, die spiraalsgewijs op elkaar zijn geplaatst. Elke doos meet circa 36 x 24 x 6 meter. Door de spiraalstapeling vormen de dozen een soort wenteltrap, in de vorm van een glazen galerij waarin het publiek met roltrappen naar boven wordt gevoerd. Vanuit de galerij heeft men panoramische uitzichten op de levende stad, stroom een haven, terwijl men in de museumdozen het verleden van de stad, stroom en haven kan bekijken.

Op elke verdieping is er een in- en uitgang van de galerij naar de museumzaal. Midden in het vloerveld ligt de centrale kern van het gebouw waarin zich de vluchttrappen, liften en schachten bevinden. Op elke verdieping is er bovendien een mezzanine die de technische ruimten bevat.

De gelijkvloerse verdieping bevat de functies voor publiekopvang (inkomhal, ticketbalie, vestiaire, museumwinkel, cafetaria) en de logistieke functies (werkplaatsen, laad- en losplaatsen, opslag-ruimten, enzovoort). De eerste verdieping bevat de kantoren. De zeven dozen daarboven zijn de museumzalen, elk uitgevoerd als een lege ruimte die later flexibel kan worden ingevuld voor perma-nente of tijdelijke tentoonstellingen. De bovenste verdieping bestaat uit een restaurant, een feestzaal en een panoramaterras met bijhorende dienstruimten (keukens, berging toiletten).

Het gebouw is opgetrokken als een betonconstructie van opeen-gestapelde dozen, waarvan de uitkragende wanden met spanten aan de betonnen kern opgehangen zijn. De fundering is op palen.

De gevels van de gesloten delen zijn bekleed met roodbruine natuursteenplaten. Op elke plaat is een versiering in de vorm van een gestileerd zilverkleurig Antwerps handje bevestigd.

De gevel van de galerij is gemaakt van gebogen glasplaten, die samen een transparante golvende gevel vormen.

Door de gebogen vorm zijn de glasplaten zelfdragend en bestand tegen de winddruk en kunnen daarom zonder raamkaders geplaatst worden. De kleinere ramen en poorten die zich in de natuursteengevel bevinden op de gelijkvloerse, de eerste en de negende verdieping zijn uitgevoerd in verdiept liggende donker-grijze metalen raamkaders met helder glas.

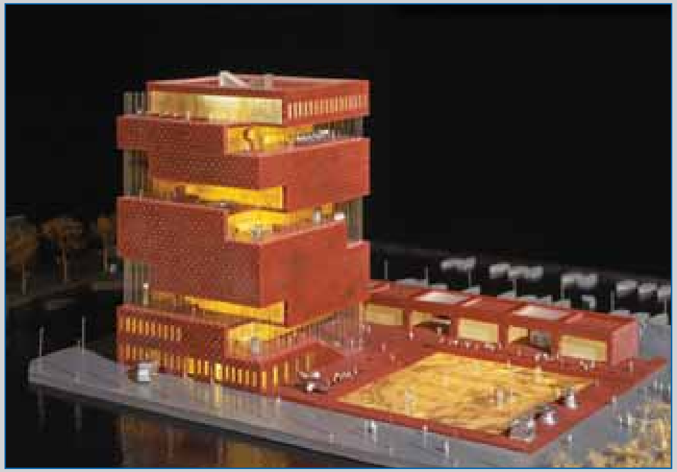
De constructie van de museumtoren is als 3-D model uitgevoerd in ESA-Prima Win. De keuze voor een 3D model is gemaakt vanwege de complexiteit van het gebouw en de moeilijk te voorspellen krachtafdrachten naar de fundering en de mogelijke vervorming in het gebouw door de vele uitkragingen

Met het 3D-model is een goed inzicht verkregen in de krachts-afdracht tussen de verschillende onderdelen en de optredende paalbelasting. Tevens is inzicht verkregen in de optredende vervor-mingen van het gebouw.

Kortom met de hulp van het ESA-Prima Win 3D model is een groot inzicht verkregen in de constructie en de daarbij behorende vervormingen.

Museum at the Stream in Antwerp

This design, by the famous Dutch architect Willem-Jan Neutelings, is the result of an international competition organized by the City of Antwerp.
The project integrated the surrounding area including a museum tower with a height of sixty-one meters, a museum square, pavilions and the public docks.
The tower consists of ten closed boxes that are spirally stacked, forming a winding staircase with escalators, which are leading to panoramic galleries and museums.
The building is raised as a concrete structure hanging on central core rafters and constructed on a pile foundation.
The front of the closed parts are made of red natural-stone plates, the galleries are composed of self-supporting waving glass plates.
The tower structure is executed as a 3D model in ESA-Prima Win.
Choosing a 3D model made it possible, considering the complexity of the building, to regain a good insight of the structure and possible distortions.



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- Off-shore projects: lock gates, Roro, oil rigs, ...
- Industrial equipment: silos, cranes, craneways, storage tanks,...
- Erection engineering: longitudinal and transverse repositioning, skidding, lifting, bridge launching...

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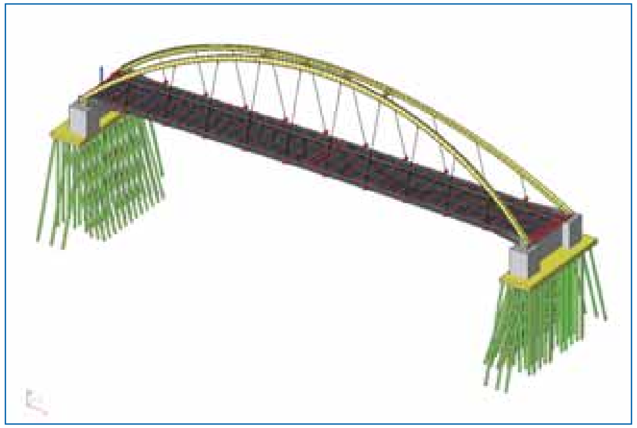
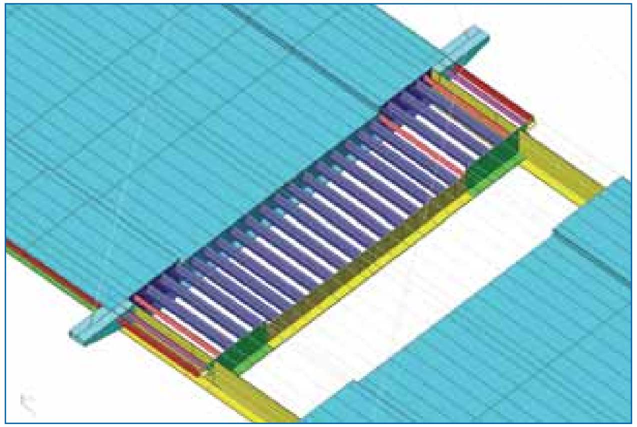




Bridge 'Olsene' across the 'Leie' river

Bridge 'Olsene' across the 'Leie' river

The existing concrete bridge had to be replaced by a new bridge and this for two reasons. Firstly, the stability of the existing bridge was no longer guaranteed for the increased traffic intensity. Secondly, the free passing under the existing bridge was limited in height and width and too small for the current ships to pass.
The new bridge is a steel bridge with a span of 110 m, consisting of 2 drive lanes of 4 m and 2 lanes for pedestrians of 2,5 m. The bridge is an arched bridge (bowstring) with inclined arches of which the cross sections vary as well in height and in width along the bridge span. For the bridge deck an orthotropic steel deck with longitudinal trapezoidal stiffeners was chosen. The bridge is different from a classic bowstring bridge because the suspensions of the deck at the arch are not connected to the main deck beams. The suspensions are connected at the transverse beams, which support the main deck beams. The whole bridge was completely preassembled in the workshop, so that the assembly on the spot could be done smoothly.

Used software • SCIA • ESA PT, ESA-Prima Win

Project: Bridge 'Olsene' across the ' Leie' river
Type: Arched bridge (Bowstring)
Location: River "de Leie", Dentergem (Oeselgem), Belgium
Owner: Ministerie van de Vlaamse Gemeenschap - Afdeling Wegen en Verkeer West-Vlaanderen
Architect: Ministerie van de Vlaamse Gemeenschap - Afdeling metaalstructuren, Brussels, Belgium
Engineering office: Ingenieursbureau Stendess N.V., Lovendegem, Belgium
Contractor: Steel: Victor Buyck Steel Construction N.V., Eeklo, Belgium - Concrete: Depret N.V., Zeebrugge, Belgium
Total steel weight: ± 1.000 tons
Total length: 112 m; Span: 110 m
Highest point: ± 20 m (top of arches)
Building period: 2005-2006

Short description of the project

The existing concrete bridge had to be replaced by a new bridge and this for two reasons.
Firstly, the stability of the existing bridge was no longer guaranteed for the increased traffic intensity.
Secondly, the free passing under the existing bridge was limited in height and width and too small for the current ships to pass.
The new bridge is a steel bridge with a span of 110 m, consisting of 2 drive lanes of 4 m and 2 lanes for pedestrians of 2,5 m. The bridge is an arched bridge (bowstring) with inclined arches of which the cross sections vary as well in height as in width along the bridge span. For the bridge deck an orthotropic steel deck with longitudinal trapezoidal stiffeners was chosen. The bridge is different from a classic bowstring bridge because the suspensions of the deck at the arch are not connected to the main deck beams. The suspensions are connected at the transverse beams, which support the main deck beams. The whole bridge was completely preassembled in the workshop, so that the assembly on the spot could be done smoothly.
The erection, which was studied by Victor Buyck Steel Construction, was done using a ponton to support the bridge deck temporarily.

In this work of art the great characters of steel came clearly to their right: the slim line and the playful form of the construction, speed of assembly and the possibility to combine heavy duty loads with an architectural design.

Use of ESA-Prima Win and SCIA • ESA PT

Description of technical questions to be solved with ESA-Prima Win and SCIA • ESA PT

As well for the dimensioning of the steel bridge as for the dimensioning of the foundations (group of piles) ESA-Prima Win and SCIA • ESA PT were used.
The complete 3D-model was formed with bars; the orthographic deck was put together as 2D-elements, with the purpose of creating the real vertical and lateral stiffness of the bridge. The tension bars, which support the deck, were simulated as classic bars.

To simulate the horizontal (longitudinal) stiffness of the bridge supports, a 3D-model was made in which the 3D-bridge structure and the foundations (group of piles) were combined.
For the calculations with regard to the traffic situation, each bridge member was given a buckling factor based on the rules of EC3. The beam check was then made by EC3 steel check of ESA-Prima Win.

The buckling control of the arches was done in three ways. The first method with EC3-steel check of ESA-Prima Win, the second method was based on the calculation of the axial critical buckling force according EC3, the third method used the stability check and the second order calculation based on EC 3 of ESA-Prima Win. The second order calculation was done with SCIA • ESA PT. SCIA • ESA PT gives the possibility of a second order calculation with a predeformation based on a stability calculation for a 3D-model with bars and plates. Here SCIA • ESA PT really proved its progress compared to ESA-Prima win.

In the calculation of this project the use of ESA-Prima Win was very intense and diverse:

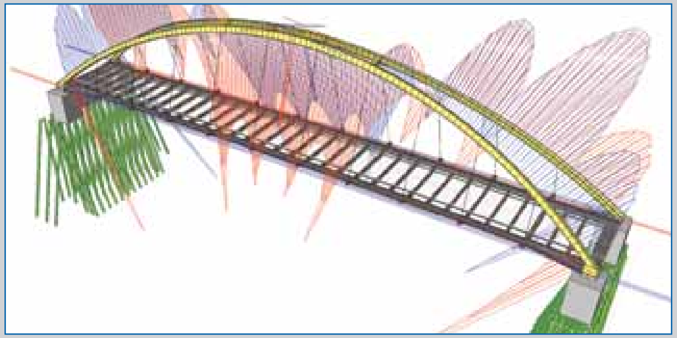
- Combination of 1D-elements and 2D-elements in one 3D-model.
- Combination of different materials in one model (steel bridge – concrete pile foundation)
- Stability control / critical buckling factor
- Second order calculation based on predeformations from stability calculations and on EC.
- Use of graphical sections
- Use of cross sections with variable height
- Rib calculations
- Free loads on 2D-model (orthotropic deck)

Description of our experience with ESA-Prima Win and SCIA • ESA PT when realizing the project.

The challenge in the calculations of the project was found in the different aspects of steel calculation and in the design of an architectural bridge for heavy loads.
For this ESA-Prima Win and SCIA • ESA PT were the most suited software because of the variety of possibilities to check the structure to the limit, based on linear calculations, EC 3 steel check control, stability control and second order calculation in one software program. This could be done in a user friendly and structured software environment.

Used modules:

- Base
- 3D frame
- 3D shell
- Stability frame
- Second order calculation
- Steel code check (EC3)
- Rib calculation
- Graphical sections
- Cross sections with variable height



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Victor Buyck Steel Construction

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NAAMLOZE VENNOOTSCHAP
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STEEL CONSTRUCTION
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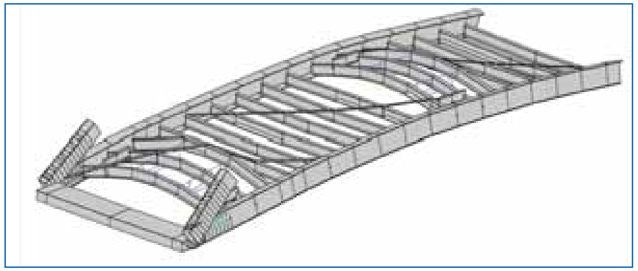
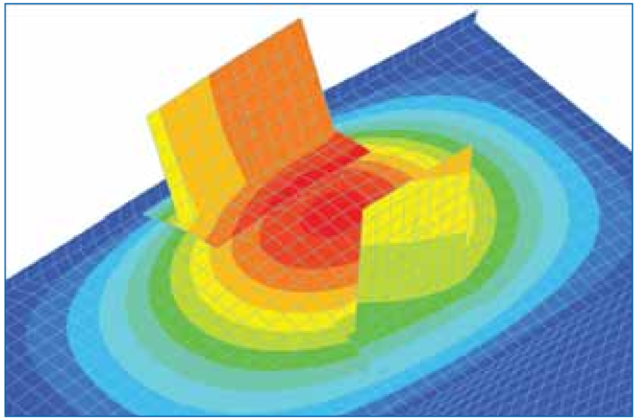
With a production capacity of 35.000 tons a year, Victor Buyck Steel Construction has been going strong since 1927 and has developed into an international group, with 4 production facilities in Belgium and Malaysia, and a sales branch in the UK. The company currently has production sites in Eeklo, Wondelgem (BUMAR), Hamont-Achel (CSM) and Kuala Lumpur (VB Malaysia). Our company employs 520 people and offers a turnkey solution to its customers, from engineering and fabrication, to anti-corrosion treatment, transport and erection. The company has extensive experience of major steel construction projects worldwide and continues to expand its activities and invest in the most modern computer controlled fabrication equipment.

The company is proud to display the ISO 9001 Quality Certificate and the VCA** Safety Certificate. Our success has always been based upon a policy of international growth. Yet we have never lost sight of our roots and we retain a respect for family values. The company has a policy of continuous investment in people, training and production technology. We specialize in two main areas: whilst on the one hand we focus on civil engineering, which is predominantly within the public domain, including transport and infrastructural projects like barriers, locks, bridges or viaducts; we also concentrate on the private domain, which incorporates tall office buildings, sports and leisure infrastructure as well as heavy industrial construction work. Our service goes from design through to the erection of the building. All this can only be achieved because we have experienced and qualified people helping the customer at every stage of the construction process. Building in steel requires more technical knowledge than building in concrete and as a result we like to get involved in project nearer their conception, so that we can assist in finding the best technical and economically viable solution. VBSC has been involved in a number of significant projects such as the Swiss-Re building in London (12.000 T), several high-rise building at Canary Wharf, the lift bridge at Rouen (FR – 3.500 T), the Pont de l'Europe sur la Loire (with Santiago Calatrava) at Orléans (FR – 5.400 T) and the Demka II railway bridge over the Amsterdam-Rijnkanaal in Utrecht (NL – 5.500 T).



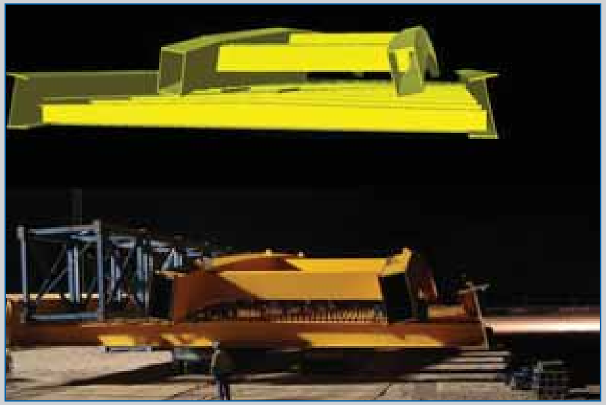


Used software • SCIA • ESA PT, ESA-Prima Win

Combibrug Utrecht

Combination bridge in Utrecht

The new Combibrug in Utrecht provided some really exciting challenges to its contractor: Victor Buyck Steel Construction. A major engineering effort went into the erection study of this particular bridge. To be built over the Amsterdam-Rhine Canal this bridge will be floated to its place during a 36h time window. Since it can only be partially erected in advance and the structural loading during this phase bears little resemblance to the final one, an extensive study had to be done. Without access to the principal calculation or support from the designers this meant it could only be successfully completed with the help of advanced structural analysis software such as ESA.



When the Dutch Municipality of Utrecht was confronted with a railroad expansion that would take the place of one of the key access bridges to the city, their city planners had a vision. The new bridge would be double as wide as the one it was to replace and its new capacity would be used exclusively to give place to a dedicated bus lane travelling in and out of the city. Additionally, in the best of Dutch traditions, the pedestrians and cyclists were presented with a majestic, 7m wide sidewalk cantilevered on the south side of the bridge.

The designers opted for a tied arch to span the 170m. The arches supporting the 27m wide deck would be 12° inclined to the centre of the bridge and would give it a very recognizable shape. Each arch was to be connected to the deck by means of 56 almost filigrane (d 140mm), diagonal ties. The deck as such– a mixed steel-concrete construction – would stretch 20m between the arches, providing 4 lanes of traffic and would extend on an additional 7m in cantilever providing for a spacious sidewalk. The total weight of the structure would amount to 6200t: 2200t structural steel, 3200t concrete, 680t road finishing and 120t street equipment.

This bridge, the Combibrug, is to be placed adjacent to the existing bridge. Contrary to the erection of most buildings the erection of a bridge generally creates a whole intrinsic set of engineering problems. This is particularly the case for an arch bridge as the structure needs to be complete before it acquires its load bearing capacity. Since the bridge spans over the extremely busy Amsterdam-Rhine Canal temporary supports are not an option as this would severely reduce the capacity of the canal. This means that the bridge has to be prefabricated 500m down site and floated on a barge to be jacked in place during a 36h blocking of the canal.

Although the principal calculation was finished even before the start of the bidding, a lot of engineering was yet to be done: pre-cambering, pre-stressing the ties, transporting the 700t prefabricated pieces on-site and floating the assembled bridge into place. Since VBSC did not have access to this principal calculation - they were to be used as a mean of verification – and some of the tasks still required an accurate model of the bridge it was decided to build a full calculation model from the ground up.

The floating of the bridge was the main source of technical challenges during the erection process: since the abutments are 80m further apart than the width of the canal, it was necessary to support the bridge far away from its intended bearings during the floating.

This in turn meant that the concrete deck could only be applied after the bridge was put in place. The arches simply could not carry the weight of the concrete while only being supported at ca. 1/3 of their span. After the floating the bridge would span the 170m without the concrete deck and so without its main source of lateral stiffness. As the bridge has an asymmetrical cross-section – there is a 7m sidewalk on the south side but not on the north side – this causes a 3-dimensional, warped pre-cambering due to the lack of lateral stiffness. It is evident that these challenges could only be successfully tackled with a flexible and accurate calculation model of the bridge at hand.

Engineering started with making a model of the bridge including its concrete deck to determine the pre-cambering. The model was set up in ESA-Prima Win using a line-model for most of the steel structure and using 2D-plates for the concrete deck and some steel plates.

Later on came the transport of the pre-constructed pieces to the assembling site. Boundary conditions like the width of locks and the heights of bridges between the factory and the site, as well as the accessibility of the barge severely limit the operable positions of the hydraulic trailers supporting the pieces. Full use was therefore made of the model to verify the stability of the cross-beams during the ro-ro operations. The slenderness of these beams even necessitated to take the internal working of the trailers and their stiffness into account, all of which was easily accommodated by ESA Prima-Win.

While the bridge features an aesthetically, as well as a structurally elegant design, the absence of stiffeners and the inclination of the arches provided some challenges in handling the pieces of the arches – their weight can go up to 200t. The special corrosion protection limited the possibilities for placing lifting hooks while they had to withstand forces from widely different angles with no stiffeners close. Yet, a FEM plate model allowed for a bolted connection to be used so the removal of these hooks would not damage the corrosion protection.

The next step was to prestress the hangers. The tensioning sequence could be determined through the use of a single model that rendered the absence of ties and intermediate supports. Removing elements trough the use of absences turned out to be a very versatile tool.

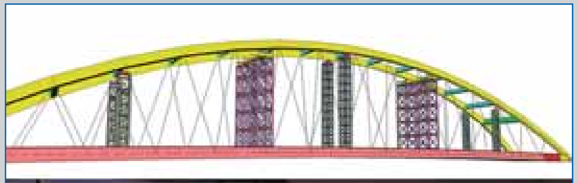
This brings us to the centrepiece of the engineering challenges involved in the erection of the Combibrug: its floating into place.

The first one is the verification of the integrity of the bridge during its transport. As mentioned earlier on, the width of the canal and the placement of the abutments make it impossible to transport the bridge on its proper bearings. A suitable lifting configuration was found that kept stresses within limits in the arches and supporting girders, however, it caused compression in the ties. While the buckling stability of some of these extremely slender ties (l > 1000) is not covered by the governing norms, the use of analysis software provided an attractive solution.

Rather than heavily reinforcing the ties as to deal with negative strains, a geometric second order analysis of the structure as a whole revealed something unexpected about their extreme slenderness. It turned out that under small negative strains they buckled out in an elastic manner. This is a prime example of how an integrated approach can yield unexpected solutions.

The final engineering challenge concern the towers supporting the bridge during the floating operation. Only the arches can bear the full weight of the structure and the deck can not be vertically restrained due to large deflections involved. The towers supporting the bridge are essentially free-standing and go through a series of different configurations: on top of trailers on the assembly site, while transferring to the barge and finally while jacking to reach the level of the abutments (7m in total).

To make this happen in an orderly and safe manner a virtual environment is required in which all aspects of the structure can be explored: from the non-linear behaviour of the bridge up to making provisions for the effects of settlements caused by the uneven terrain under the trailers. ESA provides just that and allows the engineer to concentrate on what is really making a difference.



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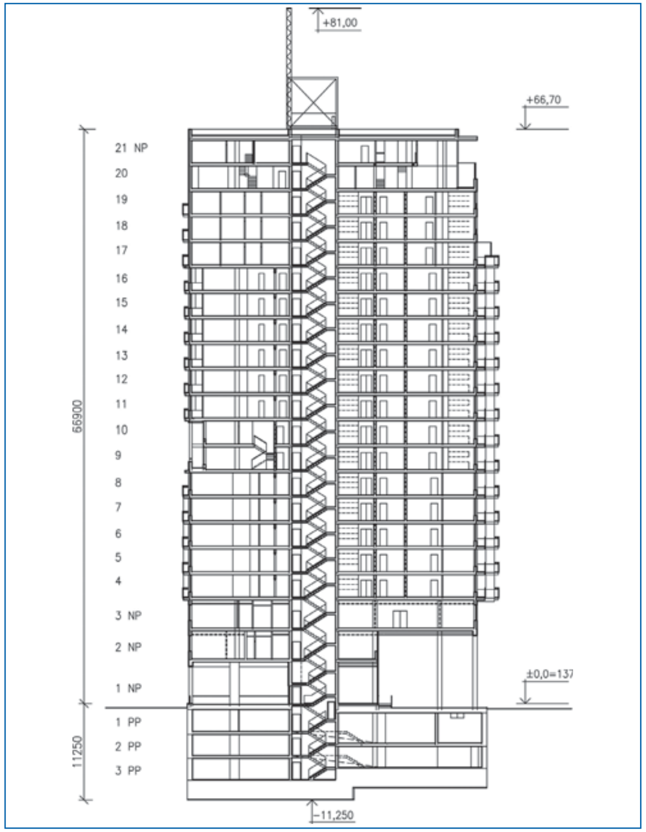
BARAN PROJEKT s.r.o.

Multifunctional Building Universo

After finishing my studies at the Slovak University of Technology in 1976, I started to work as a civil engineer. Until 1990 I worked in a company as the responsible civil engineer. Since 1990 I have become an independent structural engineer. I am a member of the Slovak Chamber of civil Engineers.

In my office we are working with 4 - 10 civil engineers according to the volume of the work.



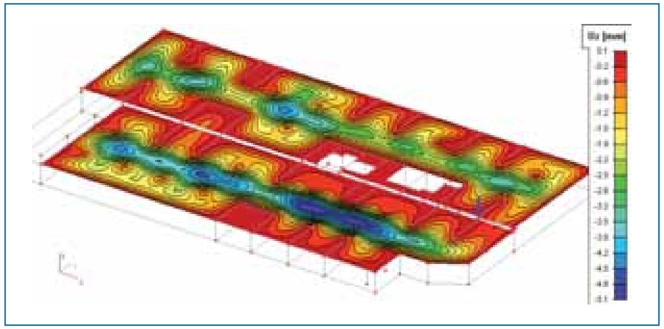
Used software • SCIA • ESA PT (Soilin)

In general

„Universo" is a multifunctional building near the centre of Bratislava city. Neighbouring streets and other buildings surround the excavation. The architectural design was made by Partner-Projekt s.r.o., Bratislava. The building is designed as a dilatation unit, even by the difference in height – 8 and 21 floors. The maximal height of the building is 78 m.

Geological conditions

According to the results of the geological investigation of the surface, the area consists of anthropogenic sediments of approximately 2-3m depth. Underneath descends a complex of dirt-sand sediments silt up by the Danube River; it's mostly sand-clay soil. The footwall of the stated is mainly consistent but it is also composed of sand-clay grounds and a gravel-sand complex (about 10-12m deep). This gravel is mostly mellow. There are neogenic sediments below.



Multifunctional Building Universo

„UNIVERSO" is a multifunctional building near the centre of Bratislava city. Neighbouring streets and other buildings surround the excavation. The building is designed as a dilatation unit, it is very remarkable by the difference in heights, one part is composed of 8 floors, the other one of 21 floors. The maximal height of the building is 78 m.
The main bearing system of the building is created starting from a cast in place reinforced concrete skeleton with reinforcement walls around the vertical communication core.

Underground water was found during the exploring bores in the depth between 5,10 to 5,30 m under the surface.

Foundation

The optimal solution due to the geological conditions is the foundation raft in the gravel level integrated under the tower with the 920 mm thick piles, which are concurrent with the foundation raft. Piles are designed to eliminate the different settlements under the tower and the 8-floor part. The raft will be locally thickened in the columns area up to 1200 mm. The retaining walls, 550 mm thick, are designed around all excavations and the depth of the foundation is 10,2 m. The retaining wall is used as a structural bearing element and because of the level of the underground water, it has to be waterproof.

Bearing system

The main bearing system of the building is created starting from a cast in place reinforced concrete skeleton with reinforcement walls of the vertical communication core. The walls thicknesses go from 300 mm to 200 mm. The object has 3 basement floors and 21 upper floors. The construction heights of the basement floors are 2,8 m and 3,15 m, the construction height of the ground floor is 5,3 m, the 2nd and 3rd floor have a construction height of 3,6m, and the construction heights of the remaining floors are 2,975 m. One part of the ground floors' surface is created by a space going through 2 floors, so the columns height in these places reaches 9 m. The prevalent module step in the longitudinal direction is 5,0 and 5,4 m, and in the cross direction 5,4 and 6,2 m. The remaining bearing constructions are reinforced concrete columns and walls. The type of the concrete of the columns is C30/37. The horizontal bearing constructions are monolithic, reinforced concrete and slabs, designed from a C25/30 concrete in the whole extent. The thickness of the slabs is 200 and 210 mm, except the slab above the 1st basement, because the implicit loads during the construction were supposed. Therefore the thickness of this slab is 350-400 mm. In order to secure the slab against the shearing efforts, welded reinforcement are placed around the columns as a shearing reinforcement. The reinforcement of the slabs is created by the KARI mesh with additional reinforcement.

Structural calculations

The SCIA • ESA PT R6.0 software, using the finite element method, realized the calculations. The whole object was simulated in the 3D model. The loads are calculated according to the valid Slovak standards. The module Soilin was used to simulate the footwall; the piles were simulated by the flexible support. The underground construction wall was simulated as a flexible line support with firmness calculated from the vertical reactions and settlement of max 10 mm.

Dopravoprojekt a.s.

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History

Dopravoprojekt was established on May 1st 1949 in Bratislava. In 1960, in former Czechoslovakia, Dopravoprojekt was transformed into the National Institute for Design of Transport Related Structures with headquarters in Bratislava and branch offices in Prague and Brno. After forming the Czechoslovak Federation in 1969, the Institute was divided into three separate national design institutes. In July 1989, the National institute Dopravoprojekt had been transformed into a state-owned company. From May 1, 1992 Dopravoprojekt is an independent private joint stock company.

Company mission, vision and philosophy

- To provide engineering and consulting services for the public and private sector in transportation, architectural, water and environmental engineering including environmental analyses and assessments.
- To meet the client's needs and expectations through our commitment to excellence and expertise.
- To perform our services creatively, on high professional level, with particular emphasis on professional ethics and social and environmental responsibility.
- To create motivating working environment for our people with the objective to recruit and educate leading experts in their profession to provide professional services and thus to ensure lasting prosperity of the company and its future growth.
- To contribute in a broader context to the growth of our profession and its public appreciation.

Company structure

Dopravoprojekt is a multidisciplinary company, which employs 240 people in its head and branch offices located in all parts of Slovakia (Levice, Liptovký Mikuláš, Prešov, Zvolen and Žilina).

Key activities

The main activities of Dopravoprojekt concern all stages of planning and design of:

- Motorways and roads
- Railways and mass transit structures
- Bridges
- Water and enviromental structures
- Buildings

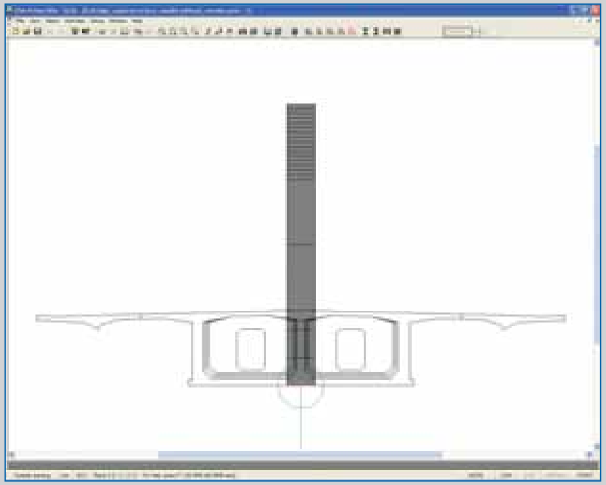
Target groups

The public sector is represented by the National Motorway Company, Slovak Road Administration, Railways of the Slovak Republic and municipalities.

References - bridges and fly-overs

- The "New Bridge" over the River Danube in Bratislava (Bridge SNP).
- The "Lafranconi" Bridge over the River Danube in Bratislava.
- The "Riverport" Bridge over the River Danube in Bratislava - adjoining flyovers.
- The "Apollo" Bridge (Košická) over the River Danube in Bratislava.
- The bridge over the River Danube in Medvedovo.
- The bridge over the River Danube between Sturovo (Slovakia) and Ostrihom (Hungary).
- Motorway viaduct at the village Podturen.
- Motorway Flyover „Prievoz" in Bratislava.
- Viaducts in Žilina, Banská Bystrica, Bridge "Pustý hrad" over the River Hron at Zvolen and a number of other long-span motorway bridges at Liptov (Dovalovec, Bela, Hybica, Vychodna, Janosikova studnicka, etc.)

Motorway Bridge over River Vah in km 9.068



Motorway Bridge

This project deals with increased effectiveness of external tendons, situated in a box girder by lifting them above bridge superstructure. By passing external tendons through a deviator above a bridge pier their uplift effectiveness increases, which enables to reduce substantially the section depth . This type tendons is called "extradosed" (ED). The advantages of this system, were utilized at designing 2 long-span bridges within the 9.7 km long section of the D1 motorway, running through Považská Bystrica (Slovakia).
One of these bridges is the motorway Bridge over the River Vah at km 9.068. It carries the D1 motorway over the Váh River and the adjacent flooding area at the end of the motorway section "Sverepec – Vrtizer".

Used software • Nexis (ESA-Prima Win)

Introduction to the project

The incessant endeavour to build more graceful, slender and more attractive bridges leads their authors to propose new construction systems and more resourceful designs including the higher value added to basic materials. Also the bridges using "extradosed" system shall be included in this group.
To increase the effectiveness of external tendons of box girders leads to raising them above a deck. Increased uplift effectiveness of external tendons passing through a deviator above the bridge pier enables to reduce substantially the section depth. This type of prestressing and tendons is called "extradosed".

General description of the project

The advantages of this system were utilized also when preparing the designs of 2 long-span bridges within 9.7 km long section of the D1 motorway, passing Považská Bystrica (Slovakia). One of them is the motorway Bridge over the River Váh in km 9.068, which carries the D1 motorway over the river and its flood area at the end of motorway section "Sverepec – Vrtizer".

Bridge superstructure

The overall bridge length of 317 m will be constructed as a continuous girder with 5 spans (40 + 62 + 110 + 62 + 40 m). The depth of deck is 4,0 m; the height of the pylon is 11 m. The double-cell box girder, 29.85 m wide, has the 6.2 m long cantilevers supported by reinforced-concrete struts. The longitudinal prestressing of the deck including inclined ties in the section is similar to cable stayed systems. The bonded tendons were used during the cantilevered construction method in the first stage and extradosed type of external tendons was continually added. The continuity external tendons are assumed to be tensioned again after concrete pour of the last section.

The first and last spans are built conventionally using falsework supported directly from the ground. The construction method of the rest of the bridge is similar to "free cantilever". The double-cell box girder built by the "free cantilever" method will be gradually widened by struts and cantilevered deck slab to full section width. After concrete pouring and hardening, the deck slab is prestressed transversally by monostrands.

Bridge substructure

The circular bridge piers are situated only in a flood area. Because of the geologically heterogeneous soil they are supported by concrete piles (dia.1200mm).

Basic materials used and indicators of their quantities

Because of the complexity of the design, it was necessary to use C45/50 concrete. The steel reinforcement 10 505 (R), the 15 and 19-strand prestressing tendons (Ls 15,5 - 1800 MPa) and tie prestressing bars of CPS Ø 32 will be used.

The indicators of quantities of basic materials (bridge over the Váh River):

- Concrete: 0.95 m^3/m^2
- Steel reinforcement: 156 kg/m^2
- Prestressed reinforcement - Longitudinal: 37.2 kg/m^2
- Transverse 3.6 kg/m^2.

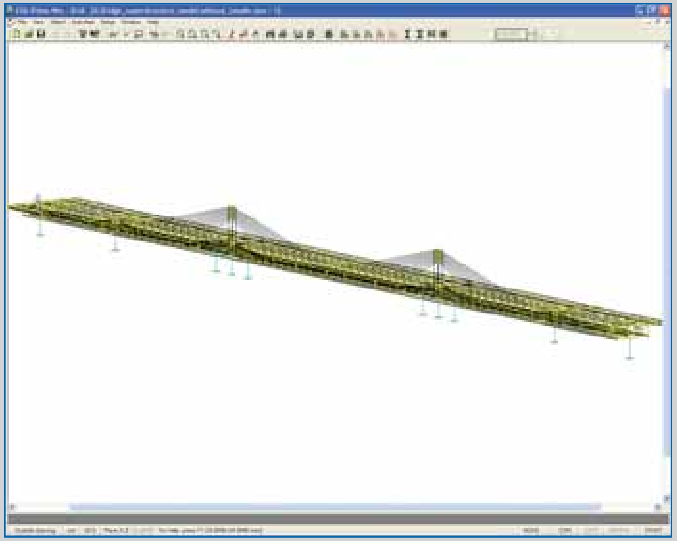
These indicators are approximately in accordance with indicators of other types of superstructures with similar span. However, the main advantage of this type of structure is the possibility to lower substantially the vertical alignment of the road and narrow substructure width, which is significant particularly in case of bridges situated high above urban areas.

Used software solutions

Due to staged construction, was it neither possible nor convenient to analyse the whole structure by one model. The global effects were assessed by the beam model taking into account construction stages and material rheology. To assess local effects, we had to create more than 20 models using shell and beam elements Cross-section stages - Three stages in transverse direction are required to build a section. At first, a double-cell core section without overhangs and concrete struts is poured, and then reinforced concrete struts with portions of overhangs and the rest of overhangs. In the beam model, longitudinal flexural stiffness of concrete struts was ignored and they were taken into account as a load. Prestressing – Two types of tendons (bonded and external) were applied in the beam model. Presstressed ties ensuring transfer of vertical forces of extradosed cables into vertical walls of a box girder section were neglected in the beam model but their effect was analysed by 3D shell element model. Construction stages – 80 construction stages were analysed by the beam model. The falsework supported on ground was modelled by "point-line" support and ageing of concrete of free cantilever by a negative relative time of a section concreting.
Results - We used the TDA (time-dependant analysis) module to analyse the bridge superstructure. The design was carried out in accordance with the Slovak national standards (allowable stress and degree of safety design method). The core sections are fully presstresed (no tension in concrete) and the overhangs at the walls are designed for tension less than concrete strength in tension (limited prestressing).
We studied the following results:

- Concrete stresses
- Stress in bonded tendons
- Stress in external tendons
- Principal stresses in concrete
- Degree of safety

The longest span of this bridge is 110 m and the width of the bridge is 29.85 m. Area of this span can be represented by half a football field. The bending moment at pylon was 810 MNm and 270 MNm in the midspan. These huge forces made the design extremely complicated and time consuming with more than 30 alternatives.



Modélisation et calcul du pont de Fétinne à Liège

Ecole Centrale des Arts et Métiers (ECAM)

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L'ECAM est une institution d'enseignement et de recherche appliquée ayant une expérience centenaire dans la formation des ingénieurs. Elle fait partie de la Haute Ecole Léonard de Vinci, laquelle appartient au réseau libre subventionné par la Communauté française de Belgique.

Les points forts de l'ECAM

Les ingénieurs industriels de l'ECAM sont présents dans tous les grands secteurs d'activité.

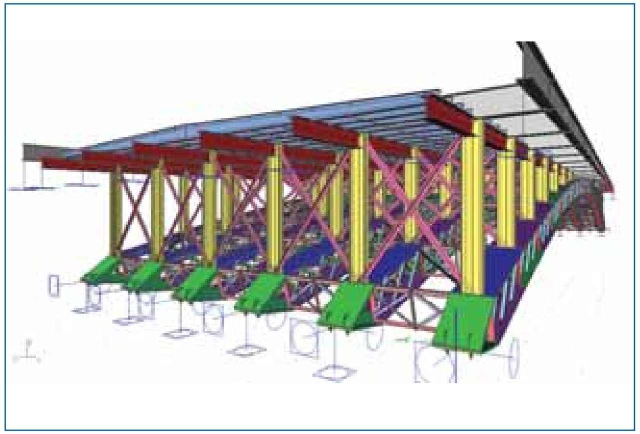
Des entreprises de toutes tailles font appel à ses compétences. La demande d'ingénieurs ECAM ne cesse de croître dans les entreprises, ce qui constitue à la fois un encouragement, une marque de confiance mais aussi un défi à relever par l'ECAM pour améliorer en permanence la formation dispensée.

Histoire et perspectives

- 1898 : fondation de l'une des premières écoles professionnelles de Bruxelles : l'Ecole Notre-Dame du Travail qui se développe rapidement et devient l'Ecole Professionnelle des Métiers axée principalement sur le laboratoire et l'atelier.
- 1905 : une section supérieure s'ajoute aux sections existantes pour former en trois années d'études des brevetés. L'établissement prend le nom d'Ecole Centrale des Arts et Métiers. L'ECAM est née.
- 1977 : la loi crée le grade et le diplôme d'ingénieur industriel de niveau universitaire organisé en 4 ans : un premier cycle de 2 ans délivrant le grade de Candidat Ingénieur Industriel et un second cycle de 2 ans, la licence, conférant le titre d'Ingénieur Industriel. Deux sections sont organisées : l'Electromécanique et l'Electricité option Electronique. Une troisième section est crée : la Construction.
- 1979 : Première promotion d'Ingénieurs Industriels en Construction.
- 2000 : l'école prend le nom de : ECAM Institut Supérieur Industriel et crée une ASBL associée gérant son patrimoine : Centre de Promotion de l'Ecole Centrale des Arts et Métiers.

Quelques chiffres

Près de 700 étudiants, plus de 70 enseignants, plus de 3.800 diplômés dont près de 1.300 au cours des dix dernières années.



The Fétinne bridge in Liège

The project consists in the modelisation of the Fétinne Bridge in Liège (Belgium). The aim is to evaluate the solicitation of the structural elements in order to plan a complete renovation. After the introduction of the structure in the program, we found that some hypotheses taken during the transposition from the existing structure gave too high efforts in some elements.
This project is the first part of the general study, the next step will be the placing plates on the structure in order to distribute the efforts on the top of the bridge. After that we will be able to conclude what actions are necessary to accomplish a complete renovation.

Used software • SCIA • ESA PT

Modélisation et calcul du pont de Fétinne à Liège en vue de réhabilitation lourde

Introduction

L'étude menée dans le cadre d'un travail de fin d'études a pour objet la mise en place d'un outil de contrôle des éléments structurels du pont de Fétinne à Liège. Pour ce faire, on se base sur les inspections du Ministère de l'Equipement et des Transports (MET) et sur la modélisation et le calcul de l'ouvrage. Celui-ci datant du début du vingtième siècle (pour l'Exposition Universelle de Liège de 1905) et construit en acier riveté, est toujours actuellement en service et supporte un trafic important (± 47.500 véhicules par jour).

Vu l'époque de sa construction et du type de corrosion qui s'y développe (corrosion superficielle en « mille-feuilles »), on peut vraisemblablement penser qu'il s'agit de fer puddlé, assimilé du point de vue des caractéristiques à de l'acier S 235, bien connu actuellement. L'état de santé actuel de l'ensemble des éléments impose d'y effectuer de lourds travaux de rénovation.

Ce projet, mené en collaboration avec le MET, permet de mettre en application des moyens de calcul qui n'étaient pas disponibles à l'époque de la construction de l'ouvrage et de contrôler le taux de sollicitation des éléments structurels. Ceci afin d'apporter des solutions de rénovation répondant le mieux possible à l'état de dégradation du pont.

Par ailleurs, la modélisation et son calcul pourront être utilisés pour contrôler le pont durant la phase de rénovation proprement dite.

Description générale du projet

La superstructure du pont (± 4500 barres) se compose d'une arche constituée de six arcs surbaissés triarticulés isostatiques. Les naissances des arcs ont une entre distance de 60,562 mètres et sont situées sur un même axe horizontal. La flèche, au droit de la clef, est de 4,326 mètres par rapport à cet axe.
Les arcs, distants de 2,68 mètres les uns des autres, sont des profilés en caisson reliés par des entretoises et des contreventements horizontaux.

La jonction des arcs au tablier se fait au moyen de montants contreventés verticalement. Il est à noter ici que le tablier n'est pas symétrique en rive gauche et en rive droite, contrairement aux arcs. En effet, le profil en long du terrain présente une différence de niveau de 1,082 mètres entre les deux rives.
Le tablier est réalisé au moyen de profilés longitudinaux prenant appui sur les montants. Sur ces éléments viennent s'appuyer des sections transversales à inertie variable, formant l'allure transversale de la chaussée. Des cornières longitudinales empêchent le déversement de ces sections.

La chaussée comporte actuellement deux bandes de circulation de 5 mètres de large et deux trottoirs de 3,1 mètres. En 1905 le pont était prévu pour deux voies de tram à l'axe du pont et deux voies charretières de part et d'autre. Actuellement, le pont de Fétinne a une classe de portance de type normal, à savoir des véhicules £ 44 tonnes par bande de circulation.

L'ensemble de la modélisation de la structure comporte 4607 barres, 2447 nœuds et 29 types de profilés.

Méthode d'approche du projet

Le pont est tout d'abord modélisé sur base des plans originaux dans le logiciel de calcul (SCIA • ESA PT) et ce sur 14 calques différents.

Après introduction des combinaisons d'actions regroupant les charges permanentes (poids propre, tôle de platelage, revêtement routier et garde-corps) et variables (foule, convois, freinage et accélération, vent) agissant actuellement sur le pont, le programme de calcul fournit les états de contrainte de chaque type de section utilisée.
La phase suivante consiste à examiner les rapports d'inspection du MET. Ceux-ci fournissent un classement des éléments structurels selon leur état de dégradation. En attribuant un pourcentage de dégradation forfaitaire à chaque niveau de dégradation, on peut y assimiler un pourcentage de réserve de contrainte disponible pour chaque type de section. La mise en parallèle de ces données avec les résultats de calcul permet de déterminer si le profilé est proche de son état critique ou non et, par la même, de définir les actions à y appliquer.

Défis techniques

Les plus importants défis techniques rencontrés ont consisté en la transposition d'une structure réelle composée essentiellement de plats métalliques et de rivets dans le logiciel de calcul. En effet, actuellement les rivets ne sont plus utilisés dans la réalisation des assemblages de structures hormis en rénovation. Dès lors, toutes les liaisons des éléments ont du être approximées à des nœuds ponctuels.

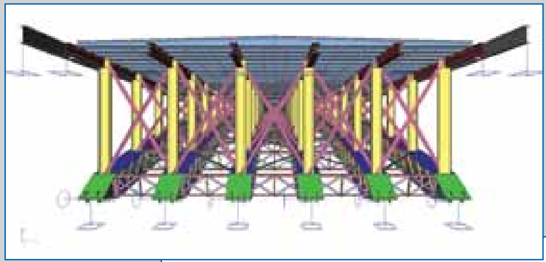
D'autre part, les sections transversales des éléments structurels du pont de Fétinne ne sont pas des sections classiques que l'on peut retrouver dans les catalogues de profilés du logiciel. Ces sections ont donc été redessinées en tant que 'sections graphiques', SCIA • ESA PT calculant leur masse, inertie, etc.

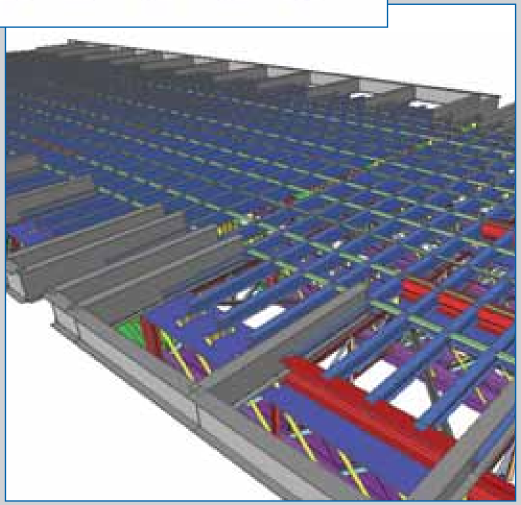
Un troisième défi technique important a été l'introduction des charges sur la structure. Les plaques du platelage du pont n'ayant pas été modélisées, on ne pouvait pas y appliquer de charges mobiles. Ces charges ont alors été réparties sur les profils transversaux formant l'allure de la chaussée, ceci entraînant des efforts anormalement élevés dans les profilés transversaux et, par la même, dans les montants de l'ouvrage. La solution envisagée a consisté en le placement de plaques sur l'ouvrage.

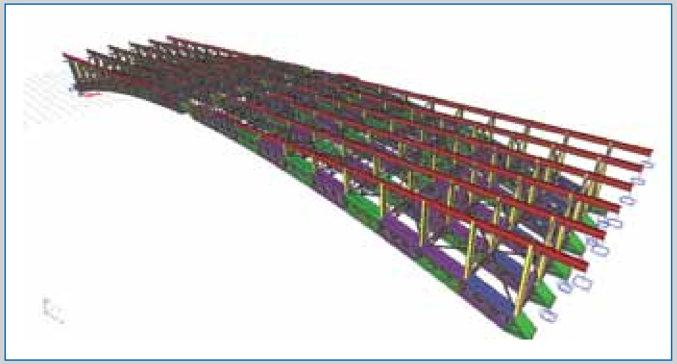
Résultats et conclusions

Le projet, développé durant un an dans le cadre d'un travail de fin d'études, est une première phase de l'étude complète de la rénovation du pont de Fétinne à Liège. La modélisation, affinée sur base de l'analyse des résultats permettra au Ministère de l'Equipement et des Transports (MET) de déterminer quels éléments du pont sont à rénover, voire remplacer.

On pourra aussi utiliser le modèle pour le dimensionnement des échafaudages, pour le contrôle du pont durant les différentes phases de travaux, pour optimiser la structure et bien d'autres applications encore...







MM Projekt, Ing. Miroslav Mačičák

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Bridge for pedestrians over the Poprad River

The firm MM Projekt of Ing. Miroslav Mačičák was founded in the year 1996.

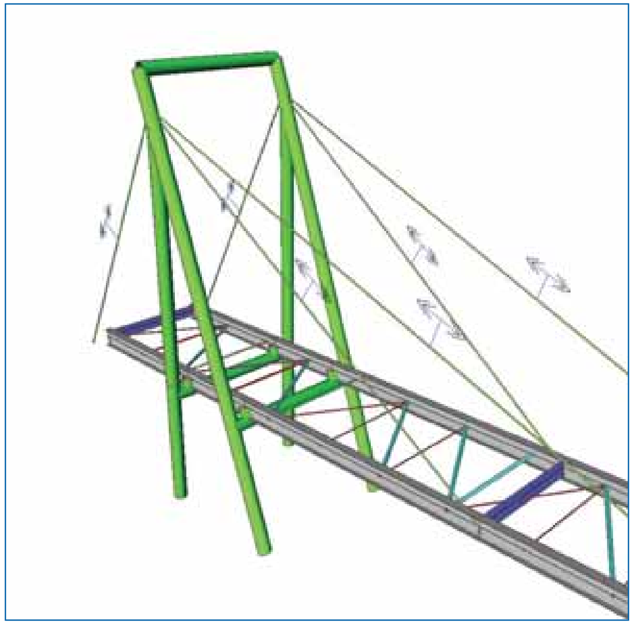
It is active in the region of the High Tatras for 10 years now. We have been taking part in many important investing projects, the main activity is the design of building constructions and the engineering of structures. From our initial cooperation with an architect at creating the constructors' philosophy from the statics point of view, continuing by project design or preparing economical possibilities of used materials on supporting structures. We are also dealing with aerial cableways in cooperation with the Slovak company Tatrapoma, a.s.

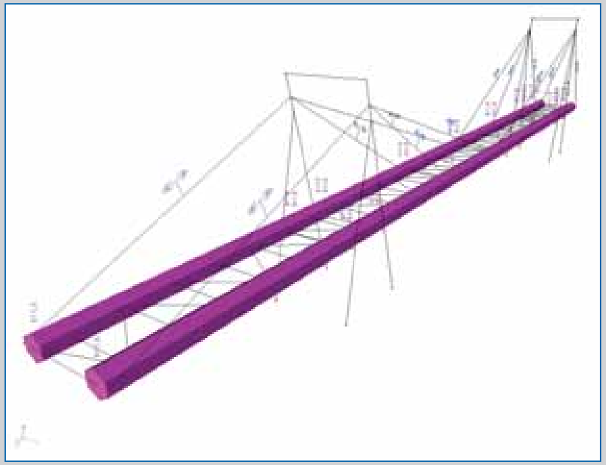
Our company is equipped with Cad PC, on which we are able to process information of the project, documentation of the structure, statics from architectural object studies, the structure of the project for the building permit, up to the own inspection.

Our studio offers complete project documentation of structure statics, structure diagnosis, whereupon we secure our expertness, quality and professionalism.

Our most important references are:

- Steel construction of the company Plastiflex Slovakia, 192 tons (manufacturing documentation);
- 24 storied block of flats - Kežmarok, Slovakia (ferro concrete cast construction using of Predos ceiling couple plates);
- Additional building of the Grand Hotel Praha - Tatranská Lomnica, Slovakia (mixed construction of ferro concrete, brickwork material);
- Aerial cableway TS 2 IGORA Sankt Petersburg, Russia (length of oblique route 944,20m);
- Aerial cableway TS 4 Gladenskaja Sajanagorsk, Russia (length of oblique route 1348 m);
- Aerial cableway TS 3 Portásovy Boudy in Velká Upa, the Czech Republic (length of oblique route 1464 m).





Bridge for pedestrians

The project is about a footbridge over the Poprad River. It is a triple-pole suspension bridge; the main bearing member is a joist, of which leaning cable suspensions reduce the span. The function of cables and pylons is evident and comprehensible at first sight.
Ropes, cable ropes with a small diameter vanish in the whole picture and the construction has a very pleasant effect.
The steel construction is made of all-welded, rolled IPE bridge floor profiles with framework stiffeners.
The bridge has a length of 63,94 m, from this length a total of 52,927 m is a steel construction; the width is 2,95 m.
The ropes are steel coiled single-row transformed STN 02 4315 with a nominal diameter of 35,3 mm (1+6+12+18+24+30), the nominal wire resistance is 1370 Mpa/mm².

Used software • SCIA • ESA PT

Author: Ing. Ach. Rudolf Kruliac, Ing. Jozef Petrík
Investor: The town of Kežmarok
Statics: Ing. Mirolav Mačičák, Ing. Peter Purtz
Date: June 2005

Construction Parameters

The bridge type: Foot Bridge
Action of statics: Triple-pole suspension construction
Steel construction type: All-welded pylon, rolled IPE bridge floor profiles with framework stiffeners
Cross angle: with the main channel of the Poprad River
Bridge length: 63,94 m, from this 52,927 m steel construction
Width: 2,95 m
Roadway: wooden fore-and-aft road
Ropes: Steel coiled single-row transformed STN 02 4315 nominal diameter 35,3 mm /1+6+12+18+24+30/, at the nominal wire resistance 1370 Mpa/mm^2
Pylons: All-welded, shaped O

Material:
Steel S 235, steel S 335, S 355 JO
Steel 120 504 R, 10 425 V
Steel cable terminal 35,5 STN 05 4456/E
Broadleaved species Oak - class SI
Concrete C 25/30 A3L T100 according ST 731201

Construction Description

At suspension bridges the main bearing member is a joist, which span is reduced by leaning cable suspensions - conducted through pylons and affected on the supports again by leaning tensions.
The function of cables and pylons is evident and comprehensible at the first sight.
Ropes, cable ropes with a small diameter vanish in the whole picture and the construction has a very pleasant effect.

Railing: Handrail created by O profile fi 60,3/5 mm, baluster created by O profile 88,9/4 mm, baluster range 3 m, vertical backing members are created by O profile 20 mm.

Bridge floor: It is made of wooden planks

Main girders: Rolled IPE 550 with framework stiffeners with theoretical height 550 mm

Pylons: They are created as O profile 355,6/20, or 355/6/6.5, in the lower part fixed into the foundation constructions.

Suspensions: Steel coiled single-row transformed STN 054315 nominal diameter 35,3 mm (1+6+12+18+24+30) at the nominal wire resistance 1370 MPa/mm^2. Direction of anchor plate sheets must correspond with the rope direction! Tightening force: drawing number 103.

Joints and tacking of bridge members: Steel construction is all-welded. Its parts will be made in the manufacture. A weld, alternatively screwed, makes assembling joints.

According to the results of geological survey the bridge filling is solved as following

Pylons
Pylons placing will be made on the ferro concrete foundations beams and piles with a diameter 600 mm, piles will be fixed into the rock R4, R2 of maxim. force capacity Uv 580kN. Designed height of pile fixing assumes steady level of watercourse depending on the heel pile height and mould height along the rock level R4. It is necessary to write into the building permit that the presence of a geologist, static expert, building surveyor while pile drilling is a must with a following prove of fixed pile height, prove of cantilever pile height (edge R4 and pile heel).

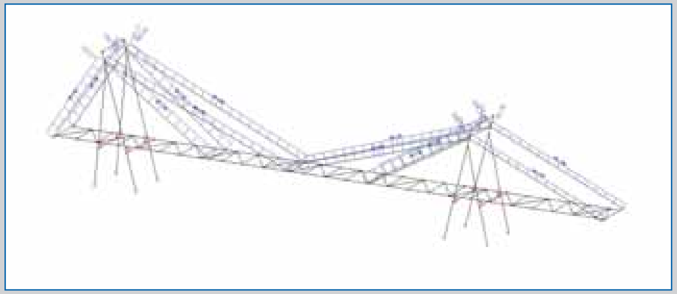
Left foundation rope (LIDL)
Foundation placement will be on piles, which will be fixed into the rock R4.
Right foundation rope

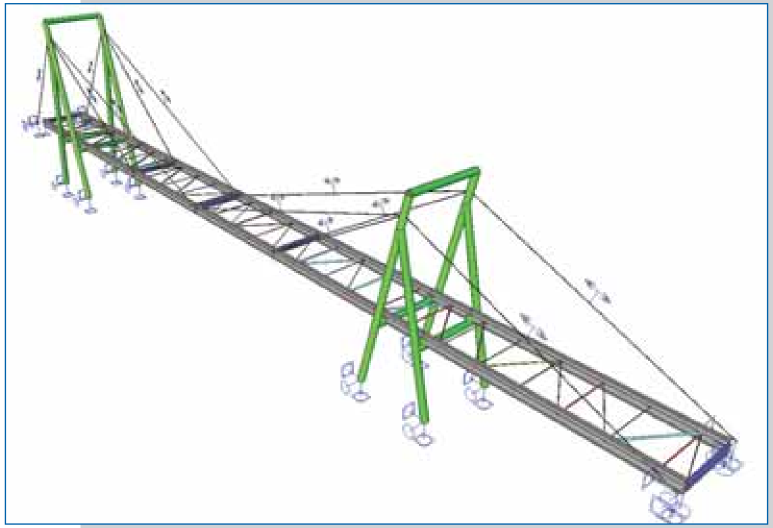
Foundation placement will be on gravels G3

Bridge calculation (dynamics, geometric non-linearity / Newton Raphson Method of calculation / dimensioning of sections) was made by the software SCIA•ESA PT 5.1.81, supplier SCIA SK Žilina, Nám. hrdinov 5 , 010 03 Žilina, Slovakia.

At the own calculation it was necessary to define correctly the elasticity rope modulus, which has a big influence by construction deformation. We have solved very carefully rope prestress, where the most optimal solution at the respecting have allowed sagging and rope safety there was by the type of rope determination as initial tension (SCIA•ESA PT).

According to the result of the own bridge frequency it was necessary to determine a dynamic coefficient loading.
From the economical point of view the combination of two main steel profiles IPE with a framework steel stiffeners was shown as the most optimal solution.





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The small private company of Ing. Daniel Bukov OK TEAM is specialised in the structural analysis of buildings as well as technological objects as pipes, vessels, bearing parts of machines, ...

I started my own small firm, as one of the many structural engineers in Slovakia in 1991. At that time I worked as a structural designer in one of the biggest Slovak designing companies.

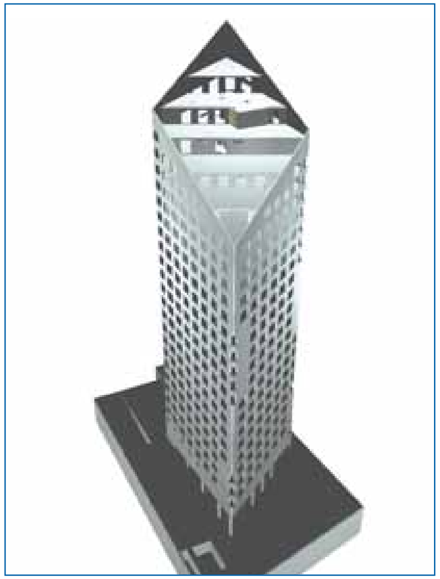
From the year 2001 on, I worked as a private structural designer, mostly for conceptual structural designers and for making calculations.

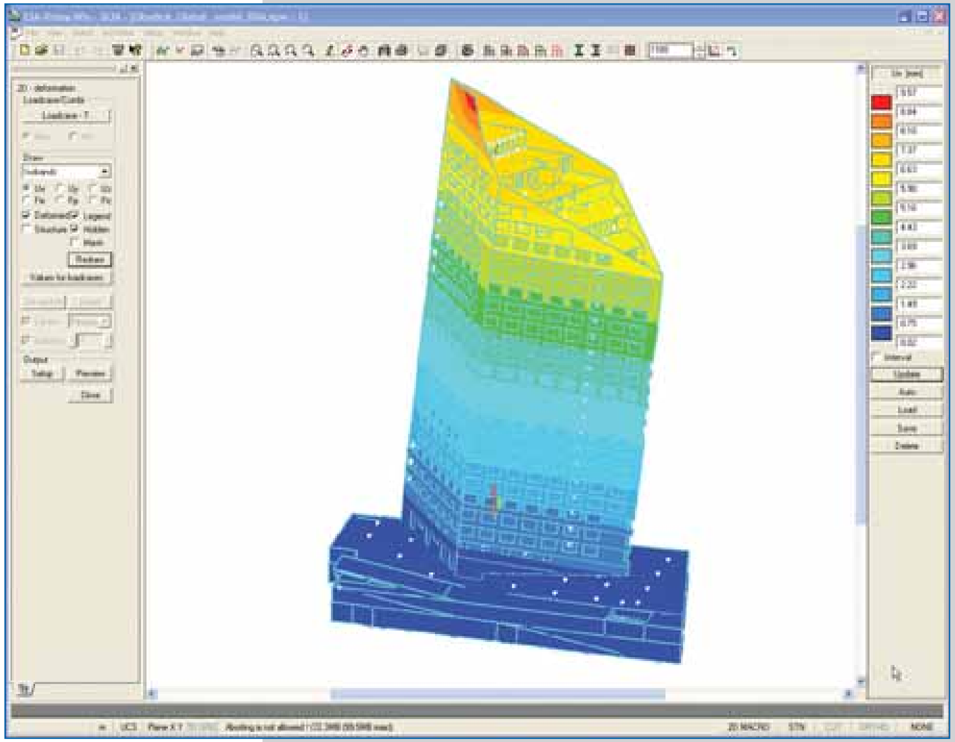
During this time a lot of things changed in my professional life: increased efficiency of computers, of operating systems and of course of computers program. In the beginning, I worked with the computer program NE-XX, SAPIV running under DOS, later on with FEMDESIGNER, STRAP, STAAD, SAP2000 and of course with ESA-Prima Win.

High rise building

High rise building

The project regards a block of flats “OBYDICK”, planned to be erected in Bratislava.
The total number of floors is 25 above ground level and two floors below ground level. The total height of the building is 85.27 m. The total area is more than 21 000 m², that is more than 650 m² per floor. The main bearing system of the building is created from cast-in-place reinforced concrete. In the middle of the building is located a small core with the dimensions 5.85 m x 12.5 m, the thickness of the walls is 200 mm. Oval columns support the surrounding concrete walls. These walls create an outside tube. The tube transmits a big portion of the horizontal loads. The thickness of the outside wall varies from 500 mm to 200 mm.





Used software • ESA-Prima Win

In General

The block of flats "OBYDICK" is planned to be erected in Bratislava. The structural design for the building licence was elaborated by ELTER Constructions s.r.o. of Slovakia. The detail structural design was elaborated by Ing. Daniel Bukov OK TEAM .

Basic Parameters of the Building

The total number of floors is 25 above ground level and two floors below ground level. The total height of the building is 85.27 m. The total area is more than 21.000 m², that is more than 650 m² per floor.

Main bearing system

The main bearing system of the building is created from cast instead of reinforced concrete. In the middle of the building is located a small core with the dimension 5.85 m x 12.5 m, the thickness of the walls are 200 mm. Oval columns support perimeter concrete walls. These walls create an outside tube. The tube transmits a big portion of the horizontal loads. The outside wall has thicknesses from 500 mm to 200 mm. The ground floor level has the thickness of the wall: 500 mm. On the inside layout circle there are located columns with diameter of 600 mm.

Method of Detail Designing

For the computation of the shape of the structure, cross sections, thicknesses and loads were taken into account. New information concerning the openings (location and dimension) were also included in the structural analysis. For the calculation of the main bearing system, the 3D model is created. For the separate parts, an own model was created (floor slabs, columns, attic etc.). The results from the global calculation are included into separate models as external loads or are included in the proportioning. All calculations are performed according to the Slovak valid codes.

Computational model

A 3D computational model, created by the finite element method, calculates the main bearing system of the building. The foundation slab, including soil interaction, core walls and columns, is exactly modelled in this space model. Floor slabs are also modelled precisely, but for computational reasons only a very large mesh is used. For the seismic response, the calculation linear response spectra method is used. For a combination of modal responses, the CQC method is used. Soil interaction has been solved with the theory of half space. The proportioning of the foundation slab and core walls is done in this model without any other influence or consideration.

For columns proportioning from the global structural calculation, only normal forces have been adopted. The bending moments were added from floor slabs analysis. All calculations are performed by NEXIS 32.60.20 program (ESA-Prima Win). For tall buildings it is necessary to take into consideration the influence of the longitudinal deformation of the columns on the main bearing system. Deformations of columns due to high compression have to deal with elastic deformation creeping and shrinkage of the concrete. Floor slab levelling eliminates some deformation; some has to be predicted by calculation. It is also necessary to take into the consideration the decreasing normal forces in the columns due to the decreasing effect of the live load depending on the number of the floors above. Influence of the settlement in the core area, which is higher than settlement in the perimeter columns, also plays a role in the designing of the bearing system. For seismic response calculation, different sub grade properties have to be used (stiffness or resistance of the soil in the case of the dynamic loads is higher). At least two models have to be calculated for one proportioning. With ESA-Prima Win we have the possibility to make many calculations in real time

Foundation Slab Design and Calculation

The internal force and the calculation of the foundation slab on the 3D model for global structure analysis were used here. The proportioning was performed in the same model.

Columns calculation

Calculation Columns are calculated in a separate calculation. Normal forces are adopted from global structural analysis. Bending moments are adopted from floor slab calculation. For each type of column, a calculation is performed and influence due to live load is taken into consideration.

Perimeter walls- tube calculation

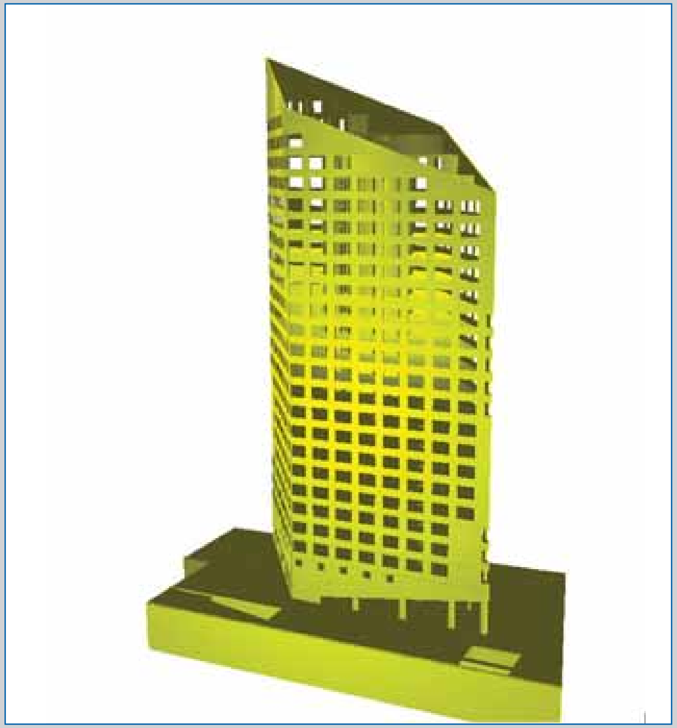
The tubes are perforated by window openings. The critical parts of the tube are those where they are connected to the columns. For these parts a very fine mesh was used, also a separate calculation of the detail was performed.

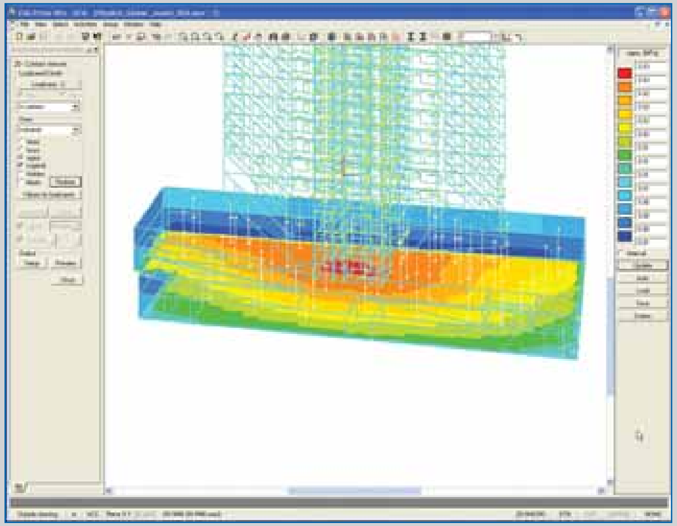
Floor Slab Calculation

Floor slabs are calculated in a separate model, punching shear and connection to the core walls is taken into account. In this model also bending moments in the columns are calculated. Around the columns a more dense mesh is used. On one side, there are decreased bending moments in the columns, and on the opposite side, there are increased positive moments in the floor slab. The proportioning of the slab in the columns is done based on sections and the reinforcement is distributed accordingly.

Conclusion

In order to obtain a solution of such a demanding structure, a very effective program for the calculation of internal forces calculation is needed. It must be able to prepare the structural model and to offer various possibilities to check the results. The incorporation of the proportioning in one package is also a big advantage. ESA-Prima Win fulfils these requirements.





Kovacs & Saeger - Diplomingenieure

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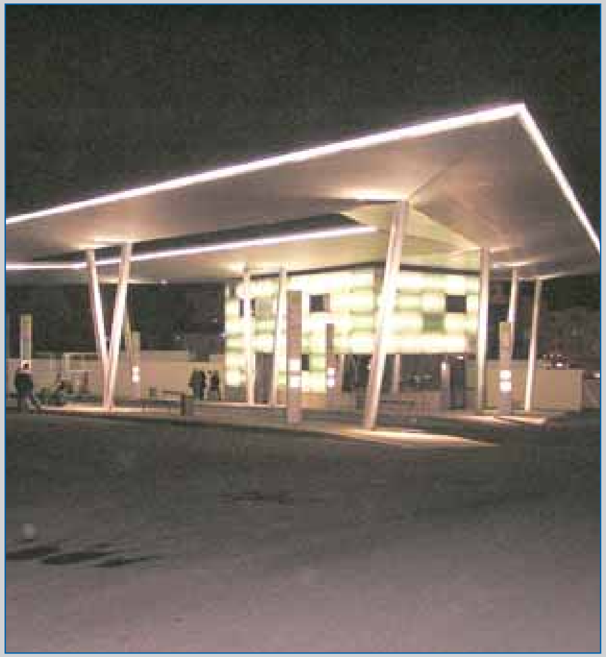
Firmengründung	Januar 1991
Firmengründer	Dipl.-Ing. Kovacs / Dipl.-Ing. Saeger
Zertifikat	Diplom-Bauingenieure
Berufserfahrung	22 Jahre / 18 Jahre
Firmensitz	Firmianstraße 1; 94032 Passau
Tätigkeitsfelder	Ingenieurhoch- und Tiefbau Industriebau Holzbau Stahlbau Altbausanierung Betonsanierung Fertigteilbau
Betriebsgröße	2 Diplomingenieure (Mitglieder der Bayr. Ing. Kammer Nr.: 31224) 2 Bauzeichner / Bautechniker 1 freier Mitarbeiter
Zeichensysteme	CAD-Arbeitsplätze der Fa. Nemetschek
Computersysteme	WIN XP Netzwerk Datenaustausch über Internet
Referenzen	Auf Anfrage
Betriebshaftpflicht	2.000.000 Euro für Personenschäden 500.000 Euro für Sachschäden bei der VHV-Versicherungsgruppe

Neubau Zentraler Omnibusbahnhof in Passau



Used software • SCIA • ESA PT

Die Realisierung des Zentralen Omnibusbahnhofes in Passau setzte eine Reihe mehrere Tragwerksuntersuchungen und Tragwerksvarianten voraus. Neben der anfänglich untersuchten rahmenartigen Stahldachkonstruktion, bestehend aus geraden Stahlstützen, Stahlunterzügen sowie einer dem Fallbild mehrerer Mikadostäbe gleichenden Dachstruktur (Variante 1), wurde auch eine Stahlbetonkonstruktion mit nachträglich vorgespannten Traglitzen untersucht (Variante 2).

Die nun realisierte Endversion des Zentralen Omnibusbahnhofes besteht aus einem Betriebsgebäude in Stahlbetonbauweise und einer filigranen Stahltragkonstruktion für die Überdachung des Omnibusgeländes.

Der Grundriss des Daches besteht aus einem unsymmetrischen nicht spiegelbildlichen Dreieck mit einer maximalen Schenkellänge von ca. 64 m und einer Höhe ü. GOK von ca. 8.0 m.

Die statische Umsetzung des Tragwerks in der nun geplanten Ausführungsvariante lehnte sich dabei vom Grundgedanken der im übertragenen Sinne ähnlichen Konstruktion einer organischen Wirbelsäulenstruktur an. Hierbei stellt die mittig liegende Stahlkastenstruktur (Torsionskasten) einen torsions- und biegesteifen Tragkörper und die angegliederten Kragarme (Stahllamellen) die eigentlichen Wirbelkörper dar. Durch das so gewählte Grundsystem könnte das Tragwerk auch auf nahezu jede Größe erweitert werden.

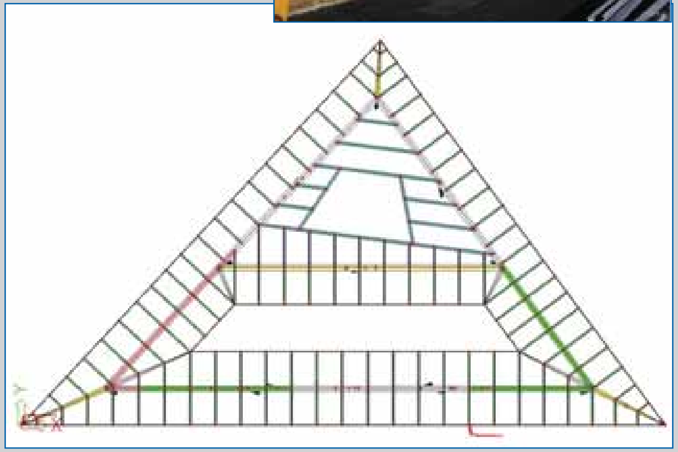
Eine Herausforderung stellten die in den Eckpunkten liegenden Gehrungsträger (GT) dar. Durch ihre Längen von zum Teil bis zu 19,0 m mussten die Materialstärken und auch die benachbarten Feldlängen der Torsionsträger aufgrund der sich beeinflussenden Verformungen mehrfach optimiert werden. Dieses konnte dank der in SCIA•ESA PT vorhandenen Verformungssimulationen hinreichend genau erfolgen.

Der die Dreiecksfläche umschließende Torsionskasten übernimmt neben den, aus dem Verkehr und Eigengewicht entstehenden, Vertikalbelastungen auch die sich aus den Stahllamellen erzeugenden Momente auf und musste dementsprechend torsionssteif konstruiert werden.

Die schrägen Rundrohrstützen besitzen unterschiedliche Fußpunktkoordinaten, welche durch die Statische Optimierung mit einem räumlichen Berechnungsprogramm (SCIA), ein homogenes Gesamtverschiebungsbild nach Theorie II Ordnung erzeugen.

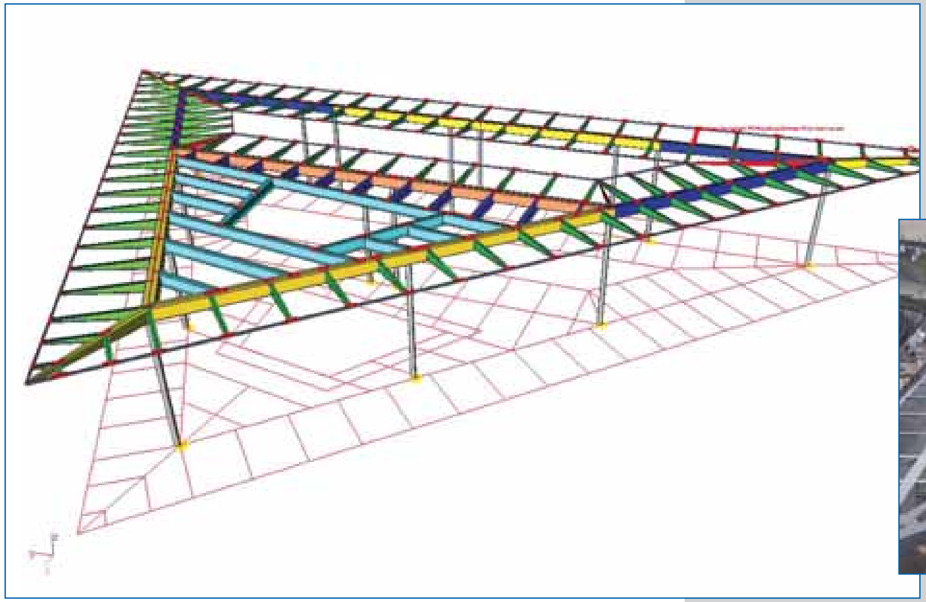
Im Vordergrund des Entwurfes des Architekten stand der Wunsch nach einer filigranen, optisch schwebenden Konstruktion. Sichtbare, dass Dach umschließende Details, wie die Dachtraufe, wurden durch eine Voute statisch minimiert, was den schwebenden Effekt zusätzlich verstärkte.

Die gefundene Konstruktion ermöglichte eine genaue Anpassung des Dachtragwerkes an den gewünschten dreieckigen Grundkörper und erlaubte damit auch die Realisierung der geplanten großen Dachöffnungen.



Central bus station of Passau

The central bus station in Passau consists of a building in reinforced concrete and of a filigran steel construction for the covering of the area.
The design of the roof consists of an asymmetrical triangle with a maximum leg length of approximately 64 m and a height of approximately 8,0 m.
The static conversion of the framework was based on the basic idea of the construction, it regards a structure similar to a spinal column. Here the centrally lying steel box structure (torsion box) represents a torsional and bending body and the attached steel lamellas represent the vertebra. In such a way, the frame could be extended to almost any size.



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PSP Engineering is a leading supplier of specialized equipment and entire plants for the building material and mineral processing industries. For more than 50 years, PSP Engineering has been involved in the design and construction of:

- Cement plants
- Lime works
- Crushing and screening plants for stone, gravel and sand
- Mineral processing plants for coal and ores

PSP Engineering offers advanced solutions in the field of:

- Pyroprocessing
- Grinding
- Crushing and screening
- Material transport

Advanced technologies are used for:

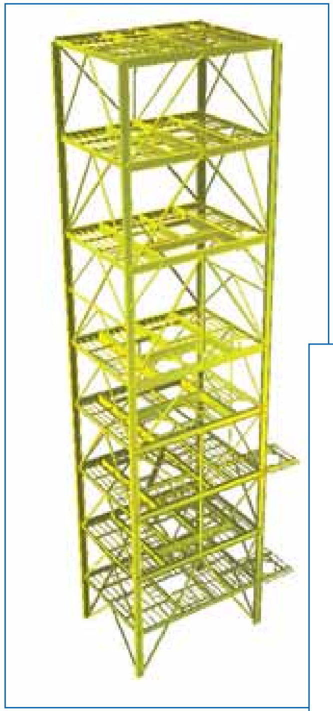
- Complete new systems
- Upgrading and retrofitting of existing plants
- Supply of spare and wear parts for PSP supplied equipment

Our efforts are aimed at:

- Minimizing investment and operation cost
- Increasing reliability
- Maintaining a high quality of the final product
- Reducing shutdown time required for installation and maintenance
- Increasing of capacity

PSP Engineering maintains its R&D programme throughout the stages of the innovation cycle:

- Evaluation of new ideas
- Test in the laboratory
- Prototyping and test runs
- Transformation into a product



Preheater tower of the cement plant 'VSH Turňa nad Bodvou'

Used software • ESA-Prima Win

A steel-cage construction of seven floors is designed with a ground plan size of 20,0 x 14,8 m.

The steel structure of the preheater is situated on a reinforced concrete floor (+10,8 m) by using elastomer bearings; the top floor is situated on +93,8 m. In the second stage was erected an elevator structure on this floor on the side of concrete silos. The highest element has a maximum level of +107 meter. With regard to the erection it was determined that the steel structure would be mainly bolted. The longitudinal circumferential main girders were calculated as elements with fixed ends to columns. All bolts of the circumferential girders and bracing were designed from steel grade 10.9.

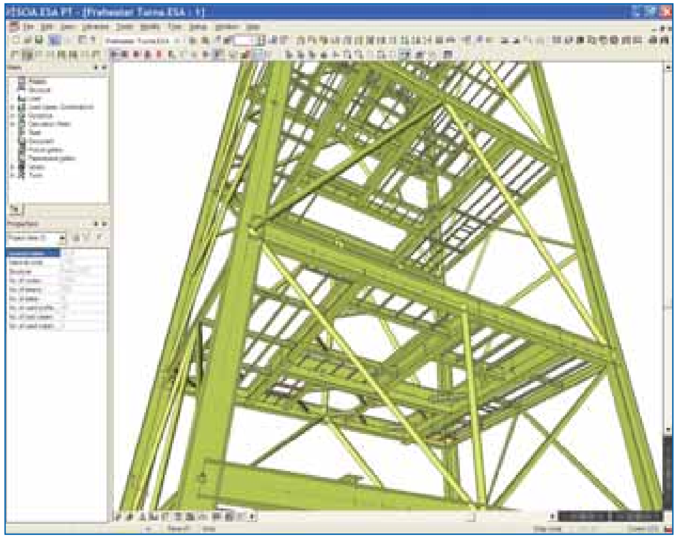
The building-up of the preheater tower was realized during the activities of the plant and above the existing production line (the new preheater tower was erected near the existing steel structure).

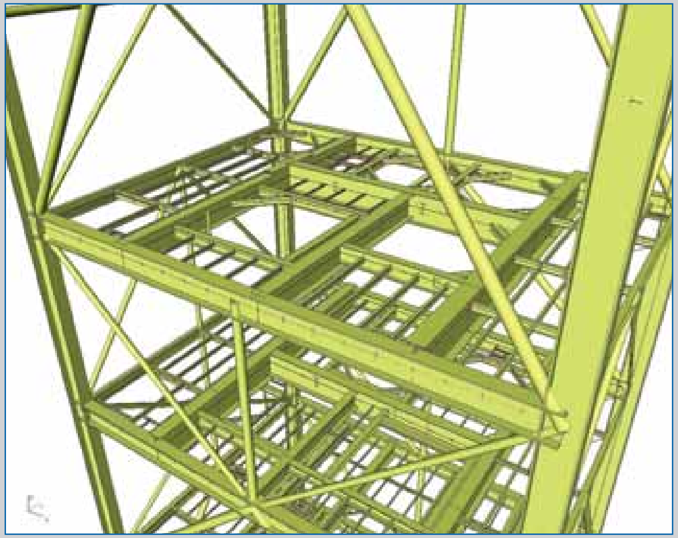
The steel-cage construction of the preheater tower, including the technological equipment, was executed in a time-span of 5 months.

The complex became operational after a shut down of two months due to connection works of the new and existing technological equipments.

Economical aspects conditioned the design of the structure and using of a lot of economical rolled profiles of various types. In this way we reached a very low consumption of steel in comparison to the cubic meter of enclosure space.

Weight of steel structure of the preheater tower: 869 000 kg
Weight of outer steel staircase: 47 000 kg
Weight of elevator shaft: 41 000 kg
Total weight of steel structures: 957 000 kg
Total weight of installed technological equipments: 1 776 000 kg





Preheater for cement tower plant ‘VSH Turňa nad Bodvou’ - Slovakia

The skeleton structure of the preheater has the following dimensions in the ground plan: 20,0 x 14,8 m and a height of 93,8m, it consists of seven floors. The steel structure was realized as a bolted construction with high-strength screws because the given assembly time was very limited. The realised design was very economical; the weight of the steel structure was very low compared to the large build-up space.

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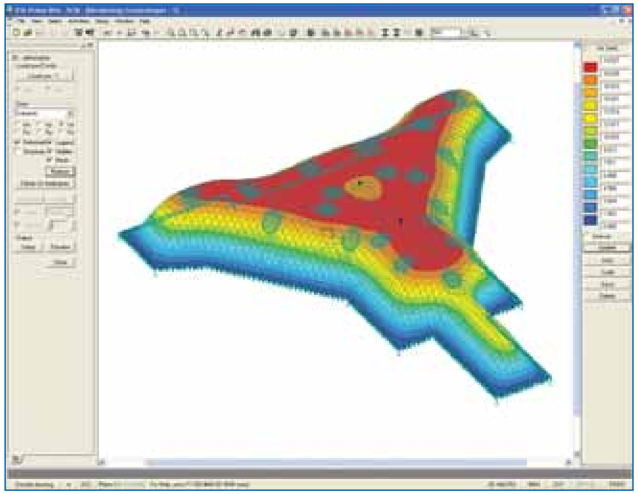
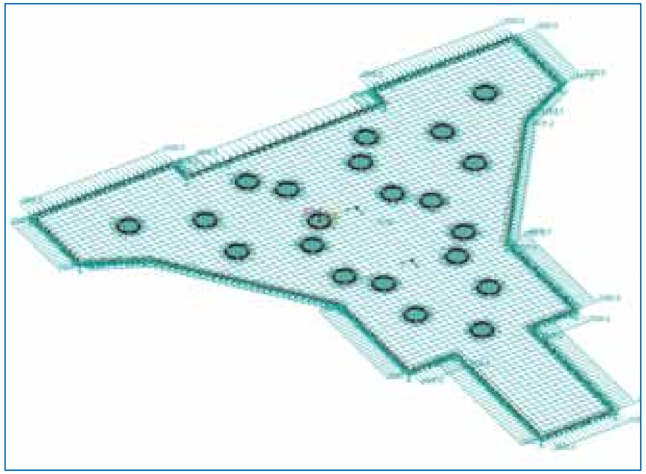
ROYAL HASKONING

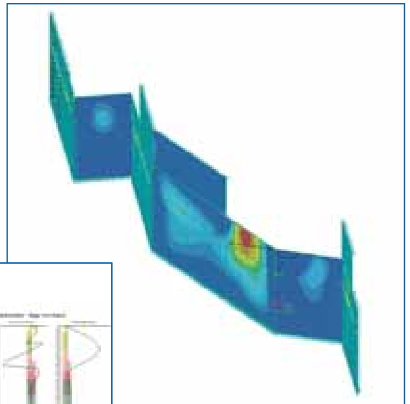
The firm was founded in 1881 in the Netherlands. At present, our 3200 employees combine a wide range of knowledge and experience. Rooted in a technical background, our consulting services focus on the broad field of the interaction between people and their environment.

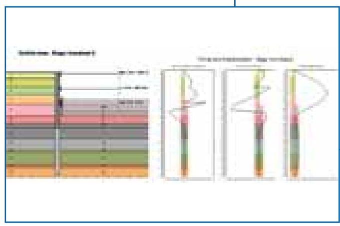
We are committed to working enthusiastically with our clients to achieve sustainable solutions in an increasingly complex society. The expertise and experience of our professionals in a variety of disciplines allows us to consider all technical, logistical, legal, organisational, social, environmental and economic aspects of your project, in order to subsequently develop sustainable and practical solutions.

Royal Haskoning has subsidiaries and partners throughout the world. Through our branch and project offices in Europe and overseas, we have access to all major international markets. This way, we can offer multidisciplinary and integrated services locally, based on experience built globally. With our personal service in consultancy, we contribute effectively to the successful planning, design, implementation, commissioning and operation of our projects and programmes.



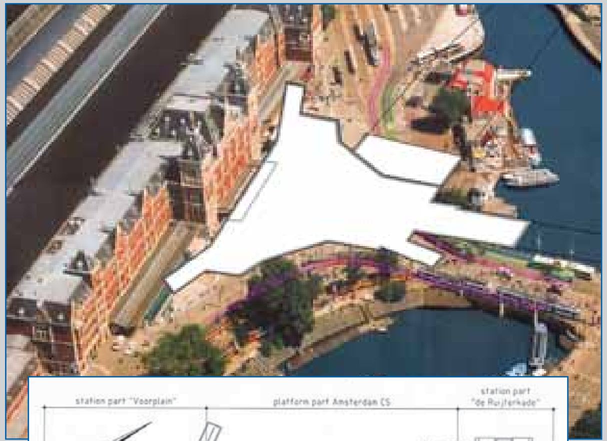


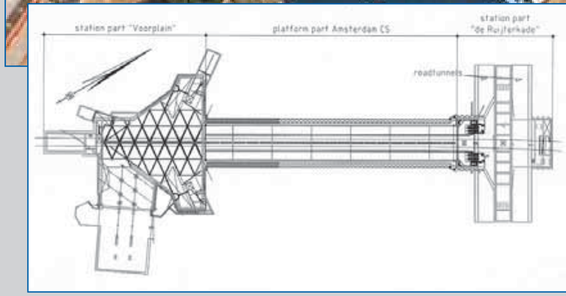




Used software • ESA-Prima Win, MSheet, MFoundation

Noord/Zuidlijn, Central Station Amterdam





Underground station Amsterdam

The project regards an adaptation of the underground station of the North/South Line of the city of Amsterdam. This station will be an integral part of the biggest public transport hub in the Netherlands and will provide transfer facilities between local, regional and international public transport systems. The underground stations' concourse is being built under the main square in front of Amsterdam Central Station.

The ground conditions formed a large difficulty, the soil profile at the site differs greatly from the characteristic Amsterdam soil profile. The location of the underground is Station Island, an artificial island that was built at the end of the nineteenth century for the construction of Amsterdam CS railway station. The island was created by filing in a channel area in the River IJ with sand.

The design of the underground station at Amsterdam's Central Station (CS) was also largely determined by local environmental constraints. The underground station is being built in front of, behind and also underneath the historic central railway station. Damage to the listed station building and delays to the different passengers and existing traffic flows are not acceptable.

Noord/Zuidlijn, station Voorplein, part of Central Station Amterdam

Introduction

The CS underground station of the North/South Line is on Station Island. This station will be an integral part of the biggest public transport hub in the Netherlands and will provide transfer facilities between local, regional and international public transport systems. The underground stations' concourse is being built under the main square in front of Amsterdam CS. There are entrances on ground level on both sides of the main entrance of the railway station and one at the south side of the station (in the direction of the city centre) leading to the main underground concourse. A direct link is being constructed from the platform level of the North/South Line to the central underground concourse and the platforms of the East Line.

Ground conditions

The soil profile at the site is different from the characteristic Amsterdam soil profile. Station Island is an artificial island that was built at the end of the nineteenth century for the construction of Amsterdam CS railway station for Dutch Railways. The island was created by filing in a channel area in the River IJ with sand. At the Station Island location the first Amsterdam underground sand layer is completely missing and the second sand layer is only partially present. The subsoil can be classified as poor.

Boundary conditions

The design of the underground station at Amsterdam's Central Station (CS) was largely determined by local environmental constraints. The underground station is being built in front of, behind and also underneath the historic central railway station. Damage to the listed station building and delays to the different passengers and existing traffic flows are not acceptable. A further complication in the design was the soft and highly variable subsoil. Building an underground railway station on such a location can be considered as one of the most challenging constructions of the North-South line.

Choice of software

For the many unique, project-specific questions there are no existing regulations. This requires a multi-purpose software solution.
Due to the high developed graphical output and the many modules we were able to solve a large scale of technical and geotechnical problems by using ESA-Prima Win in combination with M-Sheet and M-Foundation.

Short description of the technical challenges

Many phases during the building process are characteristic for this project. These phases have a major influence on the applied building method.

A distinction can be made between the following parts with their own building phase:

- The deep part with diaphragm walls, bored piles and jet grout struts. The deck of the roof will be build in parts and will be in use when the pit is excavated. The deep part will lead the passengers to the North/South Line platform with a connection to the immersed tunnel under the Central Station;
- The middle deep part with diaphragm walls, driven piles and underwater concrete. The middle deep part connects the North-South line with the existing East Line;
- The entrances from the central underground concourse to ground level.

The following parts are specially mentioned

Diaphragm walls
The permanent diaphragm walls are calculated with MSheet. Because of unequal excavations the reaction forces will be redistributed. This redistribution is determined with ESA-Prima Win and after this corrected in MSheet. After excavation a secondary cast inner wall will be made. This compound wall has a complex geometry and is calculated with 3D-Shell.

Jet Grout Strut
Stresses in the diaphragm walls will be reduced by applying a horizontal jet grout strut which is placed before excavation. During excavation normal forces and curvature due to swelling groundlayers will occur. This complex situation is investigated with a 3D Shell model including non-linear spring supports.

Bored piles / steel concrete columns
Before excavation the roof structure is made. This structure will be supported by 20 m long steel concrete columns placed in 40 m long bored piles with a diameter of 1200 mm.

The bearing capacity is determined by MFoundation. The structural behavior is determined by ESA-Prima Win and includes non-linear soil behavior and second order effect.

Other structural parts
The walls, floors are all calculated with ESA-Prima Win using different kind of modules.

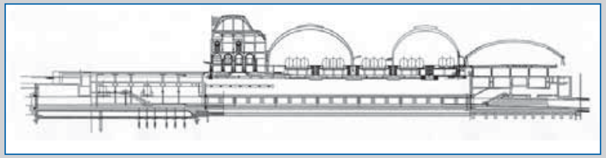
Points for emphasis

It is important to keep complex 3D-models simple and more controllable. Clear agreements have been made concerning the influence of several construction components. Where necessary, calculations have been completed with the geotechnical programs of the MSerie.

This ensures an optimum interaction of the possibilities of constructive and geotechnical software.

Used modules

- MSheet, MFoundation
- 3D Shell
- 2D Plate and 2D Wall
- 2D and 3D Frame
- Physical non-linear conditions
- Second order and stability frame
- Construction stages



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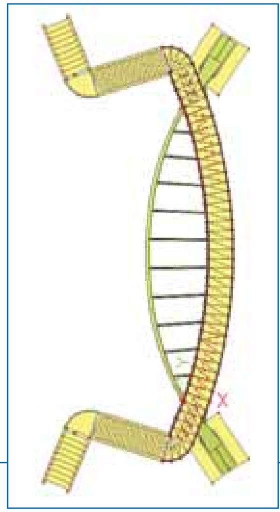
ROYAL HASKONING

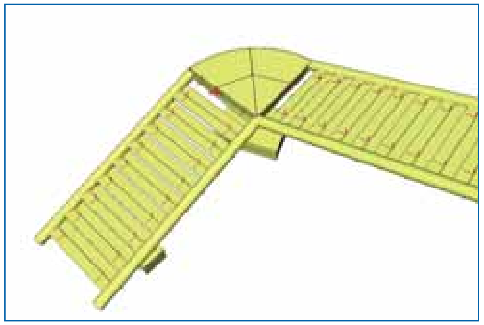
Royal Haskoning is een onafhankelijk, wereldwijd opererend, adviesbureau. De basis van onze onderneming werd in 1881 gelegd. Inmiddels bundelen 3.200 professionals gezamenlijk een brede kennis en ervaring.

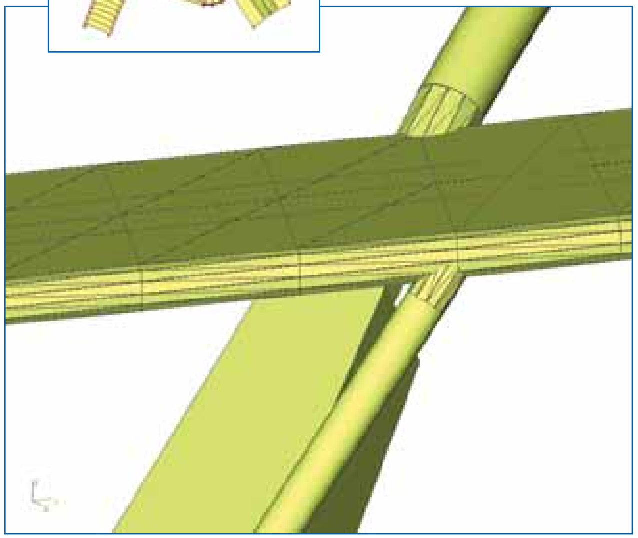
Geworteld in een technische achtergrond, bestrijken wij met onze adviesdiensten het brede veld van de interactie tussen de mens en zijn omgeving op het gebied van ruimtelijke ontwikkeling, infrastructuur & transport, architectuur & bouw, bouw management & advies, gebouwinstallaties, industriële installaties, milieu, water, kust & rivieren en maritiem.

Onze betrokkenheid met onze opdrachtgevers komt voort uit ons enthousiasme om gezamenlijk tot duurzame oplossingen te komen in een steeds veranderende complexe maatschappij. De expertise en ervaring van onze medewerkers in uiteenlopende vakgebieden stelt ons daarbij in staat om alle technische, logistieke, juridische, organisatorische, sociale, milieutechnische en economische aspecten van uw project onder de loep te nemen.

Royal Haskoning heeft diverse dochterondernemingen en partners over de hele wereld. Zo kan Royal Haskoning ter plekke multidisciplinaire en geïntegreerde diensten aanbieden, gebaseerd op wereldwijd opgebouwde ervaring. Met onze persoonlijke dienstverlening dragen wij zo op een effectieve wijze bij aan een succesvolle voorbereiding, uitvoering en exploitatie van projecten en exploitatie van projecten en programma's.





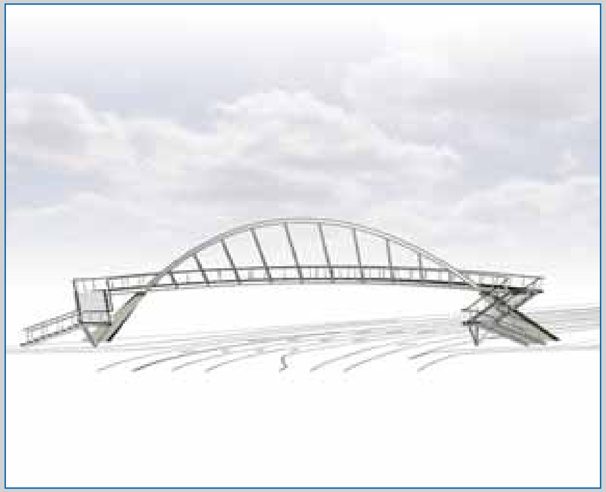


Used software • SCIA • ESA PT

Voetgangersbrug Zaanstad

Pedestrian bridge, Zaanstad

The project involves the design of a footbridge in Zaandam. The local authority asked that the design of the bridge reflected the lines of two existing bridges designed by Royal Haskoning. The bridge was designed as an arched bridge, so that it looks like the other two bridges but retains its individual identity because of the single arch.
Between the points of support, the curved bridge deck has a span of 32 metres. Beyond the points of support the bridge deck continues over a length of about 6 metres after which this changes into access steps.
The sagging of the deck is restricted by the inclined construction of the arch. Because of the inclined construction, the arch has the tendency to topple over under its own weight and this reduces the sagging of the deck.
Inputting the bridge into SCIA • ESA PT was a real challenge, chiefly because of the shape of the deck. The deck curves in two directions, which made the joints between the plate components of the deck complicated.
Because both bar and plate components were used for the bridge, it was necessary to focus on the modelling of the joints between the bar and plate components.
Eventually, importing the deck into a 3-D model was successful and we obtained a very harmonic bridge.



Inleiding

De zuidelijke randweg is een nieuwe ontsluitingsweg van Zaanstad langs het Noordzeekanaal en loopt door het winkelgebied en bedrijventerrein Zuiderhout te Zaandam. Door de ligging van de zuidelijke randweg wordt het gebied als het ware in tweeën gedeeld.

Om voor de voetgangers een veilige en snelle oversteek te kunnen realiseren is er door de gemeente Zaanstad gekozen voor een voetgangersbrug over de zuidelijke randweg.

De brug is op verzoek van de gemeente 'familie' van de busbrug over de Thorbeckelaan en de Westzanerpolderbrug in Hoogtij, welke beide door Royal Haskoning ontworpen zijn en tevens een markant zichtpunt zijn in de omgeving van Zaanstad.

Ontwerp

Doordat de twee eerder genoemde bruggen uitgevoerd zijn als boogbrug was de keuze voor een boog eenvoudig. Een enkele boog voldoet voor een voetgangersbrug. Het brugdek krult om de boog en wordt voortgezet in de flauwe trappartijen die bijna haaks op het brugdek staan. Aan beide zijden van de weg is er net genoeg ruimte voor de betonnen steunpunten die in het verlengde van de boog staan. De ruimtelijkheid van de brug wordt benadrukt door de trappen en de schuine steunpunten.

Het gekromde brugdek heeft tussen de steunpunten een overspanning van 32 m. Na de steunpunten loopt het brugdek over een stuk van circa 6 m door waarna deze over gaat in de toegangstrappen. Het profiel van vrije ruimte onder het brugdek ten behoeve van de zuidelijke randweg bedraagt 4,70 m.

De schuin weglopende boog van de brug bestaat uit een buisprofiel met een diameter van 457 mm. Het brugdek dat zowel horizontaal als verticaal is gebogen, is opgebouwd uit twee buizen van verschillende diameters. De grote buis heeft een diameter van 457 mm en vormt tevens de koppeling tussen het dek en de boog. De kleinere buis heeft een diameter van 324 mm. De buizen worden aan elkaar gekoppeld door middel van dwarsverstijvingen en een onder en bovendekplaat. Beide dekplaten zijn voorzien van twee verstijvingsribben die de vervormingen ten gevolge van plooi tegengaan.

De boog van de brug wordt door middel van trekstaven, ook wel de 'vinnen' genoemd, aan de grote buis van het brugdek gekoppeld. Deze vinnen hebben een driehoekig profiel met een verlopende hoogte van 350 mm ter plaatse van de boog naar 440 mm ter plaatse van de aansluiting met het dek.

De toegangstrappen overbruggen een hoogte van iets meer dan 4 m. De draagconstructie van de trappen bestaat uit buizen met een diameter van 324 mm. Voor de voetgangers is een extra rustpunt gecreëerd in de vorm van een plateau. Ter plaatse van dit plateau wordt de trapconstructie door drie buizen ondersteund die voor de trappen de benodigde stijfheid verzorgen.

De schuine uitvoering van de boog heeft een postitieve invloed op de doorbuiging van het dek. De boog heeft de neiging door het eigen gewicht als het ware om te vallen waardoor de doorbuiging van het dek wordt gereduceerd.

Om de torsie van het dek te kunnen opvangen wordt het dek ter plaatse van het betonnen steunpunt voorzien van een tweede oplegpunt. Het tweede oplegpunt wordt gerealiseerd door een stalen buis die onderdeel uitmaakt van het betonnen steunpunt. De stalen buis wordt gekoppeld aan de kleinere buis van het dek.

Technische gegevens van het project

Projectnaam: Voetgangersbrug Zaanstad
Opdrachtgever: Gemeente Zaanstad
Locatie: Zaandam
Constructeur: Royal Haskoning, Amsterdam
Architect: Royal Haskoning, Amsterdam
Uitvoering: 2007-2008
Hoofdoverspanning: 32 m
Vrije onderdoorgang: 4.70m
Totale hoogte constructie: circa 12 m.
Gewicht (staal): circa 70 ton

SCIA • ESA PT

Voor de berekening is gebruik gemaakt van SCIA • ESA PT 6.0.166; gebruikte modules:

- Grafische doorsnede
- Dynamica raamwerken
- Dynamica (eigenfrequentie) oppervlakken
- 3D-schaal
- Intersectie

Modellering

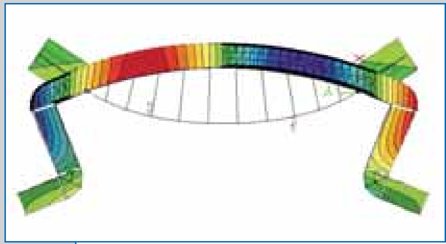
Om een goede inschatting te maken van de hoofdafmetingen is de brug in het voorontwerp uitgezet in een 3D – staafmodel. Hieruit volgde dat niet alle effecten konden worden meegenomen en het daarmee noodzakelijk was om het dek van de brug als plaatmodel in SCIA • ESA PT in te voeren.

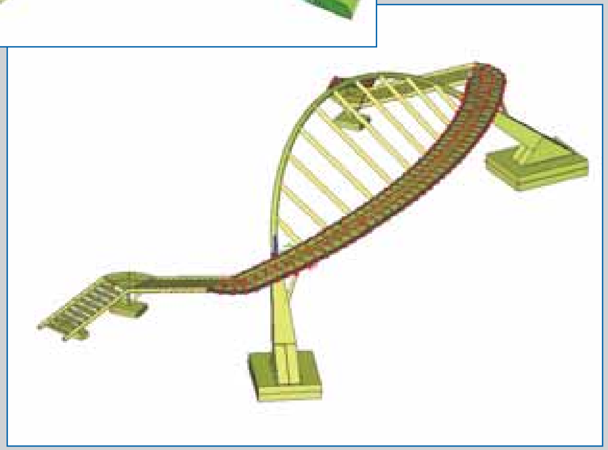
Het ging hier met name om het bepalen van de exacte doorbuiging en het bepalen van de eigenfrequentie van de brug.

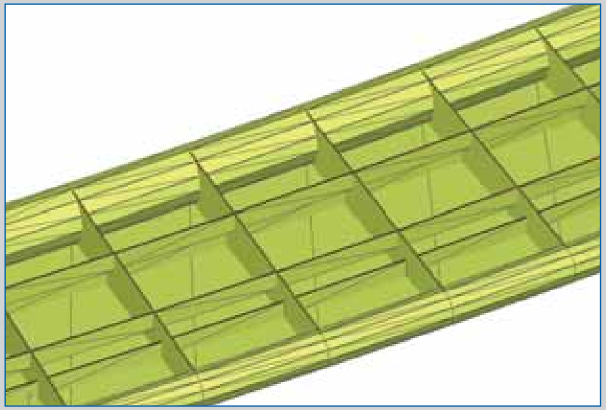
Het invoeren van het dek kostte door de gebogen vorm van het dek veel tijd. De gebogen vorm van het dek is verkregen door het uitzetten van een systeemlijn in SCIA • ESA PT.

Door de lijn op te delen in de h.o.h. afstand van de dwarsdragers van het dek, konden de dwarsdragers over deze lijn worden uitgezet. De buizen en de dekplaten van het dek zijn vervolgens tussen de dwarsdragers ingevoerd.

Omdat ervoor gekozen is enkel het dek in te voeren als plaatmodel was het noodzakelijk de verbindingen tussen de staaf- en plaatelementen goed te modelleren. Uit de berekening volgde al snel dat een niet goede aansluiting tussen de elementen aanzienlijke gevolgen had voor de krachtswerking in de brug en de samenwerking tussen de onderdelen.
Afgezien van het feit dat het modelleren van de brug veel tijd heeft gekost is het werken in 3D met SCIA • ESA PT wel als gebruiksvriendelijk ervaren. Vooral het importeren van in Autocad gemaakte doorsneden werkt erg gemakkelijk.







SBE nv

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Vakgebieden & specialisaties

Havenbouw: kaaimuren - sluizen; aanlegsteigers; dijken & oeverbescherming; renovatie.

Burgerlijke bouwkunde & gebouwen: algemene stabiliteitsstudies; speciale funderingen & geotechniek; bruggen in staal, gewapend beton & voorgespannen beton; tunnels, riolering- & wegeniswerken; eco-engineering.

Staalconstructies: ontwerp - berekeningen - overzichtstekeningen; werkhuistekeningen CAD - 3D.

Geotechnische & hydraulische modellering: 2D & 3D geotechnische modellen; 2D & 3D grondwaterstromingsmodellen; 1D, 2D & 3D rivier-, kust- en sedimentsimulaties.

Referenties

Havenbouw: Albertkanaal: diverse kaaimuren; containergetijdedok "Waaslandhaven"; verbetering waterkering Afgedamde Maas; Containerkade Noord Antwerpen; aanlegsteigers voor scheepvaart Linker Oevergebied Antwerpen en op de Schelde; Leie Doortocht Kortrijk; nieuw sluizencomplex Panamakanaal; nieuwe sluis Haven van Sevilla; restauratie en herstellingswerken van kaaimuren, sluizen en droogdokken (Zennegatsluis, D'Herbouvillekaai, droogdok Cadiz).

Burgerlijke bouwkunde & gebouwen: Petroleumbrug Antwerpen; Muidebrug Gent; tunnel onder startbaan Zaventem; Tunnels HSL: Centraal Station Antwerpen & Berchem: ondertunneling bestaande sporen; Bureelgebouw en parking Lieven Bauwens Gent; voorgespannen brug over de Leie te Wielsbeke; Appartementsgebouw Parklane II Gent; Parking Astridplein Antwerpen; Mercedes garage Sint-Niklaas; Brug te Halle; Waasland Shopping Center; Commercieel gebouw Wilma; HST-lijn Brussel-Amsterdam - diverse vakken; nieuwe Boulevardbrug Willebroek; Brug westelijke tangent Sint-Niklaas.

Staalconstructies: Verzinkingslijn met koeltoren Sidmar; Kontinugieterij 2; HQ2 Canary Warf; Efteling Kaatsheuvel Nederland; industriële gebouwen Baudour Frankrijk; diverse installaties op Petrochemische bedrijven zoals BASF, 3M, Solvay; Vliegtuigloods München; Denox-installaties Harelbeke, Houthalen, Brugge, Brussel; LNG-plant Hammerfest.

Geotechnische & hydraulische modellering: Leveren & ijken van numerieke modellen Scheldebekken Antwerpen; Grondwaterstromingsmodel & zettingsberekeningen Antwerpen Containerdok-West; Stabiliteitsberekening caissons Containerkaai Zuid Antwerpen met 3D model; Uitvoeringsstudie Deurganckdok; Stabiliteitsnazicht kaaimuur Verrebroekdok Antwerpen; optimaliseren wachtbekken Webbekom; ontwerp leefbaarheidsbuffer Doel.

Middelen

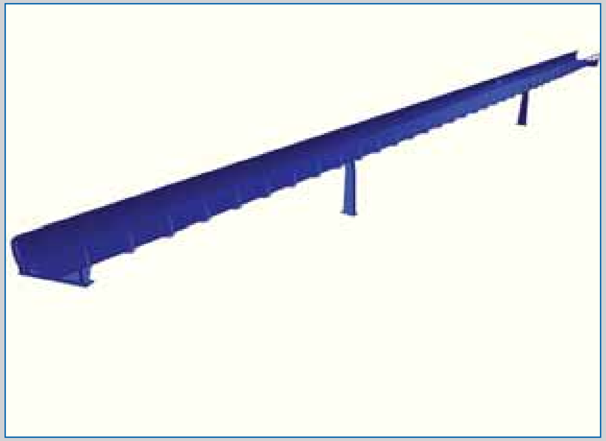
SBE werkt met een 35-tal medewerkers voornamelijk projectingenieurs, studie-ingenieurs en tekenaars.

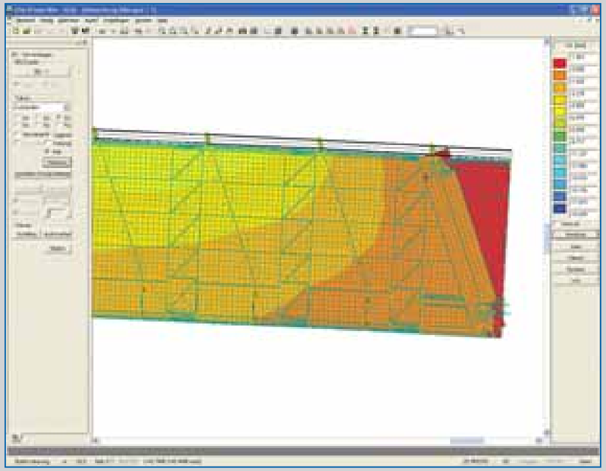
Historiek

Reeds een 15-tal jaren profileert SBE zich als bouwkundig ontwerper met, afgezien de klassieke stabiliteitsopdrachten, een specifiek accent op water- en havenbouw, geotechnische problemen, staalstructuren en funderingstechnieken.

Used software • ESA-Prima Win

Fietsersbrug te Lille (Gierle) over de E34





Cyclists' bridge over E34 in Lille

The steel cyclist bridge in the city of Lille (B) is a bridge on 4 supporting points, and it is composed entirely out of plates. Besides two supports at both ends of the bridge, there can also be found 2 final piles to jam in the bridge. The bridge can be divided in 38 standard pieces. It is therefore sufficient to create one standard piece and move and rotate it along the reference profile in order to create the entire bridge. In this way the composition of the model is done in an easier and faster way.
A bar model is realised by using construction circles and construction straight lines. As the coordinate system can be moved and rotated, it is possible to work in a plane (2D). This considerably simplifies the project.

Inleiding

Deze opdracht heeft als bedoeling de vervormingen te berekenen van een stalen fietsersbrug onder zijn eigengewicht. Met deze gegevens past de constructeur bij de fabricage van de brug de vorm zo aan dat wanneer de brug geplaatst wordt en onderhevig is aan zijn eigengewicht, het de vorm heeft zoals getekend volgens plan. Vermits vervormingen vrij nauwkeurig dienen te worden bepaald en de geometrie van de brug complex is, dient er een 3D-schaalmode gemaakt te worden van de gehele brug in ESA-Prima Win.

Beschrijving van de geometrie van de brug

De stalen fietsersbrug te Lille is een brug op 4 steunpunten en is volledig uit platen samengesteld. Naast de twee eindsteunpunten zijn ook 2 pijlers voorzien die de brug inklemmen. De staalkwaliteit is S355. Het dek is uitgevoerd in uitkraging en wordt gesteund door 3 verticale verstijvers die gelast zijn aan consoles. In totaal zijn er 38 consoles. De consoles bestaan uit een lijfplaat en een in breedte variërende onderflens die eindigt op de onderflens van de koker. De lijfplaat kromt naar het einde toe naar boven en dient als steun voor de leuning (koker 200/100/6). De bovenflens wordt gevormd door het dek. Deze consoles zijn gelast aan de koker die het hoofdprofiel van de brug vormt. Het bestaat uit 2 gekromde lijven en 2 vlakke flenzen en is verstijfd door 6 verstijvers, 3 voor elk lijf van de koker die evenwijdig lopen aan de aslijn van de koker. Ter plaatse van de pijlers en de consoles is er telkens een dwarsschot voorzien. Ter plaatse van de consoles is er ook nog een verstijver op het niveau van het dek, zodat de “bovenflens” van de console als het ware wordt doorgetrokken tot in de koker, zodat via het dwarsschot, de krachten naar de koker worden overgedragen.

Opbouw van het model in ESA-Prima Win

fase 1: opbouw van het referentieprofiel
Het referentieprofiel wordt in grondplan uitgezet via de snijpunten van cirkels en rechten (1D macro’s). Het cirkelsegment wordt ingedeeld in 37 stukken, vermits er 38 consoles zijn (eindconsoles inbegrepen). Daarna worden deze 38 punten verplaatst in de hoogte en vormen zo de referentielijn voor de brug.

fase 2: opbouw van de standaardmoot
De brug kan ingedeeld worden in 38 standaardmoten. Het is dus voldoende om 1 standaardmoot te maken en deze dan langs het referentieprofiel te verplaatsen en te roteren om zo de brug te creëren. Een staafmodel wordt opgebouwd met behulp van de constructie van hulpcirkels en hulprechten. Doordat het assenstelsel kan verplaatst en geroteerd worden, is het mogelijk om telkens in een vlak (2D) te werken, wat de zaak iets eenvoudiger maakt. De gekromde stukken worden gesegmenteerd getekend, zodat deze met recht- of driehoeken kan worden ingevuld. Vervolgens worden de verschillende onderdelen van de moot met 2D-elementen (platen) ingevuld. Elk onderdeel van de moot (bv. console, dek, ...) wordt in een afzonderlijk materiaal gedefinieerd, zodat het mogelijk is om via selectie van 2D-macro’s naar materiaalkwaliteit de verschillende elementen op een éénvoudige manier aan te passen door enkel deze actief te zetten.

fase 3: Berekening van de langs- en dwarshelling van elke standaardmoot
Vanwege de kromtestraal in planzicht en de kromming in het lengteprofiel, heeft elke standaardmoot een verschillende stand in planzicht en in vooraanzicht. De helling van de standaardmoot is het gemiddelde van de 2 lijnstukken die de naastgelegen referentiepunten verbinden. In een excel-tabel zijn de cartesiaanse coördinaten van het referentieprofiel gegeven. Dit is de output van het model van het referentieprofiel, dat in excel ingelezen is. Hiermee kunnen de benodigde hoeken worden berekend.

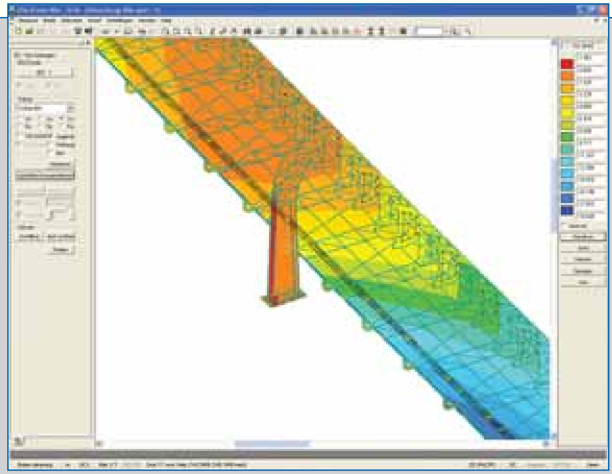
fase 4: Invoegen van standaardmoten + verbinden van moten
De standaardmoot wordt in de oorsprong van het globaal assenstelsel geroteerd in de 2 richtingen (rotatie in planzicht en rotatie in opstand). Vervolgens wordt deze moot met het referentiepunt op de referentielijn geplaatst. Zo ontstaan 38 moten die in hun referentiepunt de gemiddelde dwars- en langskromming aangeven. Vervolgens worden de moten aan mekaar verbonden door de moten aan te vullen. De verschillende onderdelen worden één voor één actief gezet en aan mekaar verbonden door 2D-macro’s te tekenen in 3D.

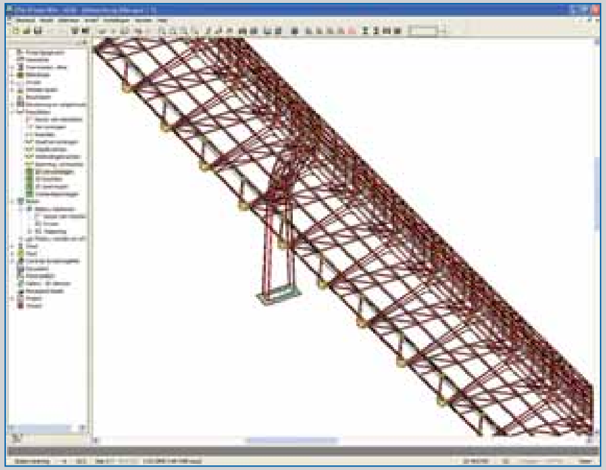
fase 5: Opbouw van de pijlers en randconsoles
De moten op het einde van de brug verschillen van de andere door de positie van het dwarsschot in de koker: bij de middenmoten staat dit loodrecht op de lijven en de flenzen van de koker, terwijl bij de eindmoten het dwarsschot in het verlengde van de console ligt. Voor deze twee moten is de standaardmoot aangepast door het dwarsschot te projecteren op het vlak van de console. Deze moot is dan aangevuld met de randconsoles. De pijlers worden ook getekend met behulp van een staafmodel geconstrueerd met hulplijnen, waar achteraf de verschillende platen worden ingetekend. Ter plaatste van de pijlers dienden ook dwarsschoten worden ingevoegd in de koker.

fase 6: Berekening
Na de generatie van de geometrie worden de steunpunten en de belastingen ingegeven. Vervolgens worden de vervormingen van de structuur berekend en geanalyseerd. Het tegenpijl wordt bepaald en doorgegeven aan de constructeur.

Besluit

De opbouw van het model is een stuk sneller en éénvoudiger door het gebruik van een standaard-moot die meerdere keren gebruikt wordt in de structuur. Via éénvoudige en krachtige opties zoals het verplaatsen en roteren van het gebruikersassenstelsel kan men in 2D tekenen, wat de zaak toch een stuk vereenvoudigd. Hierdoor is het mogelijk om in een aanvaardbare tijdsperiode een platenmodel op te bouwen van deze brug.





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Vakgebieden & specialisaties

Havenbouw: kaaimuren - sluizen; aanlegsteigers; dijken & oeverbescherming; renovatie.

Burgerlijke bouwkunde & gebouwen: algemene stabiliteitsstudies; speciale funderingen & geotechniek; bruggen in staal, gewapend beton & voorgespannen beton; tunnels, riolering- & wegeniswerken; eco-engineering.

Staalconstructies: ontwerp - berekeningen - overzichtstekeningen; werkhuistekeningen CAD - 3D.

Geotechnische & hydraulische modellering: 2D & 3D geotechnische modellen; 2D & 3D grondwaterstromingsmodellen; 1D, 2D & 3D rivier-, kust- en sedimentsimulaties.

Referenties

Havenbouw: Albertkanaal: diverse kaaimuren; containergetijdedok “Waaslandhaven”; verbetering waterkering Afgedamde Maas; Containerkade Noord Antwerpen; aanlegsteigers voor scheepvaart Linker Oevergebied Antwerpen en op de Schelde; Leie Doortocht Kortrijk; nieuw sluizencomplex Panamakanaal; nieuwe sluis Haven van Sevilla; restauratie en herstellingswerken van kaaimuren, sluizen en droogdokken (Zennegatsluis, D’Herbouvillekaai, droogdok Cadiz).

Burgerlijke bouwkunde & gebouwen: Petroleumbrug Antwerpen; Muidebrug Gent; tunnel onder startbaan Zaventem; Tunnels HSL: Centraal Station Antwerpen & Berchem: ondertunneling bestaande sporen; Bureelgebouw en parking Lieven Bauwens Gent; voorgespannen brug over de Leie te Wielsbeke; Appartementsgebouw Parklane II Gent; Parking Astridplein Antwerpen; Mercedes garage Sint-Niklaas; Brug te Halle; Waasland Shopping Center; Commercieel gebouw Wilma; HST-lijn Brussel-Amsterdam - diverse vakken; nieuwe Boulevardbrug Willebroek; Brug westelijke tangent Sint-Niklaas.

Staalconstructies: Verzinkingslijn met koeltoren Sidmar; Kontinugieterij 2; HQ2 Canary Warf; Efteling Kaatsheuvel Nederland; industriële gebouwen Baudour Frankrijk; diverse installaties op Petrochemische bedrijven zoals BASF, 3M, Solvay; Vliegtuigloods München; Denox-installaties Harelbeke, Houthalen, Brugge, Brussel; LNG-plant Hammerfest.

Geotechnische & hydraulische modellering: Leveren & ijken van numerieke modellen Scheldebekken Antwerpen; Grondwaterstromingsmodel & zettingsberekeningen Antwerpen Containerdok-West; Stabiliteitsberekening caissons Containerkaai Zuid Antwerpen met 3D model; Uitvoeringsstudie Deurganckdok; Stabiliteitsnazicht kaaimuur Verrebroekdok Antwerpen; optimaliseren wachtbekken Webbekom; ontwerp leefbaarheidsbuffer Doel.

Middelen

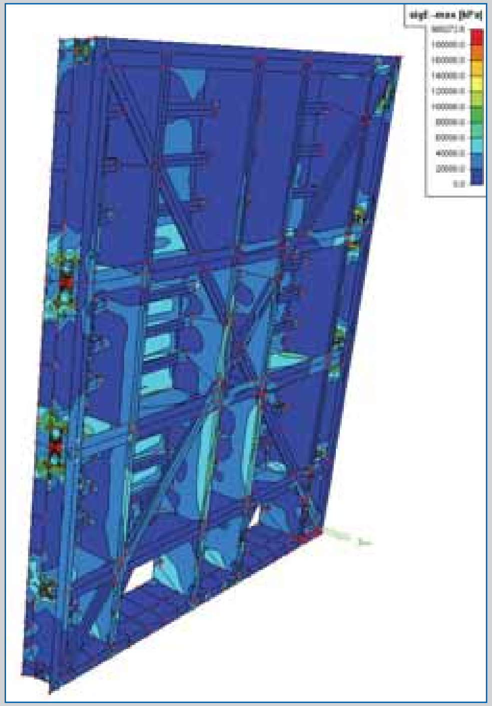
SBE werkt met een 35-tal medewerkers voornamelijk projectingenieurs, studie-ingenieurs en tekenaars.

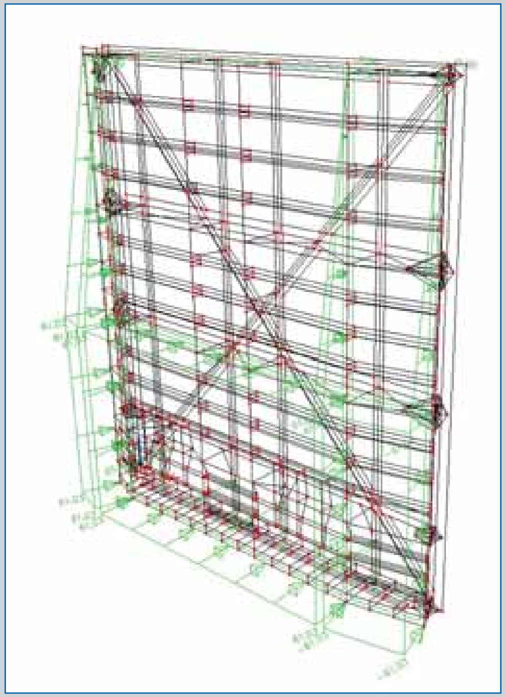
Historiek

Reeds een 15-tal jaren profileert SBE zich als bouwkundig ontwerper met, afgezien de klassieke stabiliteitsopdrachten, een specifiek accent op water- en havenbouw, geotechnische problemen, staalstructuren en funderingstechnieken.

Used software • ESA-Prima Win

Sluisdeuren Wijnegem





Project

Controlestudie van de opwaartse en afwaartse sluisdeur in staal van de 16m sluis op het Albertkanaal te Wijnegem.

Doel studie

Nazichtberekening van de voorgestelde geometrie met onder andere volgende aspecten : algemene stabiliteit, begroting van de spanningen en vervorming, lokale stabiliteit en detailberekening, controle van instabiliteitsfenomen zoals lokaal en globaal plooien van de plaatelementen, bepaling van het zwaartepunt van de structuur, gedrag van de deuren onder accidentele lasten, gedrag van de deuren in montagefase. Bij de berekening dient rekening te worden gehouden met de 3D wringstijfheid van de gehele structuur.

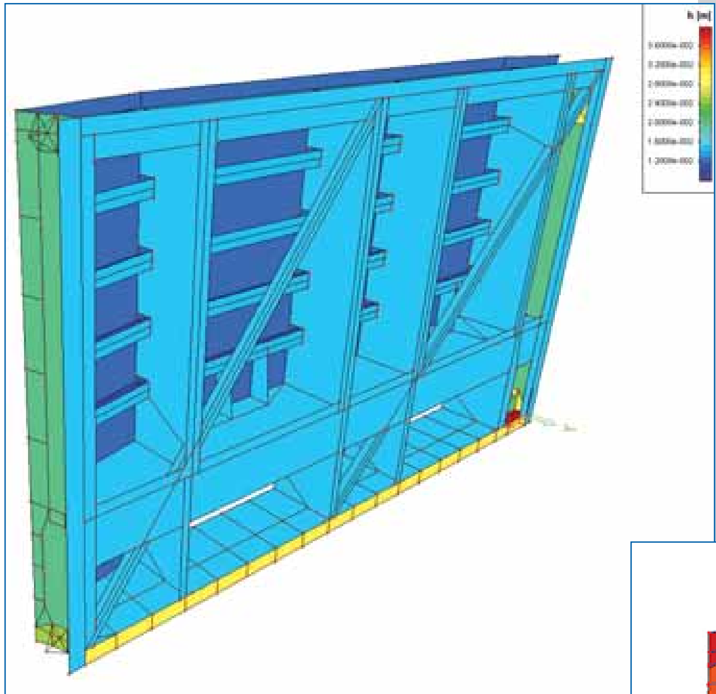
Gebruik ESA-Prima Win

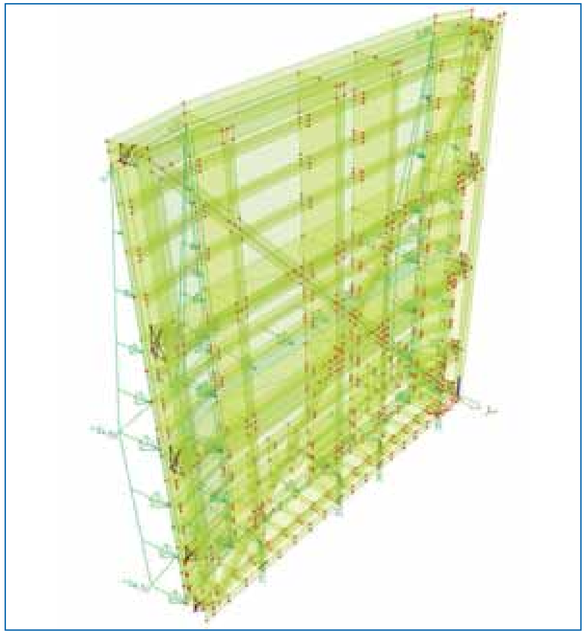
Begroting van de spanningen en vervorming van de deur in de verschillende toestanden en als basis voor de instabiliteitcontroles en spanningscontroles. Inrekenen van de 3D stijfheid van de structuur bij deze begroting.

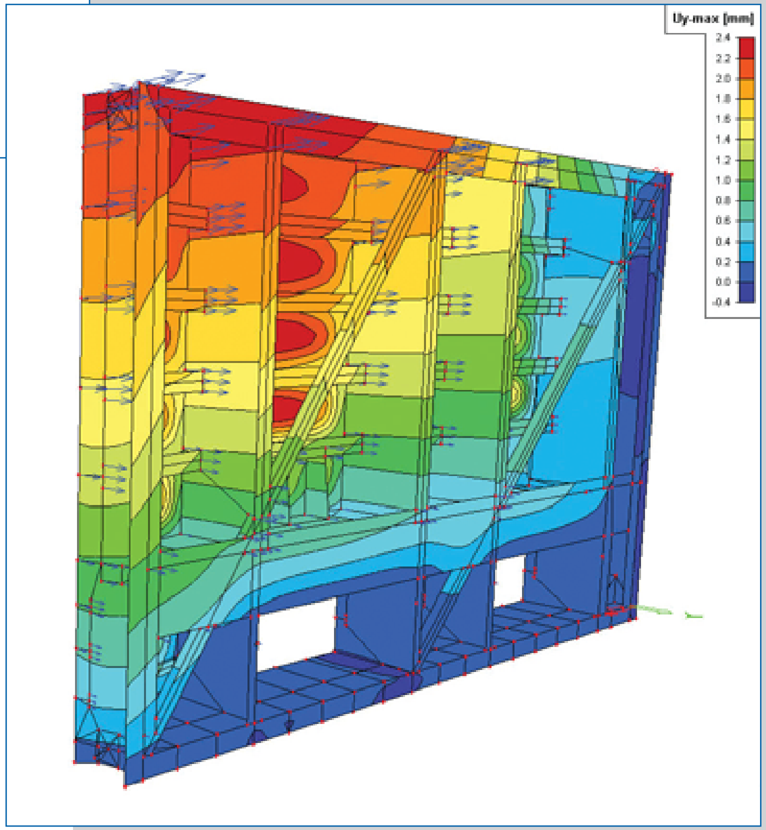
Bepaling van het zwaartepunt op basis van het rekenmodel.

Lock gates of Wynegem - 3D model of upward and downward gate

This project regards a check of the calculation of the upward and downward lock gates of the lock on the Albert Channel in Wijnegem (B). The presented geometry, along with a whole range of items, will be checked: general stability, estimations of stresses and deformations, local stability and detail calculation, control of instability phenomena (such as local and global buckling of plate elements, determination of the centre of gravity of the structure, behaviour of the doors under accidental charges, behaviour of the doors at the assembly stage. 3D torsional stiffness of the whole structure had to be taken into account.







Staaladviesburo

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Staaladviesburo SAB, is a consulting firm, specializing in expert advice and support on industrial structural steel constructions. SAB especially focuses on support for smaller firms without in-house structural consultancy and on non-standard constructions, restorations and renovations.

SAB, founded in 2000, arose - after 40 years of experience - from Engineering Company Public Works TKB - ATENCO and with the cooperation of BSC British Steel Corporation.

SAB can guide you through your projects with practical and theoretical assistance for:

- Preparatory studies, drafts, calculations
- New constructions
- Restorations and renovations
- Multi-storey frames, hangars, warehouses, crane girders, (grain) elevators, towers ...

Some references:

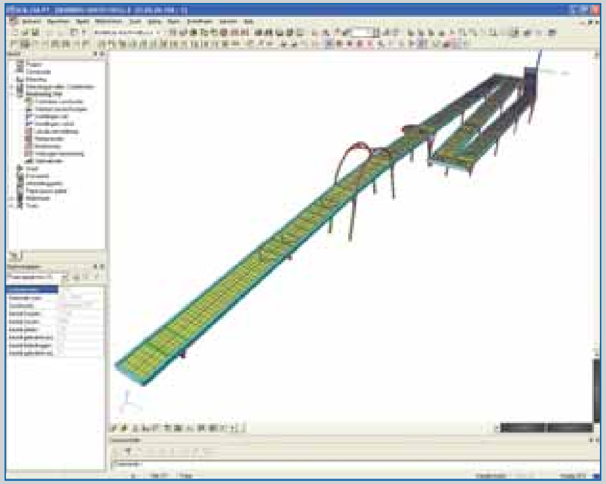
- Naval lift Belgian Army – Zeebrugge
- Pedestrian bridge – Diest
- Restauration Royal Greenhouses – Brussels
- Swamp environment and raptor cage – Zoo Antwerp
- Mosque – London
- Belgacom towers- gangway - Brussels

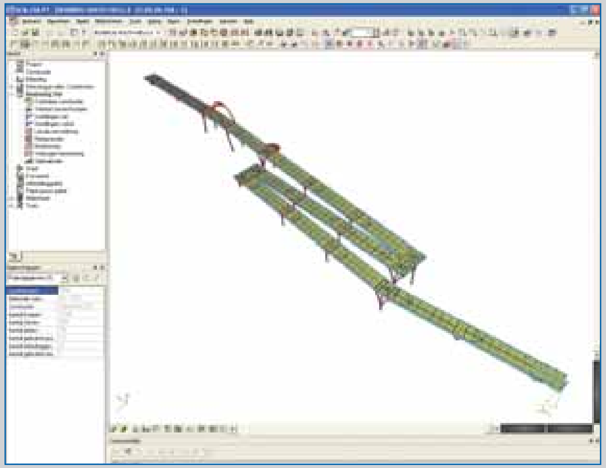
Bridge Bosberg Houthalen - Helchteren

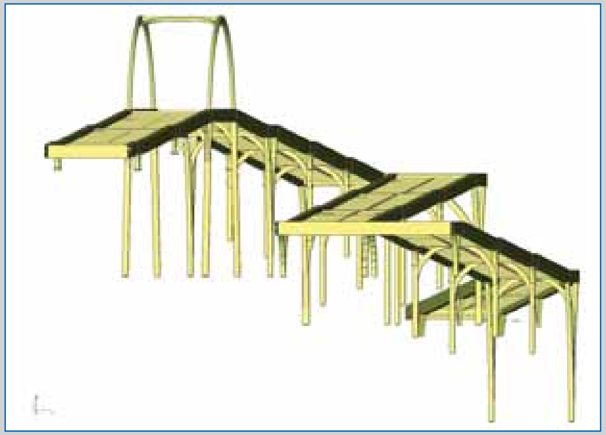
The goal of this pedestrian bridge is to connect the wood and the heather land; they are actually separated by a national trunk road. The concept of the structure is such, that it is also accessible for wheelchair-users. The local authorities insisted that the form of the construction would be in harmony with the environment.
The length of the structure is total ± 190 m, with an efficient width of about 2.50 m - is imposed by the ground profile of the terrain and the necessary free height above the national road. The distance between the platforms on each side is maximum 10 m. The total weight of the bridge construction is ± 60 ton. The road surface of the bridge is dimensioned for overloads of 5 kN/m². The complete structure is built with RHS (rectangular hollow steel sections) A.E.355 D. The protection of the steel is executed by a high-quality blast and painting, carried out in the workshop. We used ESA-software mainly for checking deflections and optimising the steel-sections.

Used software • ESA-Prima Win, SCIA • ESA PT

Bridge Bosberg Houthalen - Helchteren







The goal of this pedestrian bridge is to connect the two parts of the woods and the heath land; they are actually separated by a national trunk road.

The concept of the structure is such, that it is also accessible for wheelchair-users. The local authorities insist that the form of the construction is in harmony with the environment.

The engineering office in charge is A+D Engels N.V. - Dieplaan 55 – B 3600 Genk (Belgium).

Description of the structure

The lenght of the structure is total ± 190 m, with an efficient width of about 2.50 m - is imposed by the profile of the terrain and the necessary free height above the national road. The distance between the platforms (walk-overs and turning) is maximum 10 m. The total weight of the bridge construction is ± 60 ton.
The connecting elements between the different platforms have an inclination of max. 5% and are alternally connected as continuous and hinged elements.
The maximal useful height under the structure is 4.50 m at the height of the bow-bridge over the road. In this position, also a "viewpoint" is positioned.
The road surface of the bridge is dimensioned for overloads of 5 kN/m².

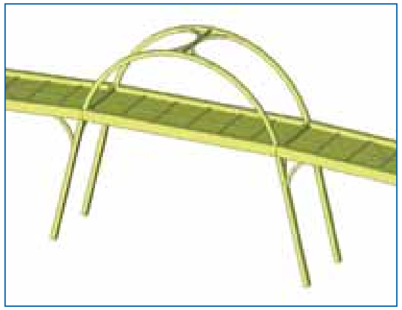
Protection and materials

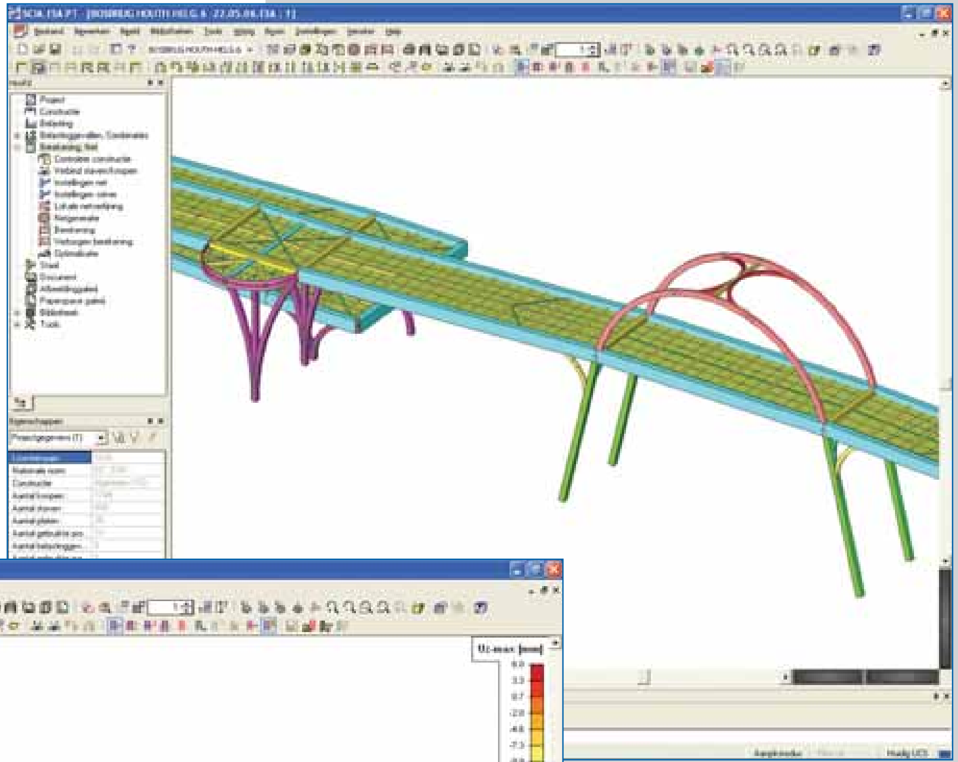
The complete structure is built with RHS (rectangular hollow steel sections) A.E.355 D.
The protection of the steel is executed by a high-quality blast and painting, installed in the workshop.

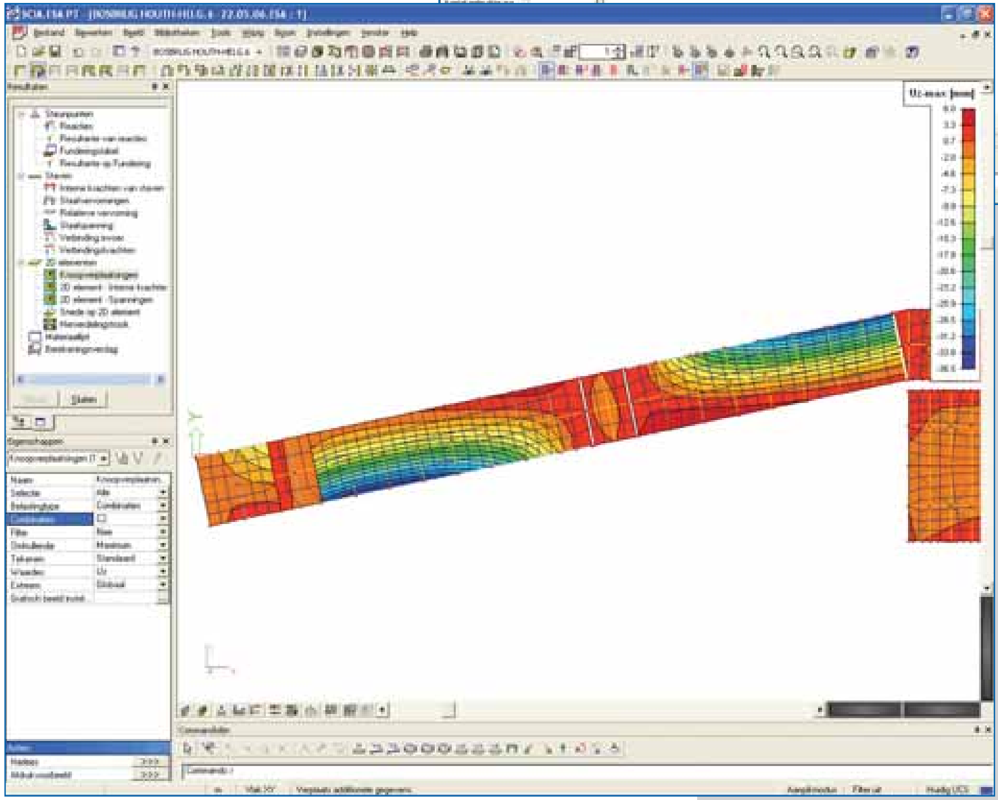
The breast wall with handles, armour plate and double knee-supports are executed in rustproof steel.
The floor covering is composed of indelible wooden strips, with anti-skit ribs.

Use of SCIA-software

We used the ESA-Prima Win software to create the model with beams and finite elements in a complete 3D environment.
Working with ESA-Prima Win is simple and powerful and the interpretation of results is clear.
We mainly used ESA-Prima Win to determine the internal forces and stresses in the steel sections, and to optimisee them according EC3-prescriptions.







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Website	www.stendess.com

A steel and concrete engineering company

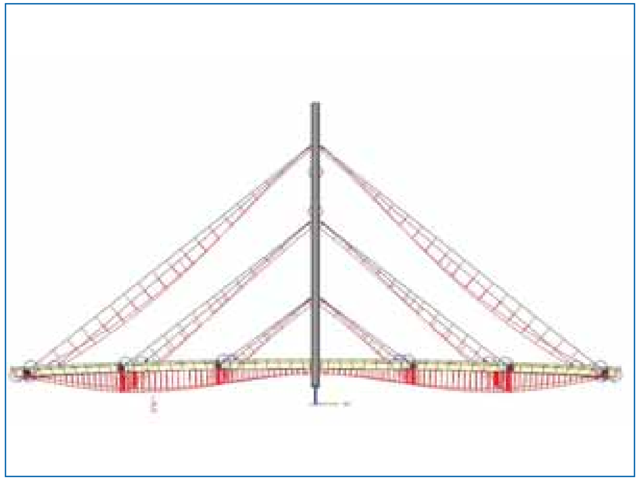
The engineering firm Stendess was founded by an experienced team specialising in the study and design of steel constructions. From its establishment in 2002, Stendess has made high quality and full service provision its top priority. Thanks to this integral service, where the design of the metal superstructure and the concrete substructure are calculated and drawn by experts in the same office, the building owner and principal contractor retain 100 % control over the complete structure.

Stendess can follow up on cross-border projects in accordance with most standards and codes: Eurocode, NBN, NEN, DIN, NF, AISC, Britisch Standards and specific national codes.

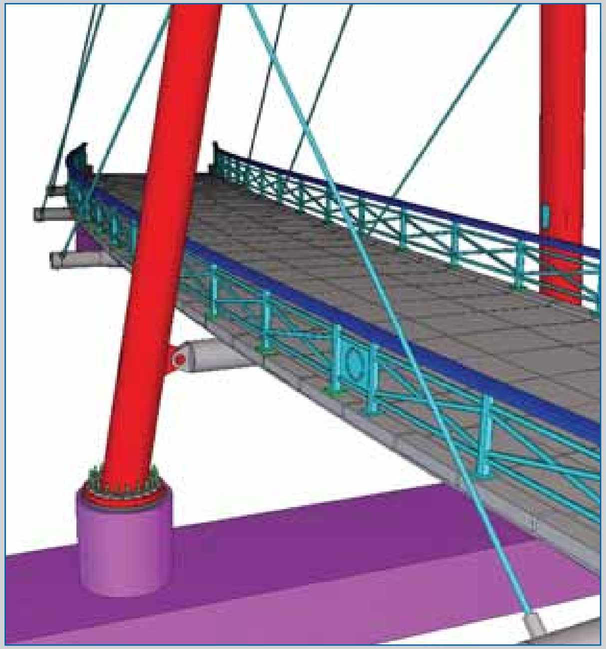
Key activities

- Industrial buildings: steel factories, power plants, depots, etc,
- Other buildings: service buildings, concert halls, sport facilities, swimming pools, apartment buildings,
- Bridge constructions: arch bridges, cable –stayed bridge, suspension bridges, bascule bridges, swing bridges, orthotropic bridge, mixed steel-concrete bridges,...
- Off-shore projects: lock gates, Roro, oil rigs, ...
- Industrial equipment: silos, cranes, craneways, storage tanks,...
- Erection engineering: longitudinal and transverse repositioning, skidding, lifting, bridge launching...

Locations of the constructions: Belgium, the Netherlands, France, Germany, United Kingdom, Spain, Sweden, Saudi Arabia, Greece, Singapore, Chili, Brasil, Cameroun, Russia, Thailand ...



Bicyclist and pedestrian bridge "Het Domein"



Used software • ESA-Prima Win

Project: Bicyclist and pedestrian bridge "Het Domein"
Type: Cable stayed mixed concrete-steel bridge
Location: Houten (Utrecht), The Netherlands
Construction firm: Welling
Architect: Grontmij N.V.
Engineering office: Ingenieursbureau STENDESS N.V., Lovendegem, Belgium
Contractor: S3C/ Zuid Nederlandse constructie en apparatenbouw, Heyningen, The Netherlands
Total steel weight: ± 65 tons
Total length: 50 m
Building period: 2005

Short description of the project

Because of the growing number of inhabitants, the village of Houten there was, the need to create new living areas. For this reason several suburbs were built in the form of leafs around the centre of Houten. These suburbs are separated by water. To guarantee an easy access between these suburbs a 'bicycle and pedestrian bridge' was needed.

The bridge can be described as a cable stayed mixed concrete-steel bridge. Circular transverse beams connected to an asymmetrical pylon by cables support a mixed concrete-steel bridge deck. The bridge deck is curved.
The asymmetrical pylon and the curved shape of the deck give, in combination with cables, a dynamic character to the bridge. The asymmetrical pylon represents the "gate" to the suburbs.

Use of ESA-Prima Win

Description of technical questions to be solved with ESA-Prima Win.

Both for the dimensioning of the bridge in the traffic situation as well as for the erection engineering of the bridge, ESA-Prima Win was used.

From the point of view of engineering this project was very challenging. First, there was the fact that the bridge deck was mixed concrete-steel. This implied a deck calculation in several stages with different stiffness factors and the calculation of cracked-uncracked concrete. The possibility of calculating mixed sections and the use of graphical sections by ESA-Prima Win was a big advantage. Secondly, there was the limitation of the reactions on the bridge end supports. Also here ESA-Prima Win proved its possibilities. Thirdly, there was the simulation of the realistic behaviour of the cables. The cables were simulated as classic bars, but with the E-modules of the tension bar material in relation to the inclination of the tension bars they were considered as cables with a fictive E-modulus. Because the linear calculations resulted in compression in the tension bars a non-linear calculation was needed. In the fourth place, it was necessary to perform a second order calculation for the check of asymmetrical pylons based on a stability calculation. Fifthly, for the erection engineering the different construction stages had to be examined and a severe erection manual for the mounting of the cables was needed. This was necessary to achieve the theoretical form of the bridge deck.
And last but not least, the dynamic behaviour of the bridge had to be checked.

Description of how our experience with ESA-Prima Win proved its completeness

- Dimensioning a 3D structure consisting of different materials (steel, concrete)
- The possibility of using and combining the results of ESA-Prima Win in a flexible way.
- The possibility of calculating mixed concrete-steel sections.
- The possibility of calculating graphical sections.
- The possibility of using tension only elements for the modelling of the cables.
- Stability calculation and second order calculations.
- Checking the dynamic behaviour of the structure by calculating the ownvalues of the structure.

This project proves the great diversity of ESA-Prima Win in checking the structure and the use of materials.

Used modules:

- Base
- 3D frame
- Dynamics
- Steel code check (NEN)
- Stability
- Physical non linear conditions

Bicyclist and pedestrian bridge

Because of the growing number of inhabitants in the village of Houten there was the need to create new living areas. For this reason several suburbs were built in the form of leafs around the centre of Houten. These suburbs are separated by water. To guarantee an easy access between these suburbs a 'bicycle and pedestrian bridge' was needed.
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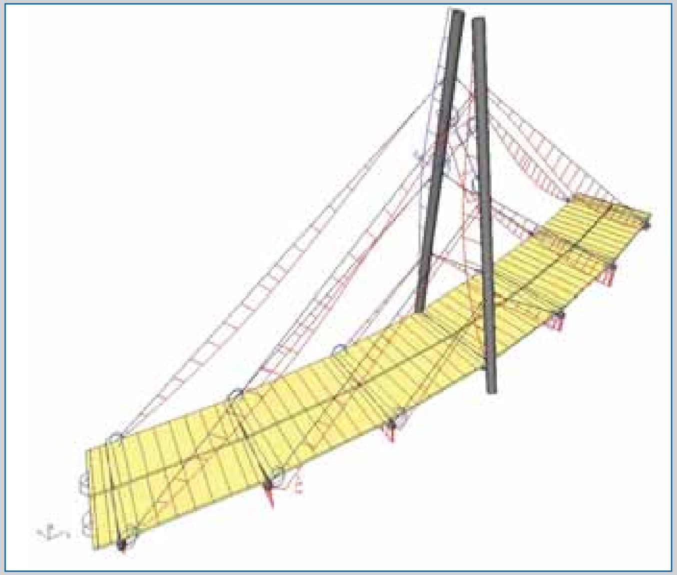

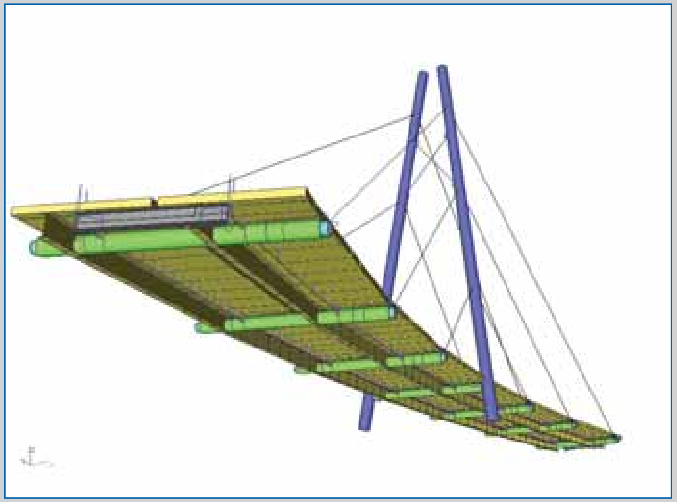

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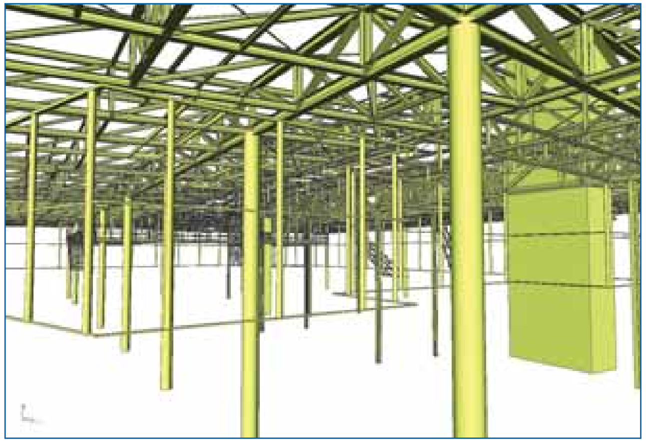
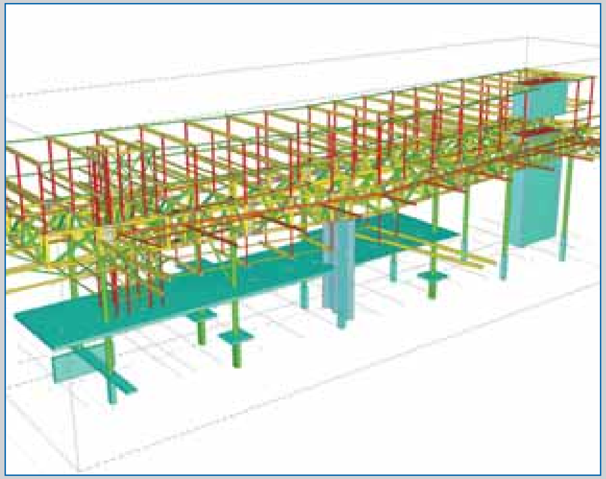
Konzernzentrale der Pappas Automobil AG in Salzburg

Unger – der führende Spezialist für maßssgeschneiderte Stahlbau-Projekte

Unger Stahlbau GesmbH, mit der Unternehmenszentrale in Oberwart und 17 Niederlassungen weltweit, zählt seit 20 Jahren zu den führenden Anbietern im Stahlhochbau und bei schlüsselfertigen Lösungen. In der Unternehmenszentrale in Oberwart, wo die Fertigung der Stahlkonstruktionen mit einem modernst ausgestatteten Maschinenpark erfolgt, sind derzeit 300 Mitarbeiter beschäftigt. Der Jahresumsatz beträgt über 150 Millionen Euro, das jährliche Unternehmenswachstum rund 15%. Pro Jahr werden auf internationalen Märkten vom russischen Kasan im Osten bis nach Dubai im Süden über 30.000 Tonnen Stahl verarbeitet. Die Referenzen von Unger spiegeln die breite Angebotspalette wider: Produktionsstätten und –anlagen, Büro- und Verwaltungsgebäude, Sport- und Freizeitanlagen, Parkhäuser, Hotels, Einkaufszentren, Hochhäuser und vieles mehr.





Used software • SCIA • ESA PT, ESA-Prima Win

Bauherr: Pappas Georg Automobil AG Reichenhaller Straße 7 5020 Salzburg
Architekt: Dipl.- Ing. Klaus Kadaer gewann den international besetzten Architektenwettbewerb für dieses Bauvorhaben.
Bauzeit Stahlbau: 10 Monate
Übergabe: August 2006
Grundrissfläche: 100 x 160 m
Verbauter Stahl: 1800 t

Technische Beschreibung

Die Stahlkonstruktion besteht aus folgenden Abschnitten:

a) Technik und Bürogebäude:
B: 15 m / L: 85 m / 3 Geschossen mit Niveau +13,0m/+16,2m/ +20,0m/ und Dachniveau +24,0m.

Die Tragstruktur für die Technik (1. +2. Obergeschoss) besteht aus einer räumlichen Fachwerkskonstruktion mit einer Systemhöhe von 3,6 m. Die Grundkonstruktion wurde mit einem Raster 8,00 x 16,00 m auf Betonstützen hergestellt. Auf diese Konstruktion wurde das Bürogebäude (3. + 4. Obergeschoss) gestellt. Die Verbundstützen wurden mit Querträgern verbunden. Die Querträger wurden zwischen den Flanschen mit Kammerbeton ausgefüllt (aus Brandschutzgründen). Die Additivdecke wurde in allen Stockwerken stärker dimensioniert um eine höhere Horizontalsteifigkeit zu erreichen. Die Horizontalkräfte aus Wind und Stabilisationskräften wurden zwischen einer vertikalen Betonwand und dem massiven Treppenhaus verteilt. Die gesamte Bürofassade ist verglast.

b) Dachkonstruktion
B: 160,00 m / L: 100,00 m
- Untere Kante des Fachwerkes +13,00 m
- Fachwerkssystemhöhe 1,8 m
- Fachwerksauskragung: 8,00 – 22,00 m

Die räumliche Fachwerkskonstruktion wurde auf Betonstützen im Raster 17,00 x 16,00 m aufgelagert. Die Hauptfachwerke des Primärsystems kragen im Randbereich zwischen 8,00 bis 13,5 m aus; an den Gebäudeecken 20,00 bis 22,00 m. Die Sekundärfachwerke haben untereinander einen Abstand von 5,3 m.

Die Ober- und Untergurte des Fachwerks wurden mit Windverbänden und Druckstreben stabilisiert. Die Dacheindeckung wurde als Foliendach ausgeführt und die Untersicht ist mit speziellen Paneelen verkleidet.
Die Dachkonstruktion inkludiert eine Glasüberdachung mit den Maßen: B: 20,4 m / L: 75,0 m
Die Glasdachunterkonstruktion wurde mit unterspannten Trägern ausgeführt.

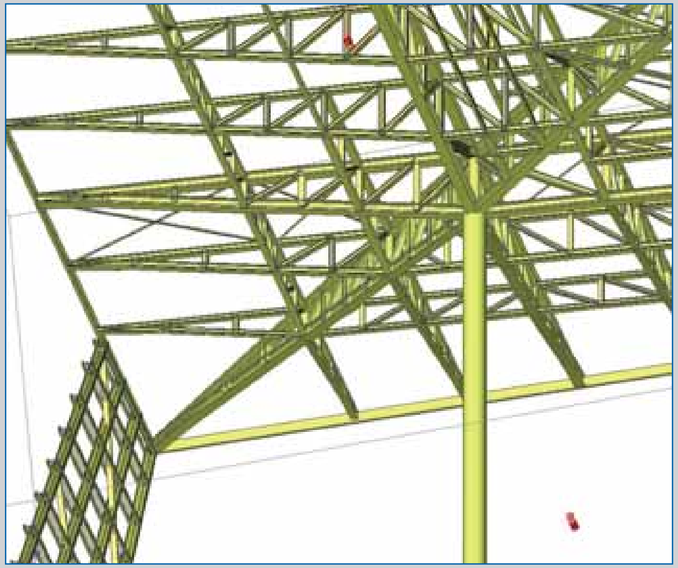
c) Aufgehängte Plattformen
auf einer Kote von +9,600
1. Plattform: B = 7,00 / L = 37,00 m
2. Plattform: B = 7,60 / L = 34,00 m

Beide Plattformen wurden mit einer Brücke (B = 2,8 – 3,8 m / L = 14,3 m) verbunden.
Die aufgehängte Plattform mit der Zwischenbrücke wurde mit den Haupt- und Sekundärträger konstruiert. Die Betondecke ist mit den Stahlträgern mittels Kopfbolzen verbunden.
Die Plattformen wurden mittels Rundrohren von der Dachkonstruktion abgehängt.
Bei diesem Projekt war es wichtig die Verschiebungen der Fachwerke zu verfolgen, daher wurden die auskragenden Fachwerke mit einer Überhöhung ausgeführt.

Verwendung der ESA-Prima Win Software

Die Berechnung wurde mit ESA-Prima Win 3.50 ausgeführt. Mit diesem Programm konnten die Geometrie und die Belastungen sehr leicht eingegeben werden. Die generierten Lastkombinationen ersparen Zeit.
Wir können mit den räumlichen FEM-Berechnungen von ESA-Prima Win das Tragwerksystem schnell und wirtschaftlich optimieren. In kürzester Zeit hat man aus dem komplexen Bauwerk ein klar definiertes Tragsystem modellieren können. Die Problemstellen waren dadurch schnell erkennbar, somit konnte man sehr schnell die geforderte Verformung für die Glasfassade erhalten.

Das statische System besteht aus 5.340 Knoten und 11.050 Stäbe.
Es ist weiters zu erwähnen, dass durch das gute Anschlussmodul von ESA-Prima Win die steifen und gelenkigen Knotenpunkte rasch ausgelegt waren.
Das Rendering mit der verdrehbaren Axonometrie ermöglicht zusätzlich eine realistische Visualisierung der Konstruktion
Die neu entwickelte Version SCIA•ESA PT hat die Kreativität des Programms 4 noch erhöht.



Pappas Automobil AG of Salzburg

The project was the corporate headquarters of Pappas Automobil AG in Salzburg, a large company that processes 1.800 tons of steel. Covering a large area of ca. 100 m x 160 m, this construction will provide space for exhibitions, factories and administration of four brands. This project stands out for its short construction period and its complex framework construction. The maximum length of the projecting framework was 22 m. The building consists of many floors and rises on just 32 supporting points. Furthermore a suspended gallery and a cable-trussed glass roof with a dimension of 1.200 m² were built up. With the help of ESA-Prima Win, the structure of this complex object could be optimised in the highest economical way.

Waternet

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Fax +31 20 6083910
Contact Dhr. G.J. Stoeten
Email jan.stoeten@waternet.nl
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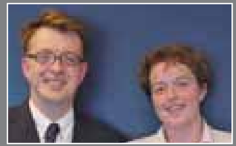


RWZI Hilversum

Op 1 januari 2006 is Waternet officieel gestart: een nieuw bedrijf, bestaande uit Waterleidingbedrijf Amsterdam en Dienst Waterbeheer en Riolering. Het eerste bedrijf in Nederland voor de hele watercyclus, van drinkwater tot afvalwater.
Het verzorgingsgebied van Waternet omvat de gemeente Amsterdam en een groot gebied in de provincies Utrecht en Noord-Holland.

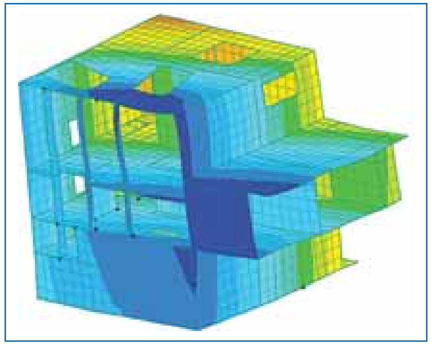
Missie

Waternet zorgt op een integrale, samenhangende en maatschappelijk verantwoorde wijze voor drinkwater, afvalwater en grond- en oppervlaktewater.

Waternet is een organisatie, die zich richt op de watercyclus. Drie primaire processen vormen samen de watercyclus: drinkwater, afvalwater en grond- en oppervlaktewater. Deze primaire processen vormen de essentie van Waternet en komen terug in de hoofdstructuur van de organisatie.

De primaire processen zijn
- Drinkwater
- Afvalwater
- Grond- en oppervlaktewater

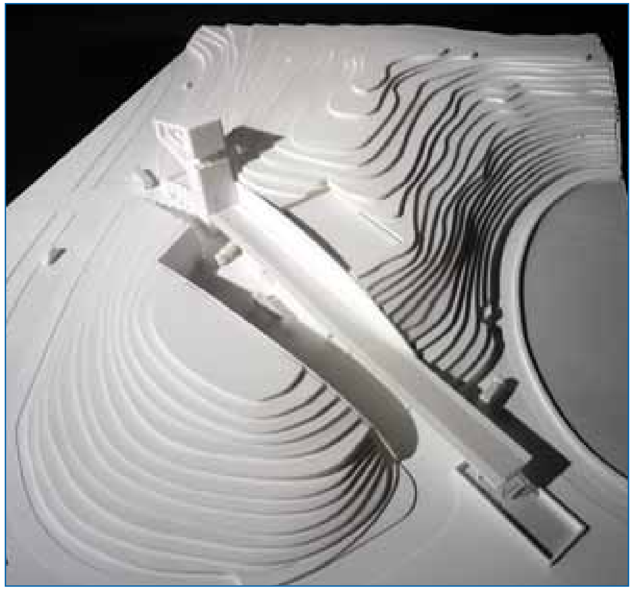
Waternet is opgebouwd uit sectoren, die integraal verantwoordelijk zijn voor alle activiteiten om hun eindproducten te vervaardigen.



Integrale verantwoordelijkheid

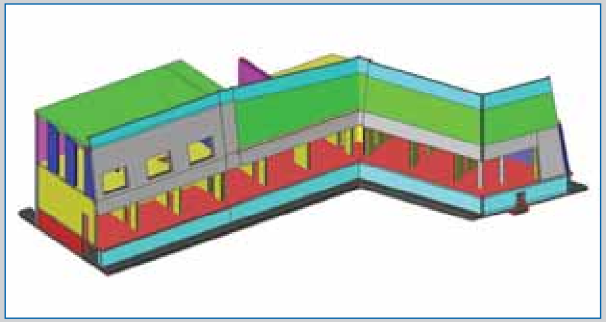
Integrale verantwoordelijkheid betekent dat de sector verantwoordelijk is voor:
- De beleidsvorming;
- De realisatie van het beleid;
- Realisatie van nieuwe werken en renovatie;
- Procesbeheersing, monitoring en inspectie;
- Bediening installaties;
- Beheer en onderhoud van de objecten.
- Gemeente Amsterdam behoudt de volledige zeggenschap over de drinkwatervoorziening;
- AGV behoudt de volledige zeggenschap over alle overige watertaken in het gehele werkgebied.

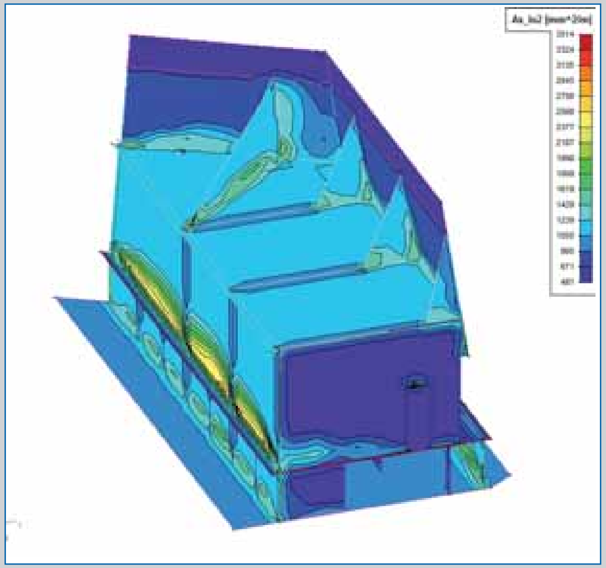
Waternet wordt bestuurd door de gemeente Amsterdam en het hoogheemraadschap Amstel, Gooi en Vecht (AGV).



Waste water treatment

Waternet is developing a new waste water treatment facility for the city of Hilversum. After completion, it will be the largest communal Membrane Bioreactor of the Netherlands. The facility will be covered with a hill, solving the problem of the polluted soil, present at the location. A park will be layed out on the hill and a housing estate can be created since the new underground facility will not pollute the air in the vicinity anymore.
Experts of Royal Haskoning in Amsterdam are hired for the design of concrete structure the innovative concept. The combination of Allplan and SCIA • ESA PT is used to its limits by converting CAD-models to FEM and exporting reinforcement data back to the CAD-model.





Used software • SCIA • ESA PT, ESA-Prima Win, Allplan Engineering

Introductie

Het gebied rond rioolwaterzuivering Hilversum is vervuild en ligt naast het Goois natuurreservaat. De gemeente Hilversum ondervindt een grote behoefte aan ruimte voor woningbouw. De bestaande rioolwaterzuivering levert een onvoldoende effluentkwaliteit.

Waternet heeft er voor gekozen met membraanbioreactoren het huidige ruimtebeslag van 15 hectare terug te dringen naar 1 hectare. Daarnaast wordt de effluentkwaliteit nagestreefd die infiltratie van effluent in de zandige bodem van het gebied Anna's Hoeve mogelijk maakt. Voor het behalen van deze kwaliteit is een Membraan Bioreactor (MBR) toegepast. Na gereedkomen zal de rioolwaterzuivering de grootste MBR-installatie van Nederland zijn. Deze innovatieve zuivering wordt bovendien geïnstalleerd onder een recreatief park dat wordt aangelegd op een berg waarin vervuilde grond wordt verwerkt. Dit multifunctionele ruimtegebruik is uniek in zijn soort.

Projectomschrijving

Het vervuilde terrein wordt gesaneerd, waarbij de vervuilde grond op de locatie van de nieuwe zuivering wordt verwijderd. Er wordt een zeer omvangrijke betonconstructie aangelegd waarin de zuivering wordt geïnstalleerd. In totaal wordt ca. 30.000 m^3 beton gebruikt. De laagste vloeren komen ca. 3 m diep onder het maaiveld en het dak ligt op ca. 14 m boven maaiveld. De lengte van de betonconstructie is ongeveer 120 m bij een breedte van 40 m.

De vervuilde grond wordt over de betonconstructie terug gebracht en afgedekt met een leeflaag waarop een recreatief park wordt aangelegd. De berg zal met een hoogte van 8 m over de betonconstructie worden aangebracht zodat het volume vervuilde grond volledig op de locatie kan worden teruggebracht.
De entree van de zuivering wordt gerealiseerd middels een uitsnijding uit de berg. De vuile lucht uit de zuivering wordt door middel van gaswassers gereinigd, waarna het kan worden uitgeblazen via een toren van 35m zonder dat de gewenste aan te leggen nabijgelegen bebouwing er last van heeft.

De bedieningsruimtes en de presentatieruimte worden in een excentrisch geplaatst volume aan de toren gehangen en steken boven de berg en het park uit. De uitwendige vormgeving van de zuivering is ontworpen door Snelder Architecten uit Hilversum.

Technische uitdagingen

De betonconstructie zal uiteindelijk volledig ondergronds komen, maar wordt op een verlaagd maaiveld aangelegd en gefundeerd op staal. De grondaanvullingen op en rond het gebouw en de interne waterdrukken zorgen voor grote te keren belastingen. Deskundigen van Royal Haskoning uit Amsterdam werden ingeleend om de constructieve expertise te leveren.
Vanwege de complexe krachtsverdeling in langs- en dwarsrichting zijn driedimensionale modellen gebruikt bij het berekenen van de constructie. Door het invoeren van krimpverkortingen tussen stortfases werd de waterdichtheid van de constructie gewaarborgd.

Projectaanpak

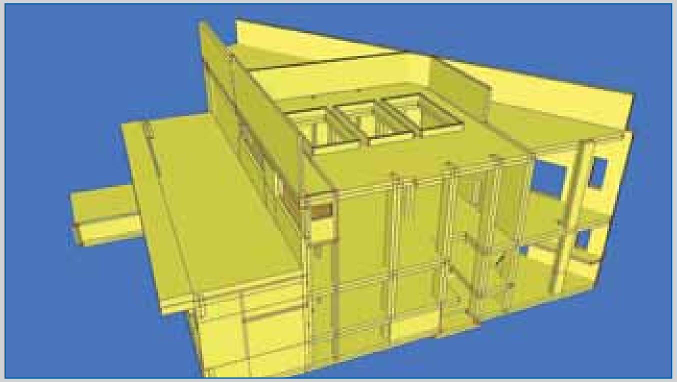
De tweedimensionale bestekstekeningen zijn door SC Engineering in Indonesië omgezet in een driedimensionaal Allplan model (zie inschrijving in de categorie CAD Engineering). Deze Allplan modellen zijn door specialisten van Royal Haskoning geconverteerd naar SCIA•ESA PT, waarna de belastingen zijn ingevoerd door de constructeurs. De wapening werd berekend, waarna er een export van wapeningsgegevens naar Allplan mogelijk was. Met behulp van de wapeningscontouren werd een driedimensionaal wapeningsmodel gecreëerd. Daarna is het mogelijk om de 2D-wapeningstekeningen uit te werken in Indonesië. Op deze wijze wordt communicatie over wapeningsafmetingen tot een minimum beperkt en blijven verantwoordelijkheden tussen de betrokken partijen zeer helder.

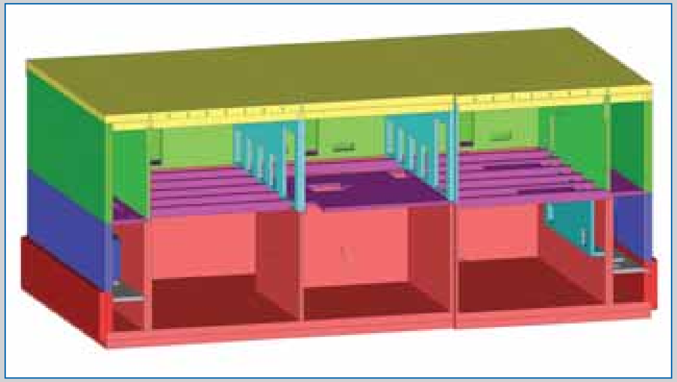
Softwaregebruik

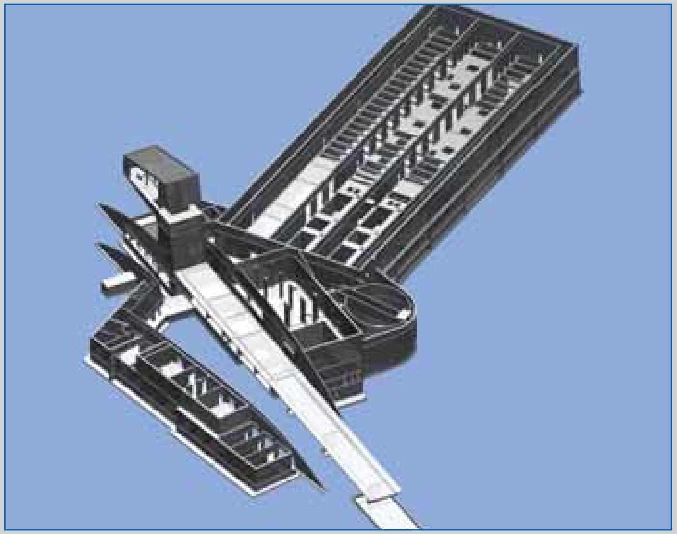
Voor de driedimensionale CAD-werkzaamheden werd Allplan Engineering, versie 2005 en 2006 gebruikt. Voor de constructieve analyses werd in eerste instantie ESA-Prima Win, versie 3.50 gebruikt en in een later stadium SCIA•ESA PT, versie 2005.

Resultaten en conclusies

Er is gebleken dat met de conversie van het driedimensionale CAD-model naar een EEM-model een grote tijdsbesparing voor de constructeur wordt bereikt. Nadat er afspraken waren gemaakt hoe elementen in Allplan werden opgezet, bleek het zeer gemakkelijk om met de modellen te werken. De constructeur heeft wensen aangegeven over de hoogte van de neutrale lijn van vloeren ten opzichte van onder- en bovenkanten van wanden en kolommen.
Sommige elementen bleken niet juist te worden geconverteerd. Soms was de dikte van elementen verstoord en schuine wanden kwamen soms verticaal uit de conversie. SCIA is bezig om deze fouten in toekomstige versies op te lossen. Hoewel de conversie dus nog niet foutloos is, moet wel worden geconstateerd dat het weinig tijd vraagt om de fouten te corrigeren. Bij het exporteren van wapeningsgegevens uit SCIA•ESA PT naar Allplan is gebleken dat het niet mogelijk is om de gegevens direct op de juiste coördinaten in Allplan in te lezen. De verschuiving van de wapeningscontour moet nog worden ontwikkeld. Bovendien is gebleken dat export van wapeningsgegevens van wanden minder intelligent is dan de export van vloerwapening.
Helaas is het project stilgelegd vanwege een te verwachten overschrijding van het beschikbare bouwbudget. Inmiddels wordt een nieuw ontwerp uitgewerkt waarin de rioolwaterzuivering niet onder, maar tegen de berg wordt aangebracht. Wellicht dat de beoogde werkwijze in een bepaald stadium van dit herontwerp alsnog wordt toegepast.





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WINNER WINNER WINNER WINNER WINNER

EXCON, a.s. started 1990 as a design studio focusing on structural analysis and dynamics of steel structures. Its initial development related to the boom in the telecommunication sector. In 1995, the company extended its business activities by engineering and contracting activities. New fields of operation were found after the telecommunication market saturation. At the end of 2002, the company acquired a facility in Hradec Králové producing of steel structures (former ZVU Chemie, today EXCON Steel, a.s.). In 2003, EXCON, a.s. entered the market as a residential developer and continues to look for other opportunities. Its original product - (steel structures -) has been developed for the entire term of the company existence.

About the Company

A great benefit of the company is the high rate of entrepreneurship demonstrated by search for new business opportunities, which are quickly transformed into activities of the company. The management applies strict ethical principles and a healthy approach to risk undertaking.

Vision

EXCON wants to be a professionally mature, dynamic company with modern management. Traditional activities of the company comprise design and supplies of steel structures. The company intends to consolidate its position in this area also on the joint European market. The company also intends to strengthen its position of residential developer in this strategic period.

References

- Sazka arena Prague
- International power Opatovice, Power plant
- General reconstruction, Petřín look-out tower
- ...

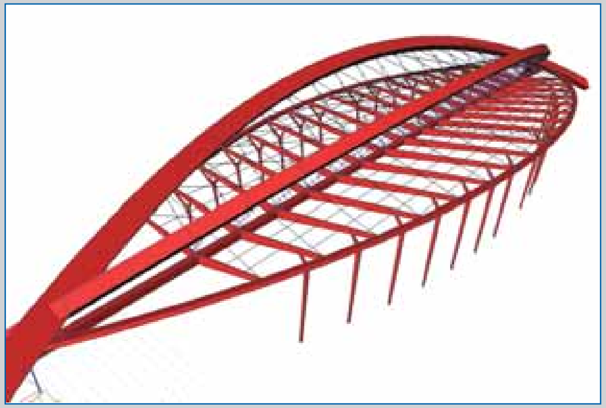
Quote of the jury:
"The design and erection of this prestigious and eye-catching structure would not have been feasible without extensive and clever use of software"

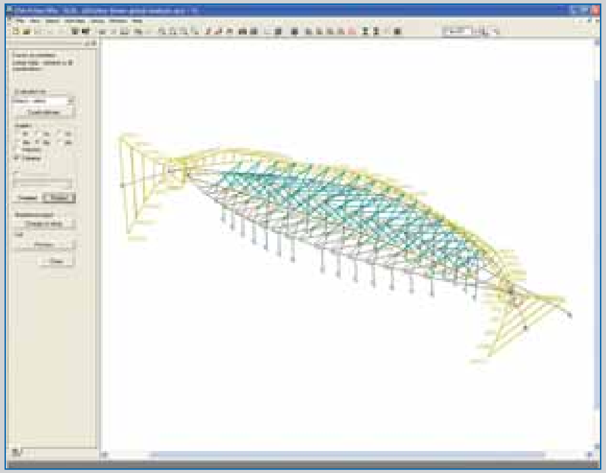
Metro station Strizkov-Prague

The project regards the design of the primary steel structure of the metro station of Prague-Střížkov.
The new metro station Střížkov in Prague is designed and built as a special structure with a high esthetical level. The hall structure is about 160 m long, 42 m wide and 20 m high. Two crossed main hingeless arches with a span of 160 m are fixed to concrete pylons. The roof structure is suspended on the main arches by a system of prestressed rods and supported by columns around the roof. The major part of the members is a circumflex with a variable cross-section (the majority of the profiles are box welded from a plate thickness of 10-35 mm, except the columns, which are welded I profiles). The geometry of all parts is very difficult for the design, the manufacturing and the erection. The whole structure was built under direct supervision of the architect. The weight of the structure is about 950 tonnes.

Used software • NEXIS 32 (ESA-Prima Win)

Primary steel structure - Metro station Strizkov-Prague





Architect's vision

The new underground station Střížkov in Prague is designed and built as a special structure of a highly esthetical level. It is the 1st station of about 50 Prague metro stations, which is built as fully glassed-in. The roof level is about 5 m above ground space (the top of the structure is 20 m above ground space) and the tracks are positioned 7 m under the ground level.

The whole station area has a length of more than 120 m is without internal columns. The idea of the architect was that the glass hall of the station will shine at night to the open up to the neighbourhood and daylight will throw light on the boarding point.

Characterization of the main structure

The hall structure is about 160 m long, 42 m wide and 20 m high. Two main crossed hingeless arches are fixed to concrete pylons (each supported by 26 PCs of capsule anchor M64, length 1300 mm). The variable box profile of the main arches is 1,5 x 1,5 m high and 1,5 x 3,0 m in the supports; it is welded from plates with a thickness of 20-35 mm. The span of the arches is 160 m; the crossed point is about 10 m from the anchoring. Arches are joint together by 3 connecting beams (three-dimensional beams of about 20 m of length).

The roof structure is suspended on the main arches by two systems of prestrained bars. The 1st system is called short bars and has great static function (profile M48 from stainless steel S460). The 2nd system is called long bars (profile M30 from stainless steel S460). For a reduction of the tension in the long bars are used special springs (with a press capacity of 180 kN, the press is transformed into tension by a special cage). The system of bars is prestressed.

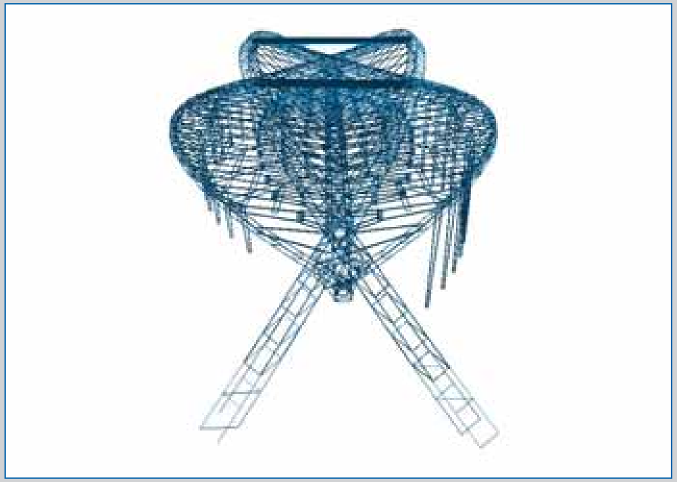
The roof structure consists of horizontal arches, middle beams, trusses and purlins. Twisted curves of horizontal arches (welded box profile) border the roof area and are supported by a system of columns. In the apparent axis of structure is the middle beam (welded box profile about 130 m length and vertical curved). The system of lateral trusses each 6 m is sited between the middle beam and the horizontal arches. Glass roofing is supported by a system of purlins. The columns round about the roof are in the shape of the Y letter (welded I profile). The majority of the structure is designed with steel S355 (prestressed bars from stainless steel S460). The geometry of all parts is very difficult with regard to design, manufacture and erection, because the majority of edges are circumflex. The weight of the structure is about 950 t.

Static analysis

- The design of the main structure was very difficult. The major part of all members is a welded box profile with a variable cross section. Only one edge is a straight line (upper flange of trusses), all other edges are circumflex (in the best case it is a circle, in the worst case a general spline without formula).
- For the 1st step of the calculation of internal forces was used the 3D linear module Nexis (ESA-Prima Win). For the structure design more then 20 load cases were considered (and more than 700 combinations). The model of the structure has more than 800 nodes and 1000 members, the number of the profiles is higher than 40. For extreme combinations internal forces were calculated by the nonlinear module (prestressed rods without press). Extreme internal forces (results of linear and nonlinear calculations) were used for the detailed profile design. The majority of profiles are welded box category 4 by EN 1993 (with local buckling for compression members or compression flanges of bent members). This type of profiles was designed with Nexis software. For the design of the stability of the members, the stability module Nexis calculated the buckling lengths. The stability calculation was made for the final structure, whereas the main arches were stabilized by a system of prestressed bars. The stability calculation was made also for the main arches during erection (without the positive influence of prestressed bars). Separately were designed connection beams by the nonlinear module Nexis (all members of connecting beams were designed fully in the Nexis system).

Erection and rods prestressing

- The main arches were mounted with parts of a length of max. 24 m and a weight of max.40 t using erection supports. The most difficult part of the mounting was the setting of anchor parts with cross-parts and next the closing of arches by quoins. During the last phase of the mounting of the arches, the geometry was corrected by hydraulic presses because of the changing temperature. After the mounting of the main arches, the erection supports were demounted.
- After this, the roof structure (horizontal arches, middle beam, trusses and columns) was mounted using erection supports under the middle beam. After completion of the roof structure, the rods were mounted. For the pressurising of the short bars, the middle beam was elevated about 40 to 130 mm by hydraulic presses. In this case, short bars were activated (at night, when the temperature was about 15 degrees). In the afternoon of the same day (when the temperature was higher then 30 degrees) the structure picked up from presses and bars were prestressed about 70% of needed value (if the temperature would be only 10 degrees, the bars would be prestressed up to 100%). The 2nd step was prestressing of the long bars. These bars were prestressed by mounting depressing strings (in the right calculated value of the depression). After unblocking of the strings, long bars were prestressed on the right value. The 3rd step was prestress short bars to 100% of needed value by technotensioner Macalloy.
- Geometry and internal forces were calculated by the Nexis system for the erection correction during the whole mounting and prestressing process. Erection of this very important structure (weight 950 t) was done from the 15th of March to the 20th of August.



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Enveloppe métallique - CVE Flamoval

Setec Bâtiment est une des sociétés filiales du groupe SETEC créé en 1957 par Henri Grimond et Guy Saias. Le groupe SETEC compte actuellement avec plus de 1000 collaborateurs et réalise un chiffre d'affaires annuel de 124 millions d'euros.

Indépendant de tout groupe industriel, commercial et bancaire, garantissant la stricte objectivité des études. En plus, le capital du groupe est détenu exclusivement par les ingénieurs qui dirigent et participent effectivement à son activité.

SETEC comprend, tant en France qu'à l'étranger, plus de vingt-cinq filiales spécialisées dans les domaines suivants :

- Bâtiment
- Industrie
- Economie, déplacements, transports
- Travaux publics,
- Systèmes de transports
- Environnement, eau, déchets
- Organisation, gestion de projets
- Télématique des transports
- Télécom et NTIC

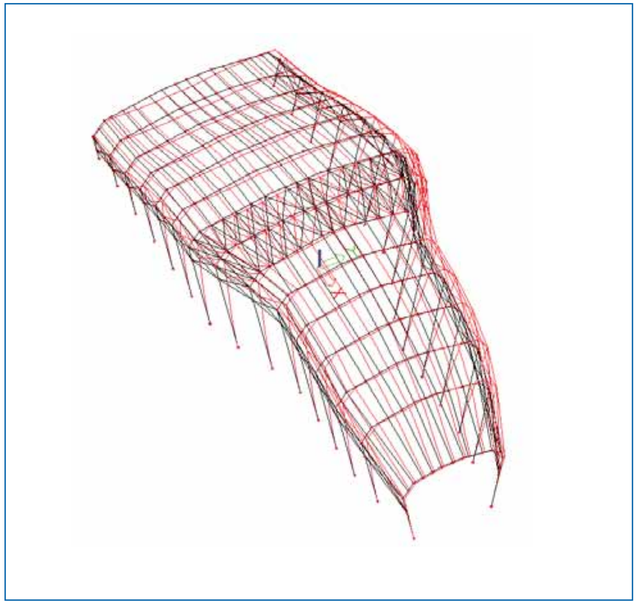
Setec Bâtiment a pour vocation d'assurer, seule ou avec le concours d'autres sociétés du groupe, les études, la maîtrise d'œuvre, la conduite d'opération et l'assistance à la maîtrise d'ouvrage pour la réalisation des grands projets en bâtiment.

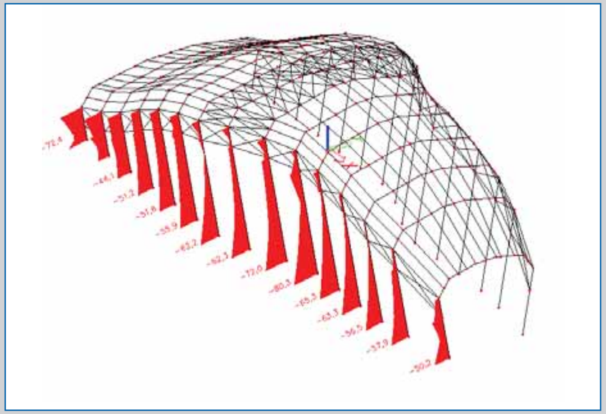
Setec Bâtiment est le partenaire des plus grands architectes français ou étrangers pour la conception et la réalisation de projets publics ou privés prestigieux.

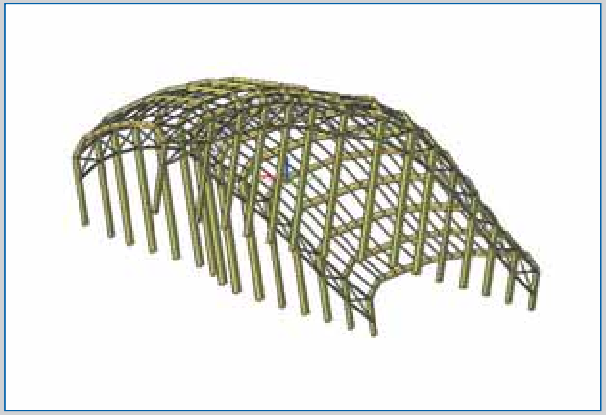
SETEC Bâtiment est un bureau d'études pluridisciplinaire comprenant des ingénieurs chefs de projets-coordonnateurs entourés d'ingénieurs spécialisés des différentes techniques du bâtiment regroupés dans deux départements :
Département Structure.
Département Équipements Techniques de bâtiment

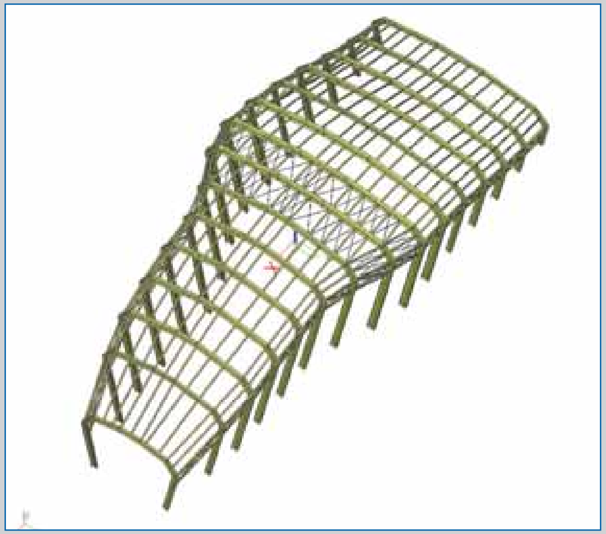
Le département Structure de Setec maîtrise les technologies les plus sophistiquées et met en œuvre de modélisations complexes à travers l'emploi de logiciel de calculs aux éléments finis notamment Digital projet (Catia), Ansys-CivilFEM et SCIA • ESA PT

Used software • SCIA • ESA PT









Maitrise d'ouvrage : Syndicat Mixte de Flandres Morinie (SMFM)
Maitrise d'oeuvre : Setec BâtimentRAS ArchitectesCadet International

Le projet Flamoval né de la nécessité de construire un centre de valorisation énergétique pour les départements du Nord et du Pas de Calais. En 2000, le Syndicat Mixte de Flandres Morinie (SMFM) est constitué dans le but de gérer ce centre de valorisation énergétique. Ce syndicat regroupe 159 communes, dont 282.570 habitants en 2005.

Le site choisi pour réaliser le projet est la ville d'Arques et la date prévue de mise en service 2010. En effet, ce centre devrait être capable d'éliminer et valoriser 92500 tonnes de déchets par an.
Le syndicat lance le concours en octobre 2005 et en mars 2006 le marché de Maîtrise d'œuvre est attribué au groupement SETEC Bâtiment, CADET International, RAS Architectes , SETEC TPI, PLANITEC BTP et ARA.

La solution présentée est très innovant au niveau architectural, mais aussi au niveau de HQE (Haut qualité environnementale). L'environnement prévu autour du centre permet d'avoir un espace agréable pour l'ensemble des personnes qui devront y travailler une grande partie de ses journées, mais aussi être attractive aux visiteurs et passants.

L'ensemble du projet au niveau du génie civil, consiste en trois bâtiments.

- Le bâtiment principal CVE.
- Le pavillon de la Communication
- Le local Rippers.

La modélisation et les calculs présentés sont ceux du bâtiment CVE en raison de son importance au niveau architecturale, au niveau de coût mais surtout pour sa complication structurelle.

Le bâtiment CVE héberge tout le « process » pour le traitement des déchets ainsi que les bureaux des utilisateurs du bâtiment. Ce bâtiment a été conçu en deux parties indépendantes : la partie consacrée au traitement des déchets et aux bureaux est en béton armé et l'enveloppe qui est de type métallique. L'ensemble a été conçu de sorte que les structures en béton soient indépendantes de l'enveloppe métallique pour ne pas générer des difficultés de mis en œuvre.

La structure modélisée avec SCIA•ESA PT est l'enveloppe métallique. Cette structure comprend des portiques métalliques disposés tous les 8,40 mètres. Chaque portique est formé de deux poteaux inclinés et d'une traverse qui suit la pente de la toiture. Les dimensions des portiques sont très variables. En effet la hauteur des portiques varie de 17,5 mètres à 41 mètres, et la portée varie de 37 à 53 mètres. Il n'y a aucune répétitivité des dimensions des portiques.

Les caractéristiques géométriques de l'enveloppe métallique ont été fournies sous le format Autocad 3D par RAS Architectes, donc ceci nous a amené à utiliser SCIA•ESA PT, car l'interface avec les logiciels de dessin est très rapide.

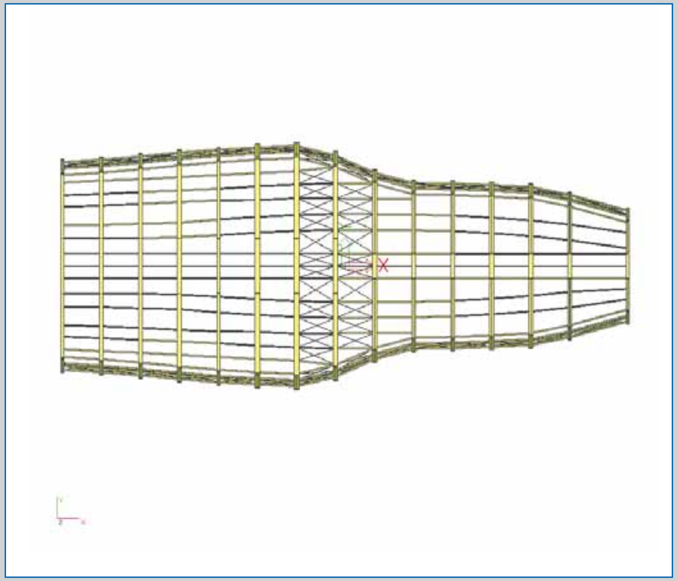
Le principe de stabilité envisagé pour la structure consiste à avoir des portiques autostables dans le sens transversal avec des nœuds encastrés aux jonctions poteaux-traverse. Ces portiques sont encastrés en pied, afin de pouvoir optimiser les sections d'acier.

Le contreventement longitudinal est assuré par deux poutres treillis qui égalisent les déplacements de la structure dans le sens longitudinal. Le contreventement en toiture est assuré par trois lignes de contreventement.
Le travail fait avec SCIA•ESA PT consiste d'abord à modéliser la structure. Compte tenu des dimensions des portiques, les phénomènes dimensionnant sont la flèche à mi-portée et en tête de poteaux et le flambement des poteaux.
Les charges en jeu, hormis les charges permanentes, sont la neige et surtout le vent, qui prend une importance énorme compte tenu de sa magnitude (75 daN/m² selon norme de vent) et du fait que le bâtiment se trouve dans une zone très exposé.
On a vérifié la flèche en tête de poteau (H/300) et la flèche a mi travée (L/300). Mais la vérification la plus contraignante au niveau de flèches était le déplacement différentiel entre deux portiques qui était limité à 2,5 cm pour des soucis d'arrachement du bardage utilisé.
Compte tenu de la hauteur des poteaux, une vérification au flambement s'avérait nécessaire. Dans un premier temps, on a dimensionné les portiques pour une contrainte limitée à 35% de la contrainte de plastification (x=0.35 dans l'Eurocode 3 pour le flambement de poteaux en H du type de ceux utilisés). En plus de ce calcul, une analyse non linéaire a été faite pour valider la stabilité globale de l'enveloppe ainsi que la limitation prise en compte.

Une chiffre : 1370 tonnes acier pour la charpente principale.

Recycling plant Flamoval

The Flamoval project concerns the opening of a recycling plant in the north of France in 2010. The team in charge of the total design of the facility-process, the building, the external works and landscaping is in charge of Setec Bâtiment and includes RAS Architects and Cadet International.
The main building is made up of a steel skeleton comprising a series of portal frames of varying dimensions, with a maximum span of over 50 metres and an overall height of over 40 metres.
The structural design takes into account the allowable relative displacement of the frames, the calculation was performed by means of a three dimensional design model, taking into account horizontal and longitudinal wind forces and local buckling.



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TAPPY BORNAND MICHAUD SA

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Histoire

TBM est un bureau d'étude fondé en 1954 à Lausanne par MM. Pierre Tappy et Pierre Duttweiler, ingénieurs civils. Le développement rapide de la société Tappy & Duttweiler l'a conduit à ouvrir des bureaux à Vevey en 1956 et à Moudon en 1960.
En 1980, Pierre Duttweiler quitte le bureau qui est transformé en société anonyme (SA). Dès 1990, Pierre Tappy s'associe à deux autres ingénieurs civils, Martin Bornand et Claude Michaud. Dès cette date ces derniers prennent la direction de la société sous sa nouvelle raison sociale TAPPY BORNAND MICHAUD SA.
Depuis 1993 MM Bornand et Michaud sont les seules actionnaires de la société.

Mission

Conception, étude de faisabilité, évaluation économique, suivi et contrôle de la réalisation. Le bureau a également pour mission d'étudier l'impact sur l'environnement des projets de construction dans le domaine du génie civil et du bâtiment.

Clients

Nos clients sont des services publics, de grands groupes industriels et financiers tels que NESTLE et des particuliers.

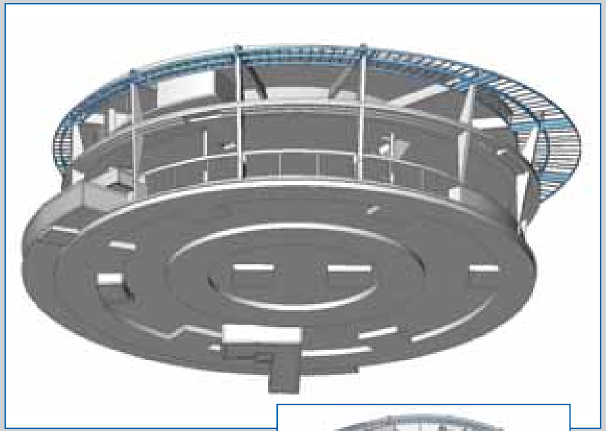
Références du bureau (3 exemples de réalisations du bureau)
1999-2002 : Construction du nouveau Campus de L'IMD à Lausanne-Ouchy, Suisse.
2002-2004 : Usine pilote Product Technology Centre Nestlé à Singen, Allemagne.
2003-2005 : Nouveau réservoir d'eau du réseau En Sonzier, Montreux, Suisse

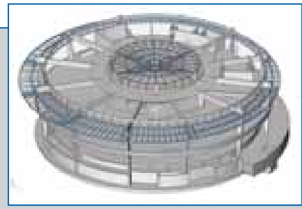
Wellnes Centre, Nestle Vevey

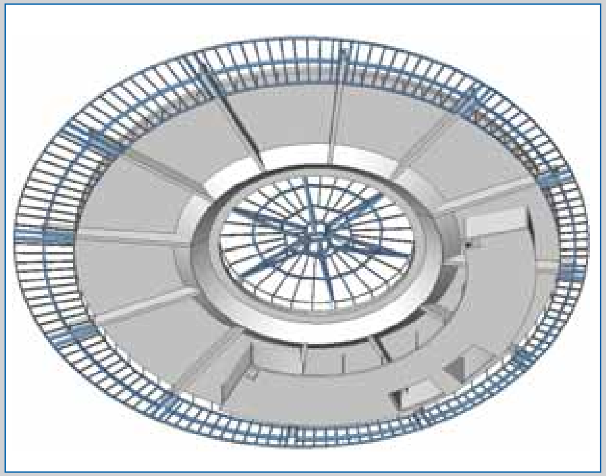
The project consists in a building realised entirely in glass, of a circular form, with a metal cap and a cupola at the top.
The building is composed of four levels, the underground level and three floors; the interior space is rationally used. The underground floor is composed of a fitness centre, a medical centre, a central ventilation unit and a storage area. The ground floor is composed of the cafeteria and the kitchens of the restaurant. On the first floor we find a self-service restaurant, also with kitchen facilities.
Finally, the second and last floor is a mezzanine suspended on the roof. This mezzanine is devoted entirely to the technical buildings.

Used software • SCIA • ESA PT

Wellnes Centre, Nestle Vevey







Introduction au projet

En 2003, pour son siège international sis à Vevey, Nestlé décide de construire pour ses employés et ses nombreux visiteurs, un édifice moderne composé d'un restaurant avec ses accessoires, une cafétéria, un centre de fitness, un centre médical et une grande terrasse à l'extérieur côté lac. A côté de ce bâtiment, également un nouveau parking de 350 places.
A l'exemple de son bâtiment principal, Nestlé a voulu que ces ouvrages, situés au bord du lac Leman, soient des constructions modernes alliant confort des usagers et respect de l'environnement ainsi qu'une meilleure intégration dans l'environnement naturel et bâti de la zone. Une rivière souterraine traversant le parking a été déviée de sa trajectoire sans modifier l'hydrographie de la région ni porter atteinte à la faune aquatique.

Description du projet

Le projet consiste à construire un bâtiment entièrement vitré de forme circulaire avec une casquette métallique et une coupole au sommet.
Le bâtiment est composé de quatre niveaux, un sous-sol et trois étages supérieurs. Les locaux sont repartis de telle sorte que l'espace intérieur soit rationnellement utilisé. Le sous-sol est composé d'un centre fitness, un centre médical ainsi que la centrale de ventilation et des surfaces de stockage. Le rez-de-chaussée est composé de la cafétéria, le service à table et les cuisines du restaurant. Le premier étage est également composé d'un restaurant self-service et ses cuisines.
Enfin, le deuxième et dernier étage est une mezzanine suspendue à la toiture. Cette mezzanine est composée entièrement de locaux techniques. Ces niveaux du bâtiment sont reliés entre eux par de larges escaliers hélicoïdaux au centre et une cage d'escaliers droits ainsi qu'un ascenseur au périphérique Nord du bâtiment. Il y a également d'autres escaliers droits reliant le rez-de-chaussée au premier étage.

Importance du projet

Ce projet est important, non seulement par sa taille mais aussi et surtout par sa géométrie; il a un diamètre d'environ 60 m et une hauteur de 17 m. Avec sa structure mixte en acier et béton armé, ce restaurant WellNes Centre a une forme circulaire avec des appuis ponctuels au niveau du terrain dont les charges sont reparties au sol par l'intermédiaire de deux anneaux.

L'anneau central repartit les charges venant de la partie centrale de l'ouvrage. L'anneau extérieur, quant à lui, repartit les charges dues niveaux supérieurs (dalle sur rez-de-chaussée, mezzanine et toiture) à travers les piliers extérieurs

Approche

L'approche consiste à poser cette structure circulaire sur une fondation qui repartît au mieux les efforts verticaux. Ceci dit, La partie supérieure peut être considérée comme un tabouret dont les pieds sont constitués par les piliers extérieurs inclinés. Ce tabouret, par son poids propre, est stable sur ses appuis. Les piliers extérieurs sont posés sur des rotules pour rendre la structure souple, ils transmettent des efforts horizontaux concourants dont la résultante est très faible. Les parois internes contreventent la structure pour qu'elle résiste aux efforts horizontaux y compris le séisme.

Pour les efforts horizontaux dus au vent, le choix de la forme circulaire de la structure est très avantageux. Le vent n'agit pas perpendiculairement à la surface du bâtiment, par conséquent il y a une réduction importante de la pression sur les façades. L'ouvrage étant dans un environnement dégagé, bord de lac, il aurait pu être soumis à de très fortes pressions dues au vent.

Les parois de la cage d'ascenseur et celle de la cage d'escaliers, les piliers extérieurs disposés en cercle et rigidifiés par la dalle sur rez-de-chaussée résisteront aux efforts horizontaux. Les piliers intérieurs reprennent les charges verticales de la dalle sur rez-de-chaussée et de la toiture. La dalle toiture est posée sur des poutres radiales transmettant d'une part les efforts aux piliers extérieurs et d'autre part aux piliers intérieurs par l'intermédiaire d'un anneau.
La casquette est suspendue à la dalle toiture par des profilés métalliques tubulaires de type RHS. Les poutres circulaires de section type RHS de la casquette sont fixées aux poutres principales en béton. Les charges dues à la casquette sont ainsi reprises par la dalle et les piliers extérieurs.

Utilisation de SCIA • ESA PT dans ce projet

La plate-forme SCIA • ESA PT nous a permis de modéliser, de concevoir, d'analyser, de calculer et de détailler notre structure 3D en mixte acier et béton armé. Ceci en utilisant les normes de notre choix, c'est-à-dire les normes SIA (Normes suisses).

La rapidité de l'entrée graphique des objets de structure nous a permis de gagner du temps, le contrôle complet et détaillé de la structure, des calculs et des résultats nous a également permis d'être sûr de notre structure et de nos résultats. La bibliothèque des aciers standards, les sections standards de béton, etc. a facilité le choix des sections de nos éléments 1D et 2D.

Le module conception acier, très pratique pour l'optimisation des profilés métalliques, nous a permis de contrôler les contraintes et la stabilité de la coupole ainsi que celles de la casquette selon les normes SIA (Normes suisses). Ainsi, Nous avons pu retrouver les parties surdimensionnées ou sous dimensionnées de ces structures métalliques. Nous avons alors pu optimiser toute la structure métallique soit en changeant les profilés, soit en les renforçant.
Le métré de toute la structure a également permis de sortir les quantités et les surfaces par type de matériaux ou de section.
L'ensemble des avantages énumérés ci-dessus nous a permis de présenter le modèle de la structure ainsi que son comportement sous charges au client, ceci sous différents angles.

La partie animation de la structure sous les charges montre comment celle-ci se déforme et quelle est l'amplitude de la déformation de chaque élément. Cette image animée de la structure nous rapproche de la réalité et permet de mieux analyser son comportement après réalisation.

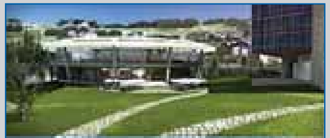
Résultats et Conclusions

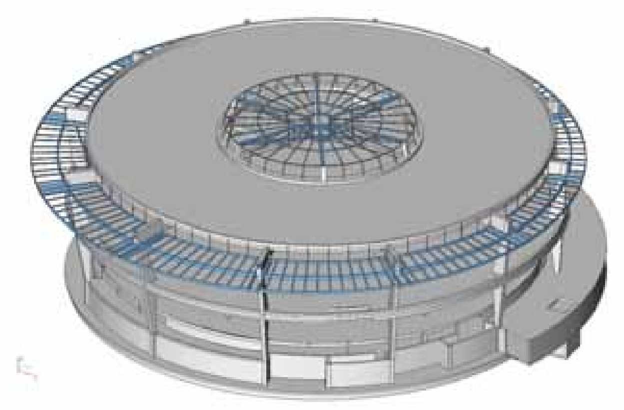
Les résultats obtenus des calculs sont très satisfaisants, la structure du WellNes Centre, comme vous pouvez le constater, est très complexe avec des barres et des plaques à sections variables.

La grande variété de type de calcul offerte par SCIA • ESA PT nous a permis de visualiser différents résultats pour différents cas de charges et combinaisons de cas de charges. La représentation graphique des résultats et la possibilité d'effectuer des sélections d'éléments et des coupes a été d'une très grande utilité pour obtenir rapidement les efforts aux endroits voulus dans la structure.

La création et le stockage des images dans une galerie nous a permis de stocker des résultats et certains détails de construction.

Enfin, la plate-forme SCIA • ESA PT est un outil performant pour les bureaux d'étude, elle permet aux concepteurs et aux calculateurs de réaliser leurs travaux dans de meilleurs délais tout en optimisant leurs structures.





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The Roof Structure of the Indoor Stadium in Liévin

VK Engineering, with expertise in Civil & Structural engineering and Building Services for more than 50 years, offers its know-how and knowledge to the private market, and more particularly to the offices branch, the industry, the residential and hospitality market. It has already several challenging and large-scale projects to its credit. The new NATO-headquarters, the Concert Hall (Bruges), the Mondrian-office building, the Marriot-hotel (Ghent) and the site of GlaxoSmithKline (Waver) are but a few examples. During these projects, VK Engineering works for nationally and internationally renowned architects, such as (amongst many others) Robbrecht & Daem, SOM, the late Aldo Rossi, Richard Rogers, Assar and Jo Crepain. It also has the most important Belgian real estates groups amongst its clients, such as Fortis, AXA, CDP, Burco, Codic, Dexia, Kairos and Allfin.
As a reputed study firm, VK Engineering is on track with the latest and future developments (CFD simulations, night cooling, natural ventilation, concrete mass activation, geothermics, co- and trigeneration, solar collectors ...), in order to always provide its clients with an integrated and performant product.

In recently adding civil & structural engineering firm Ingénieurs Associés to the group, with the Central Plaza-building, the Royal Warehouses of Tour & Taxis, Ellipse Building, North Galaxy and the Crown Avenue-project in its portfolio, VK Engineering enforces its position on the Brussels market.

Mission

Understanding our clients is our passion, and we live to help them realize their goals.

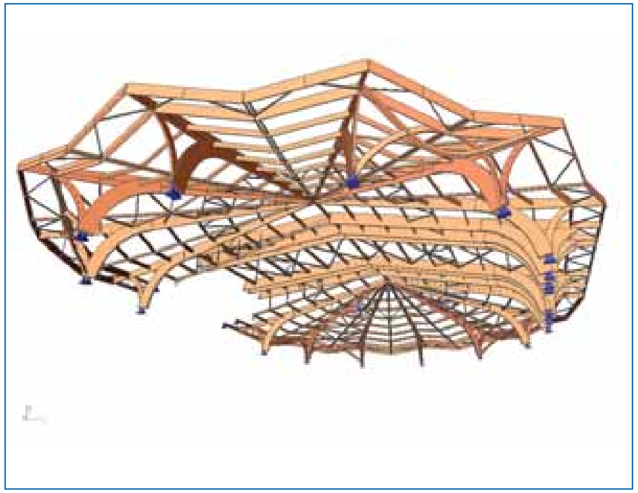
We are continually improving so that we can provide them with professional advice and innovative design solutions.
Our assets
- A team of multi-disciplinary professionals,
- Years of experience in various disciplines of engineering and architecture,
- A solid capacity to conclude large and prominent projects successfully,
- Passion for the profession,
- The respect from and for the client

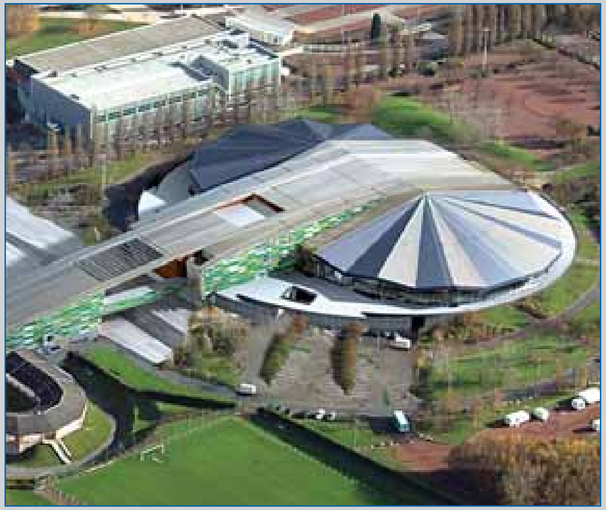
Management

The coordinating organisation is responsible for the logistic functions: human resources, finance and accounting, project administration, ICT and marketing.

Project-related matters are handled by the different studios and teams, each having a studio or team director and project managers at the head. At the moment, VK ENGINEERING is structured as follows :
- Team 'Civil & Structural' (Brussels, Ghent, Bruges)
- Team 'Building Services' (Brussels, Ghent)

Technology-related matters are handled by discipline-leaders.





Used software • SCIA • ESA PT

The regional indoor stadium of Liévin (France) hosts top level sport events and concerts. Every year international competitions, such as the “Meeting Gaz de France”, take place in the stadium.

The project presented here, which is the roof of the stadium, is a part of the project of the renovation and the extension of the stadium and the CRAF (Centre Régional d’Accueil et de Formation) a regional centre for accommodation and education. The architects are Architecture Studio, Paris.

The structure of the roof consists of half frames made of glued-laminated timber supported by simple supports at their base and connected to each other by hinged connections at their top, thus spanning 66 m. These frames support secondary beams, which carry the roofing.

In the scope of the renovations, the central part of the roof is demolished and replaced by a new structure on a higher level, while the structure of the concentric frames creating two semi cones at the two sides is to be conserved.

In addition to the change of geometry, additional loads of stagecraft equipment are intended to be suspended on the roof structure, including the conserved part.

The Roof Structure - Indoor Stadium

The roof of the indoor stadium of Liévin (France) is a part of the project of the renovation and the extension of the whole stadium. The structure of the roof consists of half frames made of glued-laminated timber supporting the secondary beams, which carry the roofing and spanning (66 m).
In the scope of the renovations, the central part of the roof is demolished and replaced by a new structure, which is on a higher level, while the structure of the concentric frames creating two half cones at the two sides is to be conserved.
In addition to the change of geometry, additional loads of stagecraft equipment are intended to be suspended on the roof structure, including the conserved part.
The ESA PT calculation model is performed for the three main construction stages: placing temporary supports using jacks, the demolition of the central part and the final phase of the complete roof structure.

The wish to conserve a part of the structure, in spite of these additional loads and the strict constraints of the architecture as to the dimensions of the new frames cross-sections, made the necessity of an accurate 3D finite elements model indispensable.

The construction stages of the demolition and the reconstruction require a meticulous study. The concentric frames of the two semi cones at the two edges of the roof are equilibrated by the ridge beam under compression, passing between the centres of the semi cones. In order to demolish the central part, a solution had to be found in order to create two stable structures without the need of the ridge beam at that temporary phase.

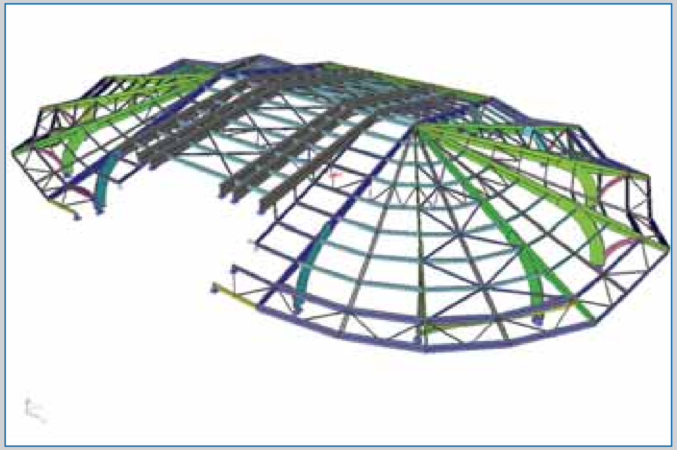
The method is to support the two centres of the semi cones and to cancel the compression by jacking these nodes. The objective of the calculation for this stage was to determine the force in the jack and the displacement required to cancel the compression in the ridge beam.

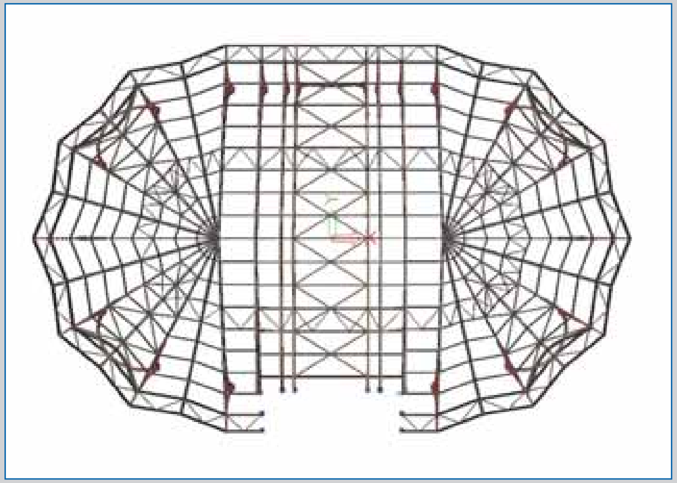
The calculation has been done using three models. In the first, the two semi cones are modelled with the ridge beam. The load applied by the jack is acting at the centres of the semi cones while the roof is loaded by its self-weight. The force required at the jacks is that which yield a nil compression at the ridge beam. This force leads to a displacement of approximately 5 cm at the centres. In the second model, one half cone is represented with its support, where the ridge beam is removed. The loads here include snow and wind loads.

The last model is the full model of the roof at the final stage with all of the loads and the particular load combinations of the stagecraft loads. The stagecraft is suspended on a complex of bridges hanged on the timber frames. In order to allow high loads and maximum flexibility to the organizers of the prospective events on the one hand and the use to the maximum of the cross-sections of the wooden members on the other, the maximum values of the stagecraft loads were defined for every frame and for every zone of the roof, rather than global limits for the loads. Thus, a certain point on a frame can be heavily loaded, provided that the total load on that frame and the total load in the zone in which that frame is located do not exceed the predefined limits.

This method led to a complex system of load combinations which had to be introduced manually. Although symmetry has been considered with respect to the transversal axe of the roof, 33 ultimate limit state combinations are introduced.

Further than the direct use of the results for the design of the roof structural elements, the realistic results for the support reactions, which include elevated horizontal reactions, were used for an economical design of the load bearing concrete elements and the foundations.





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Onze hoofdactiviteit omvat het dimensioneren van:

- Industriegebouwen en stapelplaatsen
- Appartementsgebouwen
- Verkavelingen en woningen
- Beschoeiingen

Verder adviseren we in:

- Saneringen
- Gevelrenovaties
- Gerechtelijke expertisen

De grootste troeven van het kantoor zijn de ruime ervaring (25 jaar actief in de sector), de up-to-date kennis en uitgebreide software, de persoonlijke service na aflevering van de studie, het actief nadenken over economisch en praktisch ontwerpen, sterke flexibiliteit, ...

Used software • ESA-Prima Win, SCIA • ESA PT, MSheet

Nieuwe productie-eenheid Oliefabriek Lichtervelde

Na de allesvernietigende brand op 3 oktober 2005 had de Oliefabriek Lichtervelde de ambitie om binnen het jaar een volledig nieuwe, operationele productie-eenheid te bouwen voor het persen van lijnzaad en koolzaad (biodiesel).

Ons bureau is voor het eerst hiervoor aangesproken in november 2005. Wij hebben volgende zaken voor onze rekening genomen:

- Het ontwerp en de dimensionering van het gebouw en de fundering
- Opmeting + bestek volledige gebouw
- Het ontwerp van de omgevingswerken
- De coördinatie en de bouwkundige begeleiding van dit project

Bij aanvang van de berekeningen was zeer weinig informatie bekend betreffende de gewichten en posities van de machines en installaties, aangezien deze nog in bestelling waren. Het aantal, de grootte en de positionering van de tussenverdiepen waren eveneens parameters die evolueerden in functie van de bijkomende informatie. Bijgevolg was het project, permanent in evolutie tijdens de uitvoering ervan. In die zin is er nergens een gelijkenis te vinden tussen de nieuwe (grotendeels bovengrondse) en de oude (gedeeltelijk ondergrondse) productie-eenheid.

Op het gebied van de berekeningen waren de belangrijkste aandachtspunten:

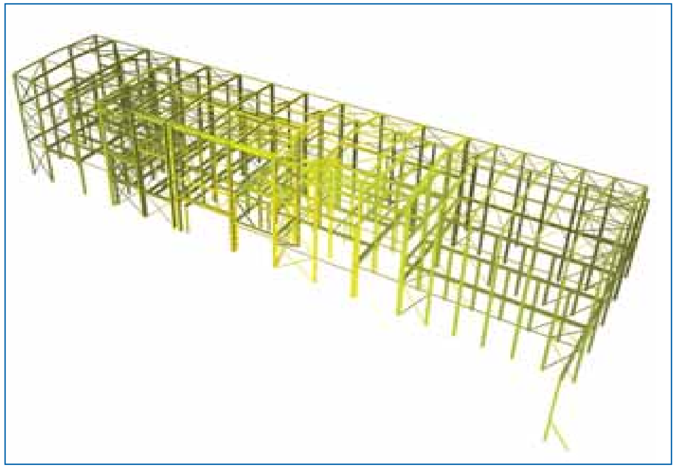
- De installaties van 100 ton op een hoogte van 10,50 m
- De machines van 40 ton op een hoogte van 7,50 m boven maaiveld
- De 3 rolbruggen op een hoogte van 14,5 m
- Een zijgevelhoogte van 16m op een basis van 15m breed
- De brandweerstand van de constructie

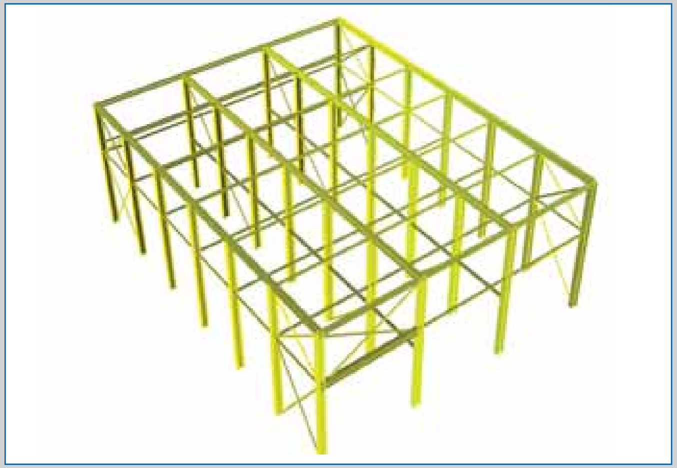
Naast de berekening van de stabiliteitselementen lag een belangrijke uitdaging in het hebben van een uitgekiend, flexibel, opsplitsbaar en vlot aanpasbaar model. Het model is nl. gedurende 6 à 7 maanden, dagelijks aangepast, in functie van de verdere detaillering van het productieproces. Bovendien was de fundering reeds geplaatst tegen de tijd dat de berekening van de bovenbouw halfweg waren. Het uiteindelijke model moest echter, naar reacties toe, blijven passen op de aanwezige fundering.

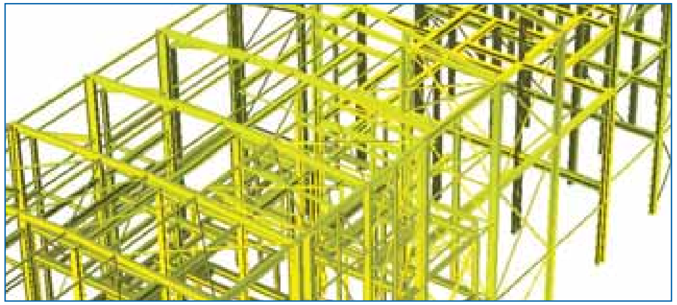
Uiteindelijk is het een zeer gecondenseerd, weinig elegant, maar vooral performant model geworden met meer dan 2000 staven.

Enkele cijfers omtrent dit project:

- Bebouwde oppervlakte: 1500 m² in 4 compartimenten
- Zijhoogte gebouw: 16 m
- Staalhoeveelheid: 450 ton
- Palen: 300 stuks
- Bouwtermijn: februari – september 2006
- Productie eerste olie: 10 november 2006







New production unit of oil factory in Lichtervelde

Oliefabriek Lichtervelde crushes linseed to produce linseed oil and linseed expellers. When the heart of the plant was destroyed by a fire on 3rd October 2005, the company quickly had the ambition to produce oil again and this within a year. The most important item for our company was the design and calculation of the structure including the foundation, based on the information we received from the Oliefabriek Lichtervelde.
All installations and machinery had to be redesigned and ordered before the calculation information was available. When we received it, the foundation was already in place. Therefore it was necessary to have an easy-manipulating, performable software model. The model changed daily over a period of 6 to 7 months. It took about 300 piles and 450 tons of steel before oil could be produced again. Production was restarted on the 10th of November 2006.

Alberti ingénieurs SA

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ALBERTI INGENIEURS SA
Bureau d'ingénieurs SIA dipl. EPFL

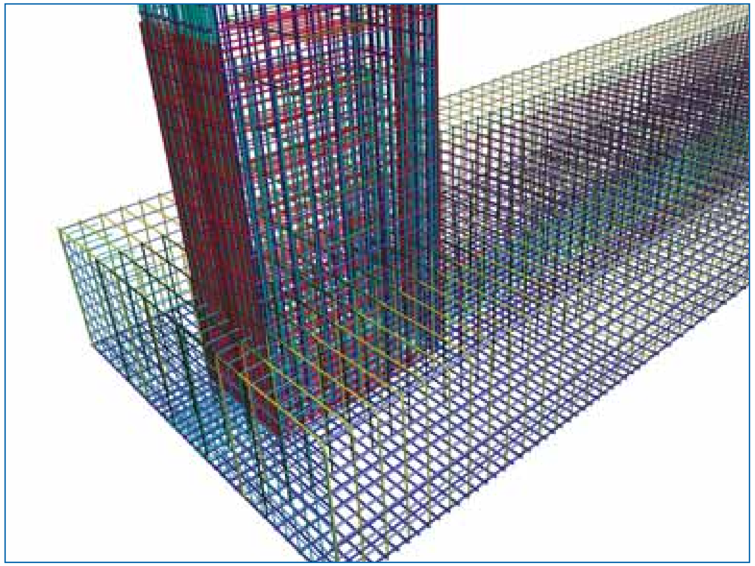
Télécabine du Roc d'Orsay, Villars-sur-Ollon

Historique

Le bureau a été fondé en 1959 par Justin et Jacques Alberti, la raison sociale individuelle a été transformée en société anonyme en 1990. Patrick Alberti a rejoint l'entreprise familiale dès 1987 et la dirige depuis 2003. L'effectif est de 9 personnes dont 2 ingénieurs EPF et 1 HES. Le bureau est certifié ISO 9001 depuis 2000.

Organisation

Les collaborateurs de la société d'ingénieurs Alberti Ingenieurs SA sont répartis selon les profils suivants: ingénieurs, techniciens, dessinateurs, comptable et secrétaire. Ce personnel, stable et hautement qualifié, démontre depuis plusieurs décennies son aptitude à la réalisation de projet de tout genre, du plus simple au plus complexe, dans un souci permanent d'écoute du client, d'efficacité, de rationalité, et de respect des critères de développement durable.



Used software • SCIA • ESA PT

Le calcul présenté s'inscrit dans le projet général du remplacement de l'ancienne télécabine à 4 places par une nouvelle installation à 8 places. Nous présentons, ci-après, le bâtiment constituant la station de départ de la télécabine.

Caractéristiques générales de l'ouvrage

La station basse est constituée d'un bâtiment non conventionnel dans sa géométrie. Ses dimensions maximales sont d'environ 33 x 35 m par 14 m de hauteur. Le rez-de-chaussée inférieur, partiellement enterré, comprend, entre autres, un hall couvert, des caisses, un local skis avec atelier, un vestiaire du personnel, plusieurs locaux dépôt, un local chaufferie ventilation, un local citerne à mazout et diesel, un coin bar et des WC client. Ce niveau est entièrement conçu en béton armé.

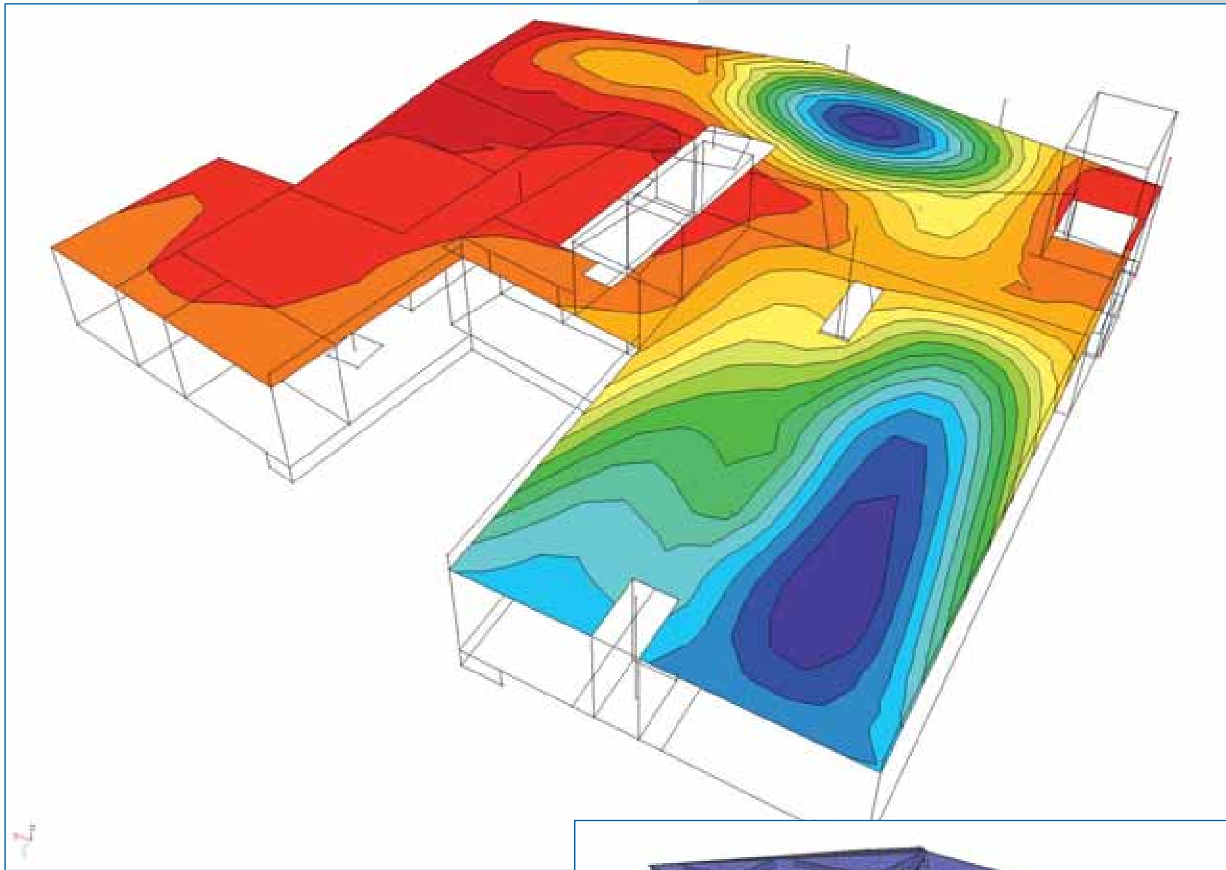
Le rez-de-chaussée supérieur est constitué d'une plate-forme recouverte partiellement par une toiture en tôle nervurée, elle-même soutenue par une charpente métallique. La partie à l'air libre constitue l'aire d'arrivée des skieurs tandis que la partie couverte protège l'installation électromécanique de la télécabine, la zone d'embarquement débarquement ainsi que le local de contrôle.

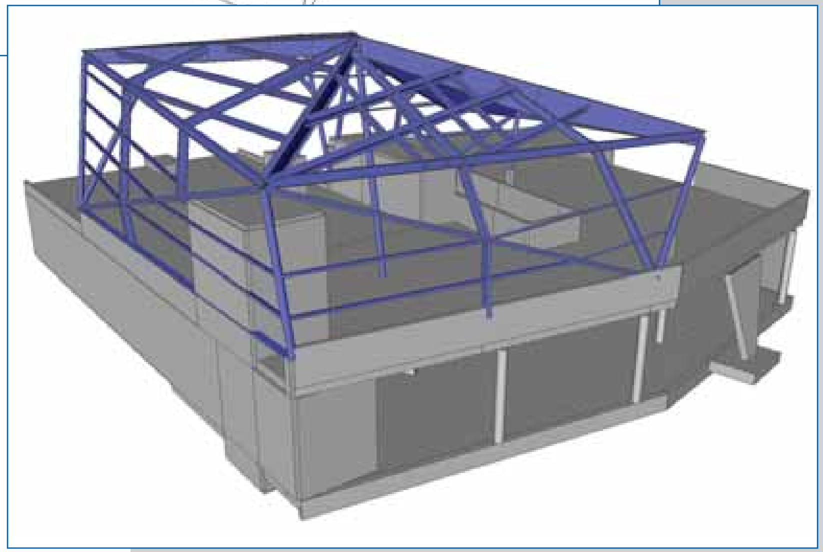
Massif de fondation et piles de l'installation à câble

- Massif de fondation l = 1757 cm, b = 400 cm avec une épaisseur de 140 cm
- Pile arrière l = 200 cm, b = 110 cm avec une hauteur de 818 cm
- Pile avant l = 205 cm, b = 150 cm avec une hauteur de 382 cm

Modélisation

Le massif de fondation, séparé par un joint de travail du reste du bâtiment, a été calculé indépendamment. Pour cette partie d'ouvrage, il a fallu trouver les combinaisons déterminantes des actions concomitantes, comprenant les charges de service de l'installation à câble, le vent, la température et la neige et des actions accidentelles comme le séisme.
Pour le bâtiment, nous avons modélisé, indépendamment et en 3D, l'étage inférieur en béton armé et le niveau supérieur en charpente métallique. Le tout a été recollé en stade final de vérification.





Cable car 'Roc D'Orsay'

The project regards a new cable car on the Swiss mountains in Villars-sur-Ollon. It concerns the construction of a new cable car for downhill skiing. Each car has a capacity of eight people. For the lower station building we used the following material: reinforced concrete for the foundations and the first level, steel for the frame and the roof.
At first we considered the two 3D models separately, then the whole was stuck together again.
We had to find the determining load combinations from cable, wind, snow, temperature and earthquake as accidental event.
We used SCIA • ESA PT to help us to bring this task to a good end.

ASTRON BUILDINGS S.A.

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Contact	Mr Marc Diedert
Email	m.diedert@astron.biz
Website	www.astron.biz

ASTRON, since 2005 a member of the LINDAB Group, is Europe's largest manufacturer of steel buildings with over four decades of experience in supplying more than 40 million m² of single and multi-storey buildings all over Europe. The yearly turnover exceeds 150 M Euro

ASTRON serves the needs of local and international companies planning to construct major new facilities in Western and Eastern Europe, such as manufacturing plants, logistics and distribution centres, trade and retail outlets, tailor made multi-storey buildings for offices, sales and storage, car parks, industrial buildings and structures.

Extensive experience and capacity

ASTRON is staffed with more than 1,020 multilingual personnel. The company has extensive worldwide experience of constructing large buildings ranging from 500 to more than 100,000 m².

ASTRON has 12 sales, engineering and support offices in Luxembourg, France, Italy, Spain, Germany, UK, Czech Republic, Poland, Russia, Hungary, Romania and Croatia.

The steel structures are all pre-fabricated in 3 factories: Luxembourg, Czech Republic and Hungary. The capacity lies up to 15 buildings per day.

One source supply

ASTRON designs and fabricates all the main components of the building: structure, roof system, wall systems, accessories and thermal insulation. This "one source supply" approach reduces site coordination.

Guaranteed quality and speed - wherever it is built

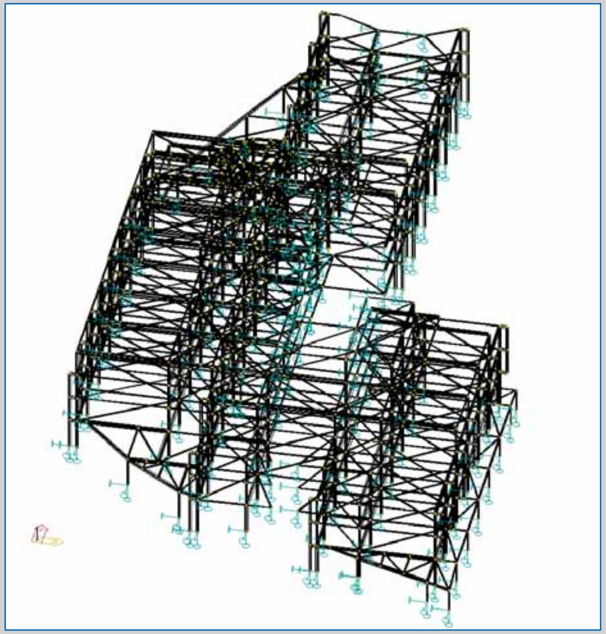
ASTRON's presence throughout Western and Eastern Europe offers investors the benefits of working with one company for multiple construction projects in different countries.

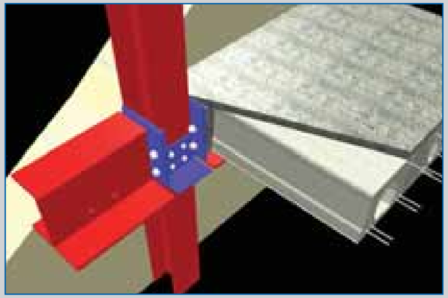
ASTRON's key benefits

- One source supply
- A complete "design-and-build" service plus turnkey construction through 360 authorized ASTRON builders
- Imaginative and appealing architectural design reflecting the customer's image
- A multitude of façade options
- Flexibility of layouts and dimensioning to suit customer requirements
- Optimum use of space, with no or fewer interior columns allowing high flexibility for the inside layout
- Early completion compared to traditional construction due to efficient erection concept
- Quick return on invest
- Research of a global economical solution
- Low maintenance costs constructions
- Environmentally friendly, recyclable
- The reliability of a long standing European group with a track record of over 30,000 buildings
- 40 years experience in single story building
- 15 years experience in multi-storey building
- A long lasting quality product with ISO 9001:2000 quality certification

Used software • ESA-Prima Win, Allplan

Administration building Floralis





Administration building Floralis

This impressive 6-storey steel building is situated on the city limits of Ghent, one of Europe's most famous port cities. IPES' new headquarters were conceived to reflect an image of a contemporary port, symbolising the history and trades that made Ghent famous.
The intensive use of glass and aluminum, plus the rotunda with its granite cladding, give the Floralis building a modern and contemporary look.
Dimensions: ± 108 m x 55 m
Surface: 15,000 m²
Storeys: 6 + 2 (underground parking)
Roofing system: built-up roof
Wall system: steel / glass façade

Administration building realized by IPES n.v.
Client: Liberty Invest n.v.
Architects: Ivan Van Mossevelde; D & C Van Impe

Technical data

Dimensions: ± 108m x 55m
Surface: 15,000 m²
Storeys: 6 + 2 (underground parking)
Roofing system: built-up roof
Wall system: steel / glass façade

Project description

This impressive 6-storey steel building, achieved in August 2005, is situated on the city limits of Ghent, one of Europe's most famous port cities.

IPES' new headquarters were conceived to reflect an image of a contemporary port, symbolising the history and trades that made Ghent famous.

Flexible solutions, solid structural design combined with esthetics, competitive pricing: ASTRON has adapted its systems well to the new market requirements and has in the past collected the necessary know-how to successfully manage all large scale projects.

For the Floralis project, the main advantages were the price and the reliable short delivery terms, as well as the simple erection with steel beams incorporated in the intermediate floors. This latter feature provided excellent free heights between the floors as well as reducing the structural area that had to be painted for fire protection. Installation of services proved to be much easier as with traditional solutions.

Floors are set back from one another which, combined with the intensive use of glass and aluminum, plus the rotunda with its granite cladding, serve to give the Floralis building a modern and contemporary look.

Completed only 15 months after work started, it will accommodate such renowned companies as Esko graphics, BMT and the administration centre of the Ghent-based Floralies.
Two levels of underground parking were incorporated into the design.

Description how software was used

Input
After job clarification, our customer needs very quickly (a matter of days) the anchor bolt reactions and lay-out. Therefore we need a tool with a quick and easy input.

Among other advantages, the input of the structure and the loads is quite easy and time saving due to the fact that even wind loads don't need to be calculated separately for each column and beam, but can be generated automatically.

Once the model is defined and completely introduced, the input data can be very easily checked and a quick structural analysis according first order theory is executed. Due to the multitude of countries to which we are selling buildings, it is very important not only to have one standard (Eurocode) but a multitude of codes. For countries not included in ESA-Prima Win standards, the adaptation of safety factors and load combination factors makes it possible to work with only one single design tool.

The model
The entire steel structure is modelled as a 3D model in ESA-Prima Win. The static design and the verification of the standard hot rolled sections for columns, roof beams and floor beams are detailed and processed in the model. The concrete staircases and the concrete walls of the ground-floor are simulated as supports, generating foundation reactions.

3Dimensional rendering
This tool is used to get a realistic representation of the structure allowing new customers of a quicker comprehension of the structure and helps him to see his project during the different phases and under different angles.

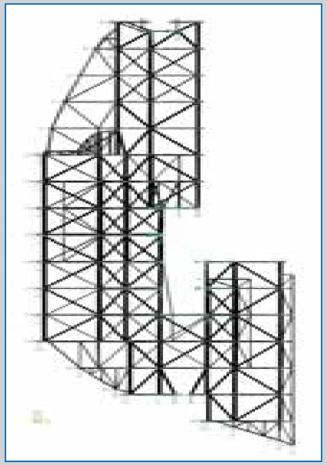
Diaphragm simulation of the floors
The floor of our standard building consists of concrete hollow core elements which are simulated by diagonals in the floor beam area. This allows a precise generation and definition of the loads in the concrete staircases, steel stabilization crosses and steel frames.

Verification according 2nd order
After the model and the loads have been completely introduced, we check the second order behaviour of the structure. This allows also a precise analysis of the horizontal and vertical deformations.

Dynamic seismic analysis
For projects located in areas with seismic solicitation, the model is submitted to nodal analysis by ESA-Prima Win.

Steel code check
The main part of the different steel elements was checked and optimized with ESA-Prima Win. This allows to order material in a very early stage of the project and to reduce delivery time. In addition, a precise weight, cost and project follow up is given.

Only the floor integrated beams (INODEK) consisting of a hot rolled T-cut section with a welded wider lower flange are designed separately.



GROUPE ATEIM (Dunkerque)

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Coursive Nord Module Standard Corps Central

Depuis sa création en 1969 à Dunkerque, le groupe ATEIM s'est développé régulièrement pour devenir leader dans son activité au Nord de la France. Il intervient aujourd'hui tant au niveau national qu'international. D'une vocation d'origine sidérurgique et pétrolière, le groupe a pour ambition de se diversifié au travers d'industrie aussi variées que la métallurgie, la chimie, la pétrochimie, le verre, la construction automobile, ferroviaire et aéronautique, l'agroalimentaire, la pharmacie, les installations générales, le bâtiment.

L'expérience acquise, le savoir-faire, les moyens, les missions du groupe permettent de proposer une large palette de services dans les domaines de l'ingénierie, des études techniques, des études de produits et de la communication.

Situé en bordure de la mer du Nord à Dunkerque, premier port maritime français. Au cœur d'une zone en liaison directe avec toute l'Europe.

Le groupe ATEIM est situé à

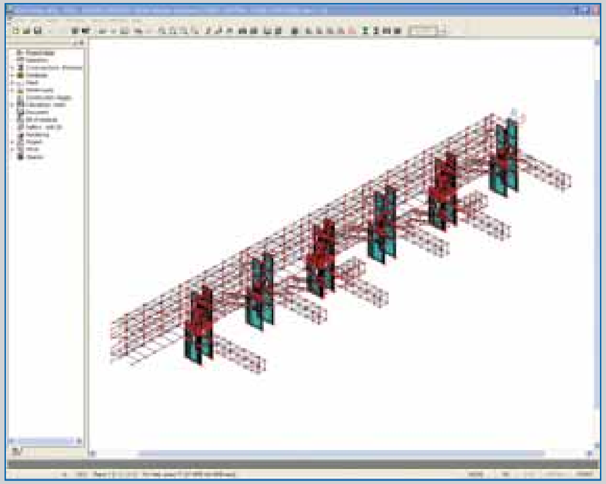
- 40 km de Calais
- 45km du Tunnel sous la Manche
- 100 km de l'aéroport de Lille-Lesquin
- 2h de TGV de l'aéroport de Roissy/Charles De Gaulle

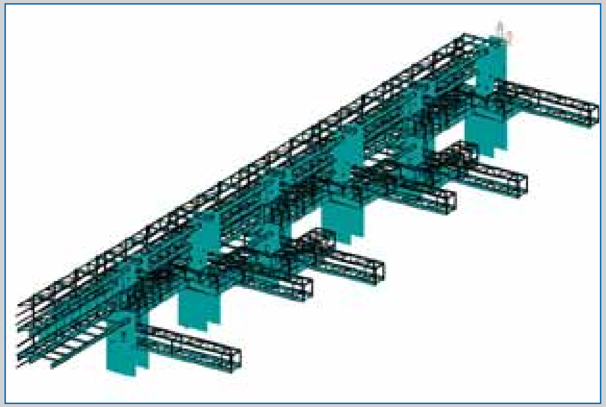
Secteurs d'activités

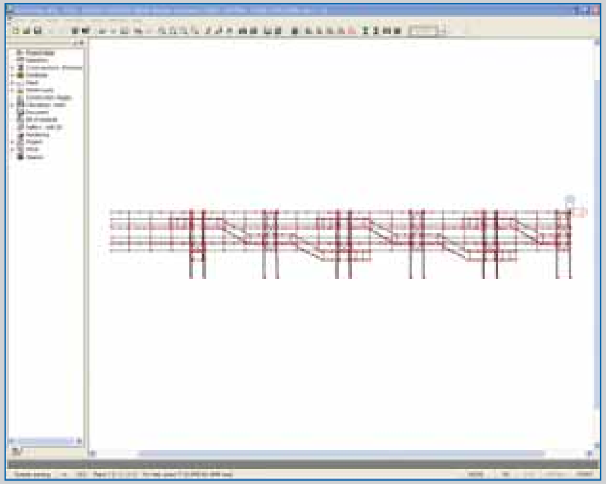
- Sidérurgie
- Métallurgie
- Automobile
- Bâtiment
- Raffinage
- Chimie
- Installations générales
- Industries du verre
- Industries pharmaceutiques

Zones d'actions

- Régionales
- Nationales
- Internationales







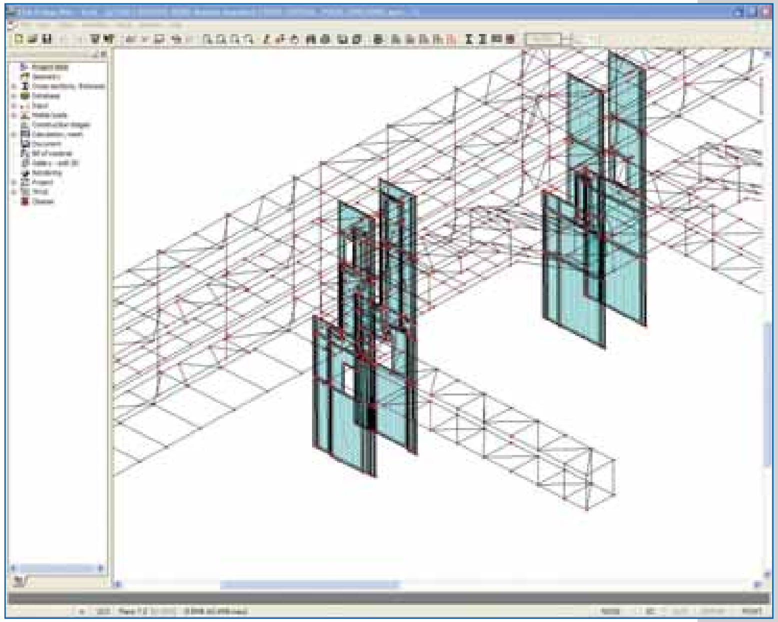
Used software • SCIA • ESA PT

Il s'agit de la construction d' une nouvelle aérogare (satellite S3) à l'aéroport Charles de gaulle. Le satellite est composé d'un corps central,d'une aile sud et d'une aile nord.Chaque aile comprend :

- Les coursives de débarquement
- Les passerelles
- Les galeries reliant les coursives et les passerelles au bâtiment principal

Notre étude concerne le coffrage et ferraillage des poteaux en BA des ailes nord et sud. Les poteaux sont en forme d'aile d'avion de 5.50 x 0.50 m de section et d'environ 20 m de haut . Les poteaux présentent des engravures et des ouvertures à tous les niveaux de plancher .

Afin d'optimiser le ferraillage des poteaux, un calcul en éléments finis des poteaux. Les résultats de sollicitations par graphiques nous a permis de choisir les aciers qu'il fallait, surtout au droit des inserts et des ouvertures.



New air terminal of Charles de Gaulle airport, Paris

It is about the construction of a new air terminal (satellite S3) of the airport Charles de Gaulle. The satellite is composed of a central body, a southern wing and a northern wing. Each wing includes:

- Gangways for arrivals;
- Footbridges;
- Galleries connecting the gangways and the footbridges to the principal building.

Our study relates to the formwork and the reinforcement of the concrete columns of the northern and southern wings. The columns are placed in the shape of the wing of a plane with a span of 5.50 X 0.50 m and they have a height of approximately 20 m. The columns present groovings and openings at all the levels of floor.

In order to optimize the reinforcement of the columns, a finite element calculation is carried out. The results of the loads by graphs enabled us to choose the necessary steel quantity and quality, especially where the loads acted perpendicular to the inserts and the openings.

Multifunctional Offices Building PARK ONE

BARAN PROJEKT s.r.o.

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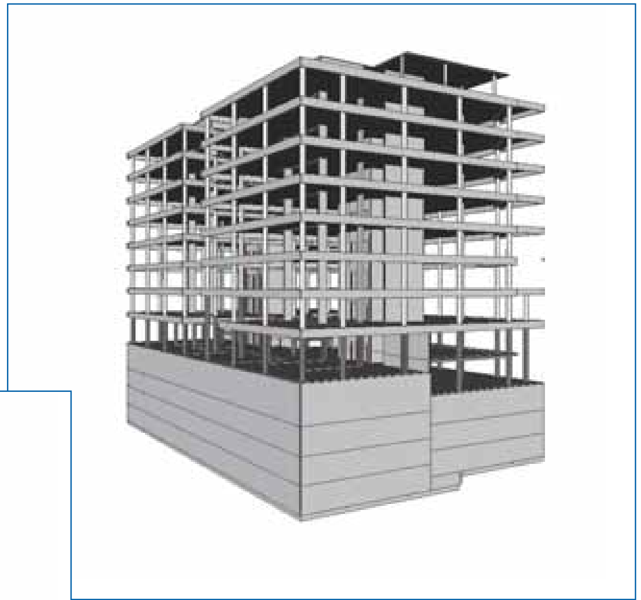
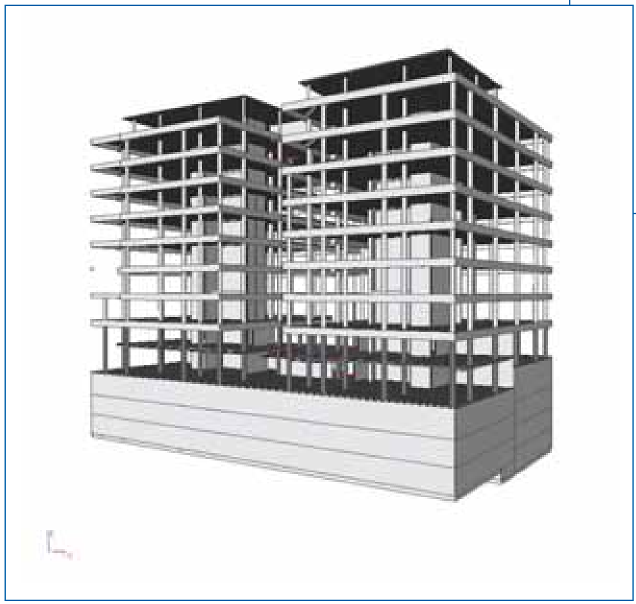
After finishing my studies at the Slovak University of Technology in 1976, I started to work as a civil engineer. Until 1990 I worked in a company as the responsible civil engineer. Since 1990 I have become an independent structural engineer. I am a member of the Slovak Chamber of civil Engineers.

In my office we are working with 4 - 10 civil engineers, according to the volume of the work.





Used software • SCIA • ESA PT

In general

„PARK ONE" is an office building in the centre of Bratislava city. It consists of four underground and nine upper floors. The structure is designed as a monolithic reinforced concrete skeleton with slabs without ribs.
The total height of the project above the ground level is 36 m. The excavation is surrounded on three sides by the main city infrastructure, which is separated from the excavation only by a pedestrian sidewalk. The depth of the excavation was 12 m. The nailed slope with additional ground anchors secured the walls of the excavation.
The main raft was located about 2 m below the groundwater level, therefore the hole was stuffed by bentonite aperture to the impervious neogenic footwall and the water was drained.

Geological conditions

In the geological content of the building area is quarterar and neogene soil. The surface layer is created by anthropogenic sediments with the characteristics of dirt-sand accretions with the rest of the building process sewage. The sediment discharge is up to 1,50 – 2,0m p.t. Quarterar sediments are represented mostly by a sand-gravel complex. It is usually dirt-sand gravel with boulders up to 15 cm. Neogene is represented in a depth of 14m p.t. by relatively impervious negenic grey-green clay.

Foundation

The optimal solution due to the geological conditions was the shallow foundation – foundation raft in the gravel level. The raft is 1100 mm thick. The external walls of all of the basements are made of watertight concrete C30/37 with reinforcement fy=460 Mpa.

Bearing system

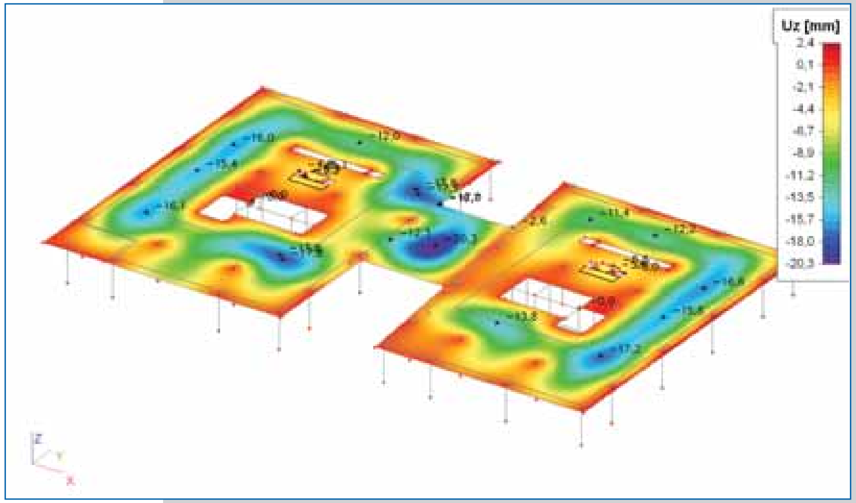
The main bearing system of the building is created from a cast in place reinforced concrete skeleton with reinforcement walls around the vertical communication cores. The walls thicknesses go from 300 mm to 200 mm. The object has 4 basement floors and 9 upper floors. The construction heights of the basement floors are 2,7 m and 3,9 m, the construction height of the ground floor is 4,8 m and the construction heights of the remaining floors are 3,55 m. The prevalent module step in the longitudinal direction is 7,5 and in the cross direction 7,5 and 5,1 m. The remaining bearing constructions are reinforced concrete columns and walls. The type of the concrete of the columns is C30/37. The horizontal bearing constructions are monolithic, reinforced concrete and slabs, designed from a C25/30 concrete in the whole extent. The thickness of the slabs is 230 mm. In order to secure the slab against the shearing efforts welded reinforcement are placed around the columns as a shearing reinforcement. The reinforcement of the slabs is created by the KARI mesh with additional reinforcement. The facade of the object is fully vitreous, therefore a belt girder is designed on the circumference of the roof rafts, so that the roof deformations were eliminated to a required standard.

Structural calculations

The calculations were realized by the SCIA•ESA PT 5.2 software, using the finite element method. The whole object was simulated in the 3D model created by 2D – shell elements, which are used for approximation of the bracing walls and for slabs. Columns are approximated by the 1D elements. The loads are calculated according to the valid Slovak standards. Module Soilin was used to simulate the footwall.

Multifunctional Offices Building Park One

„PARK ONE" is an office building in the centre of Bratislava city. It consists of four underground and nine upper floors. The structure is designed as a monolithic reinforced concrete skeleton with slabs without ribs. The total height of the project above the ground level is 36 m. The excavation is surrounded on three sides by the main city infrastructure, which is separated from the excavation only by a pedestrian sidewalk. The depth of the excavation was 12 m. The nailed slope with additional ground anchors secured the walls of the excavation. The main raft was located about 2 m below the groundwater level. The facade of the object is fully vitreous, therefore a belt girder was designed on the circumference of the roof rafts.



Baudin Châteauneuf

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Website www.baudinchateauneuf.com

La maîtrise du métal

En 1919, la SNC Baudin Châteauneuf et compagnie est créée par deux hommes : Basile Baudin, entrepreneur, et Georges Imbault, ingénieur spécialiste des ponts. Fondée à Châteauneuf sur Loire, la société est baptisée Baudin Châteauneuf en 1952. Née de la production de pylônes électriques et de hangars agricoles, l'entreprise s'oriente vers la construction de ponts métalliques. Après la deuxième Guerre Mondiale, Baudin Châteauneuf participera activement à la reconstruction des ponts en France. Ces nombreux chantiers valoriseront son expérience et enrichiront sa connaissance des ponts suspendus.

La diversification

Dès 1954, Baudin Châteauneuf cherche à diversifier ses activités. Sa parfaite maîtrise du métal l'entraîne logiquement vers les charpentes de bâtiments. La véritable expansion de la société s'est produite vers les années soixante-dix, affirmant l'ambition de Baudin Châteauneuf d'incarner un acteur important de l'aménagement de notre pays.

Construire pour la vie

Baudin Châteauneuf s'est développée grâce à la maîtrise de la réalisation des ponts suspendus et a étendu son savoir-faire dans les domaines variés de la construction. Nous développons ainsi notre activité autour de trois axes majeurs :

- Bâtir notre environnement en concevant et réalisant des ouvrages pour le compte des entrepreneurs et des collectivités
- Franchir nos espaces, terrestres et fluviaux
- Rénover notre passé, en réhabilitant tout ouvrage d'art ou équipement industriel

Aujourd'hui, Baudin Châteauneuf propose une gamme complète de prestations, au plus haut niveau technologique, aussi bien en construction et rénovation d'ouvrages d'art, en charpentes métalliques, en génie mécanique, en génie civil ou en Entreprise Générale.

Sa tradition de modernité toujours respectée, Baudin Châteauneuf est plus que jamais à l'écoute de son temps.

Baudin Châteauneuf en quelques chiffres

Six départements :

- Entreprise Générale
- Charpentes Métalliques
- Rénovation Mécanique Montage
- Export
- Ponts Métalliques
- Génie Civil

En 2005 :

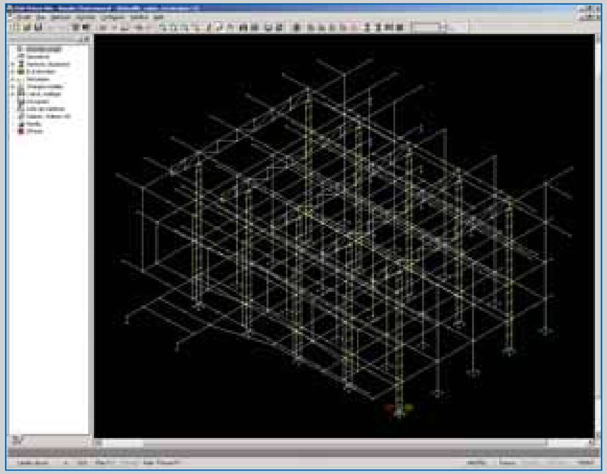
- Effectif Siège + Agences : 650
- Effectif du groupe : 1250
- Chiffre d'affaires de BC : 136 000 000 Euro
- Chiffre d'affaires du Groupe : 200 000 000 Euro

Used software • ESA-Prima Win

Ecole d'Architecture de Paris Belleville

School of architecture of Paris

This operation consists in transforming a technical school into a school of architecture. The project concerns the heavy rehabilitation of six existing buildings and the construction of two new buildings.
The urban environment and the exiguity of the Parisian site raised true difficulties.
Some reinforced concrete walls reached a height of 9 m, variable thicknesses from 45 to 80 cm, a length of 100 m, cased at one surface and without intermediate floors.
The exceptional character of this building site is expressed in its specificities like, for example, the use of mixed materials (concrete and steel).
In the first building 'B' of 65 meters by 18 meters, 330 tons of steel and functions according o a traditional stabilization scheme by metal frames and hard concrete cores were implemented.
On the other hand, the principal framework of the central building, the building 'C', 33 by 26 meters was realised with 270 tons of steel and made out of frames ensuring stability in the two directions.
The School of Architecture of Paris-Belleville is a building site with multiple constraints but it confirmed the multi-field competences of the Departments of BC like its expertise in metal and the complex realization of frames.



Cette opération consiste à transformer un lycée technique en une école d'architecture. C'est vers la réhabilitation lourde de six bâtiments existants et la construction de deux bâtiments neufs que le projet s'est orienté. La mise en valeur des structures aciers, de la mixité béton/acier, de grands voiles en béton brut font partie intégrante du projet architectural qui émane d'une réflexion sur l'insertion d'ouvrages particuliers ayant une vocation pédagogique dans ce lieu d'enseignement.

Dans cette opération, traitée en lots séparés, BC est titulaire du lot n°2 : «gros œuvre et charpente métallique» Le chantier a démarré en avril 2005 pour une durée de 19 mois et demi.

Les contraintes de l'affaire

L'environnement urbain et l'exiguïté du site parisien ont posé de véritables difficultés : il a été nécessaire d'optimiser l'utilisation de la seule surface de stockage disponible servant parfois de zone tampon. Grâce à une gestion quotidienne en flux tendus des livraisons (un «homme trafic» a été chargé de cette mission) et des méthodologies de chantier adaptées, les travaux ont pus être menés au même moment sur tous les bâtiments. Deux grues à Tour et une grue automotrice de forte capacité, des outils de gestion des interférences, des opérations en horaires décalés, ont permis de cumuler des tâches sur un planning très tendu.

Un chantier exceptionnel

Une gestion exigeante du gros œuvre

La particularité du projet, la gestion des entreprises de gros œuvre et une part de production propre, a nécessité la mise en place d'un encadrement de formation gros œuvre adapté (ingénieurs, conducteurs de travaux, chefs de chantier).
Certains voiles en béton armé ont atteint 9 m de hauteur, des épaisseurs variables de 45 à 80 cm, 100 m de long, coffrés une face (mis en œuvre contre des murs mitoyens) et sans planchers intermédiaires.
La complexité de cette opération résidait également sur les fondations ou l'on découvrait parfois, dans le cadre des travaux sur les existants, des principes structurels non reconnus dans le diagnostic préalable. Afin de préserver la continuité des travaux, il a été nécessaire d'avoir une grande réactivité sur les principes constructifs à adapter. BC a proposé des méthodologies compatibles avec le contexte du chantier et son environnement en effectuant des travaux de reprise des existants en sous-œuvre par puits blindés, par passes alternées, par longrines de redressement, ...
Il a fallu, pour les terrassements en pleine masse (22 000 m^3) dans un quartier populaire avec un marché quasi quotidien, adapter les rotations journalières, tout en travaillant sur les bâtiments contigus.

Une charpente innovante

Le caractère exceptionnel de ce chantier s'exprime dans ses spécificités comme, par exemple, dans la mixité des matériaux utilisés (béton et acier).
En effet, les deux bâtiments «neufs» de l'opération possèdent une superstructure entièrement métallique supportant les planchers collaborants.
Le premier, le bâtiment B, 65 mètres sur 18 mètres, 330 tonnes d'acier mises en œuvre, fonctionne suivant un schéma classique : la stabilité transversale est assurée par une série de portique multi-étagés et la stabilité longitudinale repose sur les noyaux durs des circulations verticales, cages d'escalier et d'ascenseur.

Par contre, l'ossature principale du bâtiment central, le bâtiment C, 33 mètres sur 26 mètres, 270 tonnes d'acier, est réalisée en portiques assurant la stabilité dans les deux sens. Ces portiques sont composés de poteaux doubles en Profils Reconstitués Soudés(PRS) et de traverses supérieures en fermes treillis .

Les parties de planchers en porte à faux sur une façade sont suspendues à ces fermes treillis, elles-mêmes en porte à faux, par l'intermédiaire de tirants.

Les poteaux de hauteur 14 m et pesant 7 tonnes ont dû être stabilisés individuellement pendant le montage en attendant la pose des structures définitives.

La protection au feu de l'ensemble est assurée par l'application sur site d'une peinture intumescente ou d'un flocage.

Modélisation

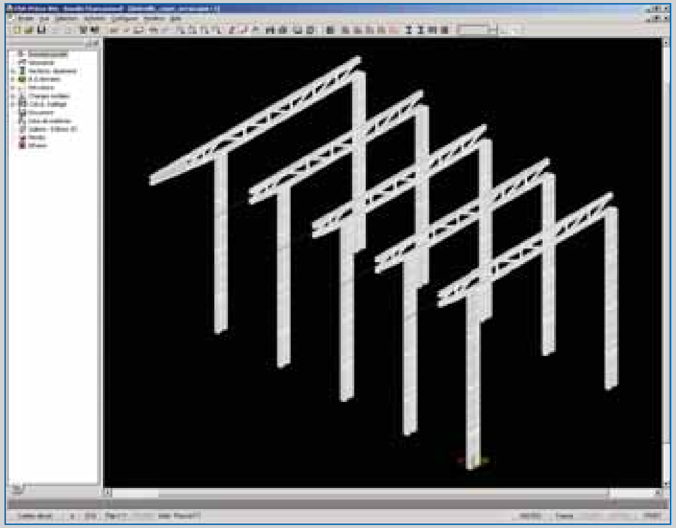
Le caractère spécifique de l'ossature du bâtiment C a nécessité le recours à un modèle global de la structure principale dans les trois directions.

En effet, non seulement les fermes treillis, auxquelles deux niveaux de planchers sont suspendus, sont en porte à faux, mais latéralement, à chaque niveau sur les deux pignons du bâtiment, les planchers se prolongent en console par rapport aux portiques de rive d'une demi-travée.
Le grand nombre de cas résultant d'un chargement « en damier » de chaque étage a aussi pu être facilement combiné par la génération automatique des combinaisons suivant les règles CM 66.
Par ailleurs, l'analyse modale de la structure a permis la détermination de la fréquence propre « horizontale » du bâtiment et donc de préciser le coefficient de majoration dynamique du vent, et aussi de la fréquence propre «verticale» nécessaire pour s'assurer du confort des futurs utilisateurs.

Conclusion

L'Ecole d'Architecture de Paris-Belleville est un chantier aux multiples contraintes mais qui a confirmé les compétences pluridisciplinaires des Départements de BC, ainsi que son expertise dans le métal et la réalisation de charpente complexe.

Reperes Volume de béton : 960 m^3 pour les fondations spéciales et reprises en sous œuvre, 5 200 m^3 pour les ouvrages neufs et 2100 m^3 pour les ouvrages réhabilités. Tonnage total de la charpente métallique (brut fini) : 700 t. PRS : 14 m de long et plus de 7 t. 22 personnes (hors compagnons) mobilisées sur cette affaire chez BC.
Intervenants : Maître d'ouvrage : DAPA (Direction de l'Architecture et du Patrimoine). Assistance Maître de l'Ouvrage : EMOC. Maîtrise d'œuvre : Atelier Philippon.



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Industrial hall Bakbel

Bureau d'Etudes Matriche, established in 1962 by Mr. Julien Matriche, AILg civil engineer, and managed since 1985 by Mr. Roger Matriche, AIrBr civil engineer, has been continuously active, for more than 40 years, in the domain of stability.

All techniques relating to stability, in the field of new constructions as well as restorations or rehabilitations, are covered.

The number of projects dealt with is around 200 to 300 per year, and among them, one third of restorations. The annual turnover is above 800.000 Euro. The total number of projects studied until today is greater than 9400.

All kind of materials are used and mastered: prestressed and reinforced concrete, wood, glued laminated timber, steel, masonry, inox,...

The acquired experience, know-how and means allow the office to invest itself in expertise and arbitrage missions dealing with stability.

Bureau d'Etude Matriche collaborates with 4 full-time civil engineers and 5 full-time drawers and technicians. The current size of the office is a deliberate choice, aiming at keeping a personal and human contact between all the partners while making it possible to deal with complex and bulky projects.

The office is fully equipped with up to date IT equipment and software (Autocad 2006, SCIA•ESA PT,...).

Current projects include blocks of apartments, prestigious residential development in the old centre of Brussels, a purification plant, a barrack of firemen, convalescent homes, some individual houses, store transformations, 17.000m² industrial building, office buildings,...

A harmonious balance between public and private works, new constructions and renovations, as well as small and huge projects is carefully preserved in order to conserve the practice of the multiple facets that compose the job of consulting engineer.

Used software • SCIA•ESA PT

General information

Customer : Bakbel sa, 28 rue Hector Ameye,
7110 Houdeng-Goegnies
Architect : sprl Bureau d'Architecture J. Van Haeren,
18 rue Montagne du Parc, 1400 Nivelles
General Contractor : Lixon sa, 60 rue des Chantiers,
6030 Marchiennes-au-Pont
Total surface : 3010 m²
Total steel weight : 163T

Project description

The project consists in the creation of a manufacture for a company producing fruit jam in an industrial zoning. It is composed of a 2340 m² industrial hall for production and offices on 670 m² and 2 levels. The hall has a length of 58 m and a width of 40 m with a height under ceiling of 6 m and 9 m.The offices annexed to the hall are 6,3 m tall on a surface of 11,7 m x 30,5 m including 2 levels. The entire building (hall and offices) has a steel structure for a total weight of 163T.

The steel structure consists in an external framework in which walls and ceilings, made of isolating panels, are included. The hall is closed in his upper part by steel sidings and flexible metal roofing. The roof has to support external loads like snow or wind but also a walkable ceiling hanged to its structure and charged with electro-mechanical equipment. As a consequence, the loads to take into account are higher than for usual roofs.

History of the project

Initially, the client didn't want any column inside the hall. So, we first calculated a hall relying on six rigid frames with span of 40 m spaced of 1 m with quite heavy roof loads. We made a first study with 40 m long trussed beams.

We completed the calculations on this basis. After invitation to tender to the contractors, the client considered that the budget was too expensive and requested the architect company in charge of the project to tighten the budget. To reach this goal, the client agreed to implement columns in the hall, dividing the 40 m long span into two spans of 20 m. Consequently, we restarted our calculations on this assumption. Keeping trussed beams wasn't justified anymore and we thus passed to HEA sections with bulges close to the supports. The new calculations allowed us to make an economy of 40T of steel.

At the time of the new orientation taken by the project, the modelling of the structure enabled us to easily recover a good part of the work already carried out without having to start all again.

Structural concept

Concerning the infrastructure, because of the weak soil quality, the building is based on eighty-five 17m long piles. There is no cellar and the floors are made of a cast in place floating slab. The columns of the steel structure are fixed in the foundation pads and the façades lie on the foundation beams.

Concerning the hall, six rigid frames spaced of 11 m compose the principal structure. Two of these frames have a height of 7,3 m, one makes the transition between the low and high part of the hall and the three lasts are 11,3 m tall. The four inside frames have two spans of 20 m each while the lateral ones have regular columns spaced of 5 m each.

These principal frames are linked by 11 m-long roof bearers supporting the flexible metal roofing and at which hang the ceiling and the electromechanical equipments.

The offices have masonry façades that aren't bearing but just filling the steel structure. The floors are made of prestressed hollow slab.

Modelling and structural calculation

A complete 3D model of the steel structure was made with SCIA•ESA PT:

- 395 nodes
- 376 bars
- 46 nodal supports
- 8 load cases

The actions on the steel structure due to floors, ceilings, wind... were calculated by hand and implemented in the model. The module steel code check was used to optimize the dimensioning of the structure. The connections were also checked with SCIA•ESA PT. The foundations were hand calculated using the forces given by the software.

The entire steel structure was built in 10 days.

Industrial hall Bakbel

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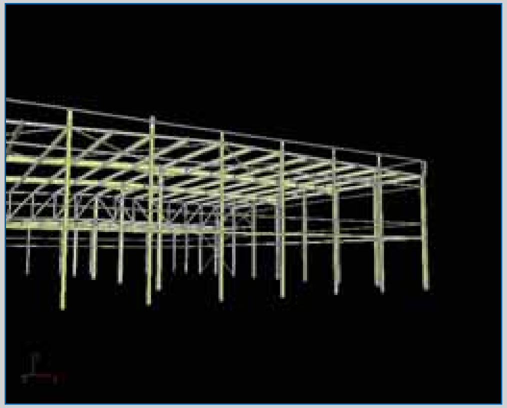

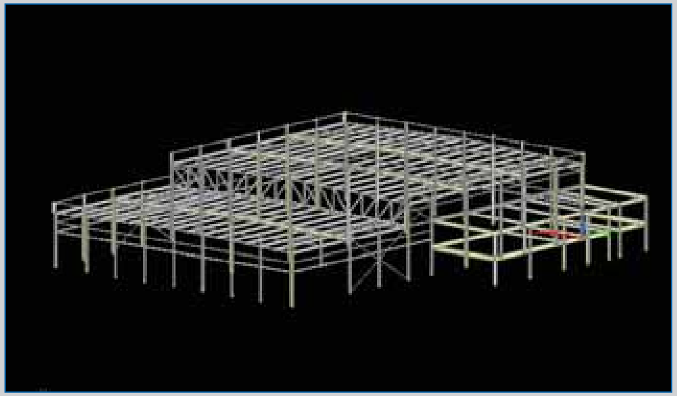

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Ortmans s.a. - Thimister

Bureau d'Etudes Lemaire

Créé en 2000, le Bureau d'études Lemaire sprl réalise des études techniques dans les domaines de l'industrie, du génie civil, du bâtiment et des infrastructures. Il se distingue par son dynamisme, son savoir-faire et ses compétences.

Dès la naissance d'un projet, le Bureau d'Etudes Lemaire sprl s'efforce de dégager des solutions techniques créatives et originales respectant la dimension architecturale souhaitée par son concepteur. Avec des outils informatiques performants et à la pointe de la technologie, le Bureau d'Etudes Lemaire sprl offre un service moderne, innovant et de qualité.

Architecte

Atelier d'Architecture de Lavaux sc
Rue Lavaux, 1
B-4130 Esneux

Used software • SCIA • ESA PT

Description du projet

Construction d'une nouvelle usine de fabrications soudées en acier inoxydable et métaux nobles : fabrication de tanks de stockage, cuves de process, puits de stockage de déchets radio-actifs et autres équipements pour l'industrie nucléaire, gardes-corps, éléments de structure, gainage de haubans, ouvrages d'art, corps de pompes, serpentins, ... etc.

L'atelier est composé 4 halls principaux : Magasin, Préparation, Chaudronnerie légère, Chaudronnerie lourde et de 2 halls secondaires : Décapage et Stockage des produits finis. Des zones de transfert relient les halls entre eux suivant l'évolution de la chaîne de fabrication. Les halls de production représentent une superficie totale de 11.200 m². La hauteur sous poutre est de 10 m pour les 3 premiers halls et varie entre 11,2 m et 22,5 m pour la Chaudronnerie lourde. L'ensemble du bâtiment est équipé de 12 ponts roulants présentant une capacité de levage comprise entre 5 et 40T.

Les bureaux comprennent l'aile bureaux (concept et gestion) et l'aile sociale articulées autour d'un patio métallique d'accueil et de distribution.

Conception

La structure des halls de production est métallique. Les bardages (caissons – isolation - tôle de finition) ainsi que la toiture (tôles trapézoïdales – isolation – étanchéité) sont réalisés également à partir d'éléments métalliques.

La structure apparente de l'auvent «en casquette» sur le patio, situé entre les ailes bureaux et sociale, s'exprime architecturalement comme une forêt de poteaux tubulaires en acier inoxydable en finition brossée (grain 320). La hauteur de ces poteaux est de 8 mètres. Ceux-ci supportent les poutres métalliques de toiture intégrées dans les faux-plafonds réalisés à partir de cassettes métalliques micro-perforées.

Les panneaux vitrés du mur rideau, cerclés de cornières inox polies, sont fixés aux colonnes par l'intermédiaire de pattes en acier inoxydable de type araignée. Le muret marketing à l'entrée du patio, en profil acier tubulaire, est revêtu de tôles en acier inoxydable brossé. Il reprend le sigle de l'entreprise par lettres découpées en acier inoxydable poli. L'escalier est en verre sablé sur structure avec garde-corps en inox brossé. L'espace de détente et de distribution vers la cafétéria est couvert par une double verrière longitudinale en profils aluminium. Ces verrières reposent sur un élément central plein supporté lui-même par une structure métallique en porte-à-faux.

Architecturalement, l'acier et surtout l'acier inox sont les matières premières du domaine d'application, de fabrication de l'entreprise ORTMANS. Le bâtiment devait être à l'image de la société. La forêt de poteaux du patio, le muret marketing, le concept vitrage mur rideau en inox, tous les éléments de charpente et de revêtement acier sont le contenant publicitaire du savoir-faire de l'entreprise.

Le dimensionnement de l'ensemble de la structure a été optimisé au moyen du logiciel de calcul SCIA•ESA PT.

Plants for welded products, Ortmans/Thimister

Construction of a new plant for welded products in stainless steel and noble metals: manufacture of storage tanks, process vessels, storage pits for radio-active waste and other equipment for the nuclear industry, rails, structural members, covering of cables, works of art, cylinders, coils, ... etc.
The workshop consists of 4 main halls: storage, preparation, heavy kettle department, light kettle department and of 2 secondary halls: stripping and storage of finished products.
The transfer areas connect the halls, following the progress of the manufacturing chain. The manufacturing halls represent a total surface of 11,200 m².
The height under the girder is 10m for the 3 first halls and vary between 11.2 m and 22.5 m for the heavy kettle department. The whole of the building is equipped with 12 roller bridges, which represent a lifting capacity of between 5 and 40t.

Buro II

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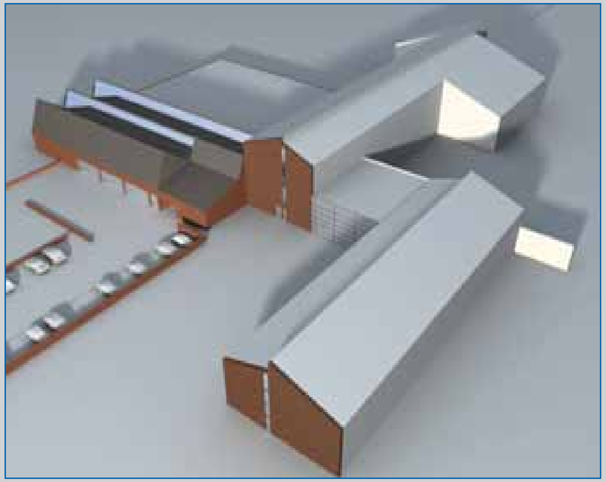
Showroom Korimco Kortrijk

BURO II and BURO Interior were founded in Roeselare (Belgium) 25 years ago by Hendrik Vermoortel and Rita Huys. Since then, the architectural office has grown into a group of over 90 associates, covering several disciplines: architectural and interior design, spatial planning and landscaping, structural and mechanical engineering, site coordination, planning and budget management.

A systematic company organisation and the availability of diverse disciplines contribute to an integrated design process, the selected method for achieving more sustainable, innovative and future-aimed projects. An intense dialogue with clients, governments, colleagues and specialists is the key to quality. According to the type of commission, project groups can be enhanced with external associates, including landscape architects, environmental experts, legal experts, restoration specialists, artists, an historian or even a cultural philosopher.

As well as architecture and construction, research and consultancy are increasingly important: feasibility studies, master plans, complex public-private partnerships, preliminary research for project development, project management and supervision.

The slogan 'Durably handling space together' cryptically reflects the BURO II and BURO Interior company philosophy.



Used software • SCIA • ESA PT

Showroom Korimco Kortrijk

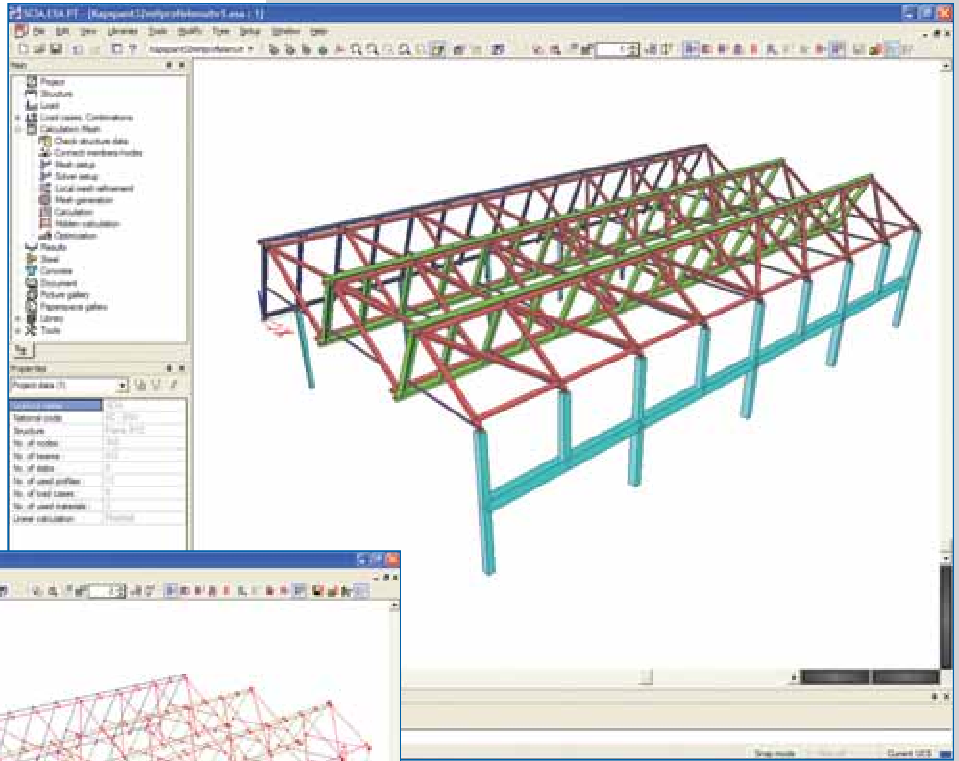
The mission of the structural engineering department was to design the structure of the roof of the showroom. The client is a well-known international manufacturer of roof tiles. The roofs of the existing buildings were typical shed roofs. The architect wanted the same typical shed form for the new showroom. There could not be any diagonal truss members in the glazed surfaces, and there could not be any visible structure in the other parts of the roof.

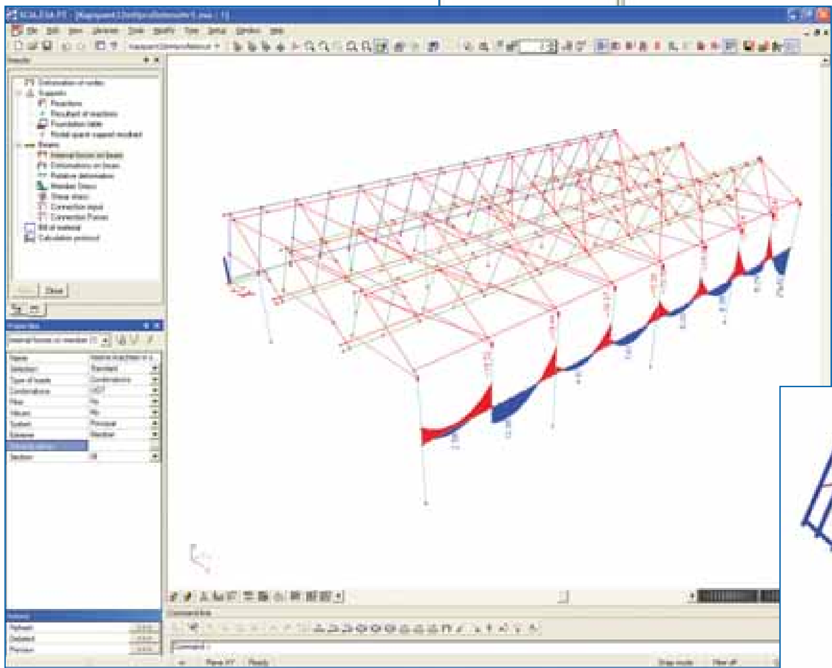
The surface of the main roof is 18*32.50 m². The orientation of the shed form leads to a semi 3D structure, a combination of trusses and frames carrying the loads in the direction of the 32.50 m. The frames were placed in the glazed parts, and the more economic trusses in the other parts. The use of tension bars in the other direction to connect the different frames and trusses was inevitable, but they had to be placed as high as possible, with a minimal cross section.

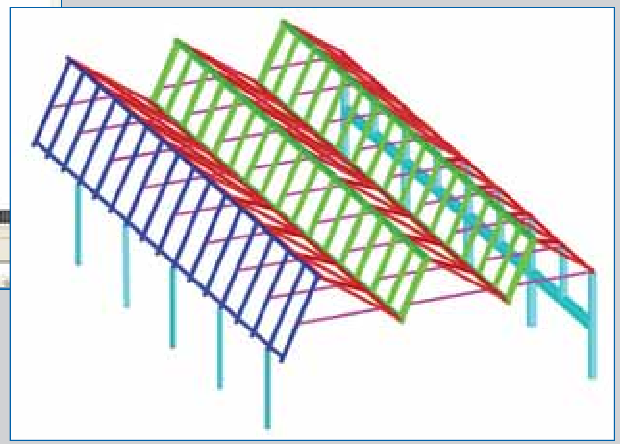
The roof became a rather complex structure, highly hyperstatic and with important internal forces. The possibilities to transport and assemble the roof had to be investigated, the total cost of the roof structure had to be minimized. The glazed surfaces allowed only small displacements.

The best approach for us was to use the powerful and easy to handle SCIA•ESA PT software package to build an accurate 3D model of the roof structure. The use of layers and the work plane tool made it easy to build the model. The steel check and optimisation module allowed us to reduce the weight of the structure. Displacements were easy to check. After a first study, some changes in the geometry could be easily implemented into the model in a short time.

The use of SCIA•ESA PT allowed us to reduce not only the total weight of a rather complex roof structure, but also the time and effort needed to design it.







Showroom Korimco Kortrijk

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Office building Vanhaerents

BURO II and BURO Interior were founded in Roeselare (Belgium) 25 years ago by Hendrik Vermoortel and Rita Huys. Since then, the architectural office has grown into a group of over 90 associates, covering several disciplines: architectural and interior design, spatial planning and landscaping, structural and mechanical engineering, site coordination, planning and budget management.

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Used software • SCIA • ESA PT

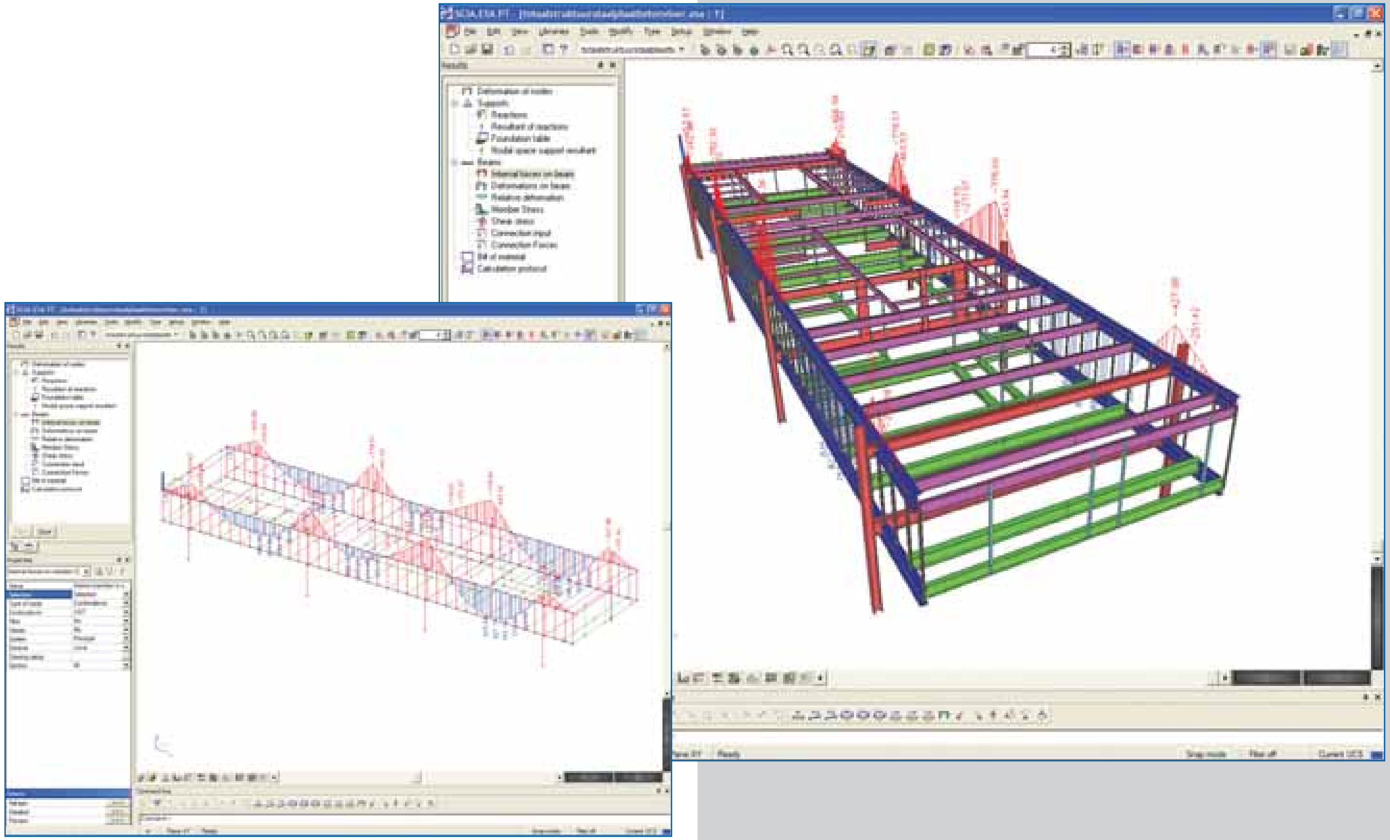
The mission of the structural engineering department was to design the structure of a single level office building, placed on top of the existing office building. The structure had to be economic and functional. The erection of the building had to be quick, with a minimum of inconveniences for the employees working in the existing office. The architect did not accept any diagonal truss members in the facades.

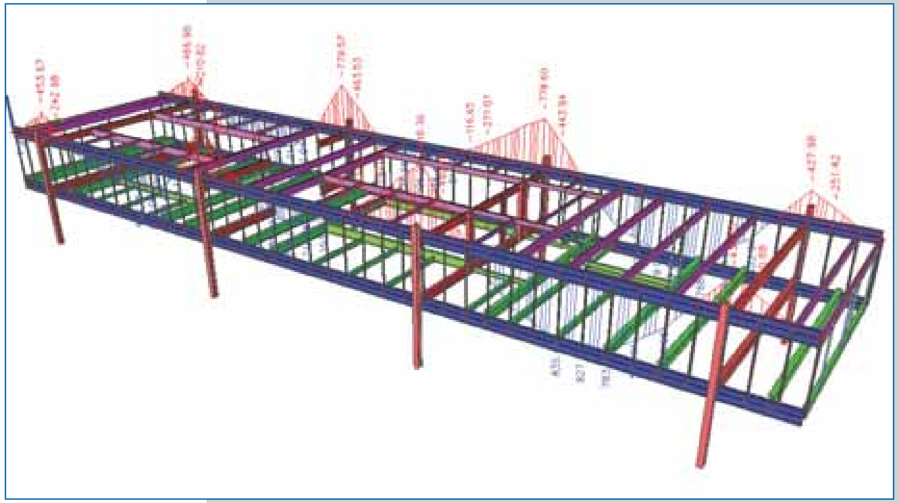
After studying several options, the team chose for a steel frame structure, with two longitudinal main frames, and four transverse frames. The beams of the transverse frames, whose eight columns are carrying the whole building, support the steel beams of the longitudinal frames. The first floor and the roof are designed as mixed steel plate – concrete floors on transverse steel beams, in order to reduce the weight of the structure, but keeping enough mass to ensure a good thermal response of the building. The new building has a length of 56.70 m, and a width of 13.50 m.

The span (16.00 m) and the overhang (4.00 m) of the longitudinal beams were considerable. Horizontal stability in both directions had to be ensured by the framework. The total height of the structure had to be minimized, as well as the cost of the steel structure. Esthetical demands and the material used in the facades permitted only small displacements.

The best approach for us was to use the powerful and easy to handle SCIA • ESA PT software to build an accurate 3D model of the structure. The tools in the section manager of the software permitted us to design some special sections (cross columns in the facades, build up sections in the transverse frames). The steel check and the optimisation module allowed us to reduce the weight of the structure. Displacements were easy to check. Some minor changes could be brought into the model on a very short notice. The design of the joints is not yet executed, because the steel constructor is not known yet, and his vision must be taken into account.

The use of SCIA • ESA PT allowed us to strongly reduce the time and effort needed to design, in an accurate way, for a not so common steel frame structure.





Office building Vanhaerents

The mission of the structural engineering department was to design the structure of a single level office building, placed on top of the existing office building.
The structure had to be economic and functional. The team chose for a steel frame structure, with two longitudinal main frames, and four transverse frames. The beams of the transverse frames, whose eight columns are carrying the whole building, support the steel beams of the longitudinal frames. The first floor and the roof are designed as mixed steel plate – concrete floors on transverse steel beams, in order to reduce the weight of the structure, but keeping enough mass to ensure a good thermal response of the building. The span (16.00 m) and the overhang (4.00 m) of the longitudinal beams were considerable.

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Dipl. - Ing.
S. Ryklin STATIK

Leistungsbereiche

- Tragwerksplanung
- Tragwerksoptimierung
- Projektberatung
- Bauphysikalische und Dynamische Nachweise

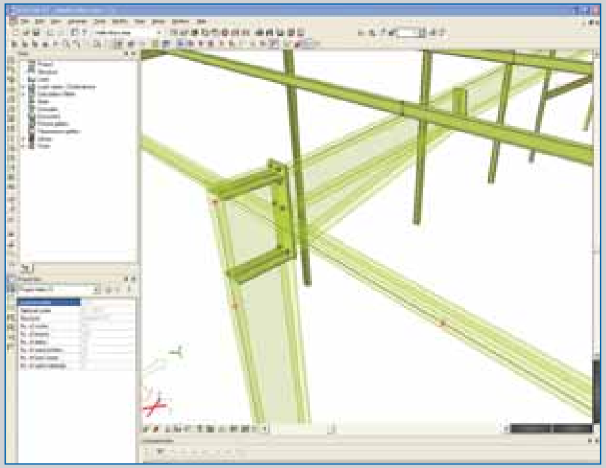
Phylosophie

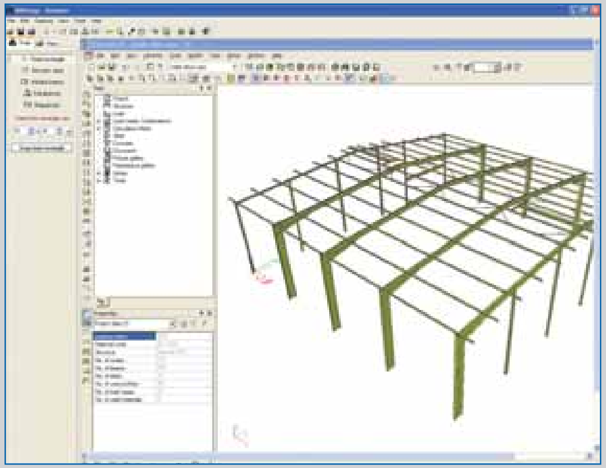
- Durch ganzheitliche 3D-Planung und Bemessung - zur Ermittlung und Umsetzung der optimalsten Lösung unter Berücksichtigung der Kundenwünsche
- Schnelle Reaktion auf eventuelle Änderungen
- Ständige technische Weiterentwickung und Weiterbildung
- Umsetzen in den Projekten der neuesten Entwickungen der Branche

Production hall with adjacent office for Gläser

In 2006 our company received an order from a company that produces glass, they wanted to extend their production capacities and therefore the existing buildings had to be extended. The first problem was that the execution planning should be finished within 14 days. A time-saving planning and execution by integration and computation all sections was a must. ESA PT was used in all stages, from design, over easy (time-saving) adjustments, efficient utilisation of the construction units, to secure and fast planning and execution.

Produktionshalle mit Anliegebüro





Used software • SCIA • ESA PT

Projektbeschreibung

In 2006 hat die Fa. Gläser beabsichtigt ihre Produktionskapazitäten zu erweitern. Die Planung und Ausführung sollte Produktionsbedingt sehr kurzfristig erfolgen. Für die Ausführungsplanung wird der Frist von 14 Tagen eingeräumt.
Der Auftrag umfasst eine neue Produktionshalle als Stahlkonstruktion mit dem massiven zweigeschossigen Büroteil.

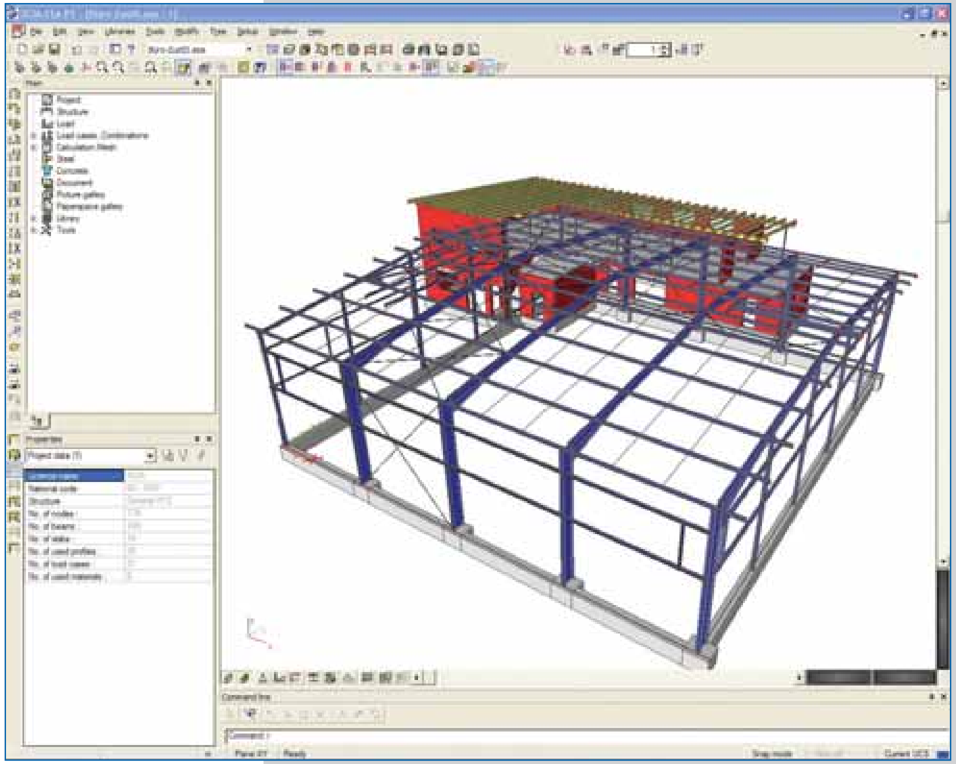
Besonderheiten

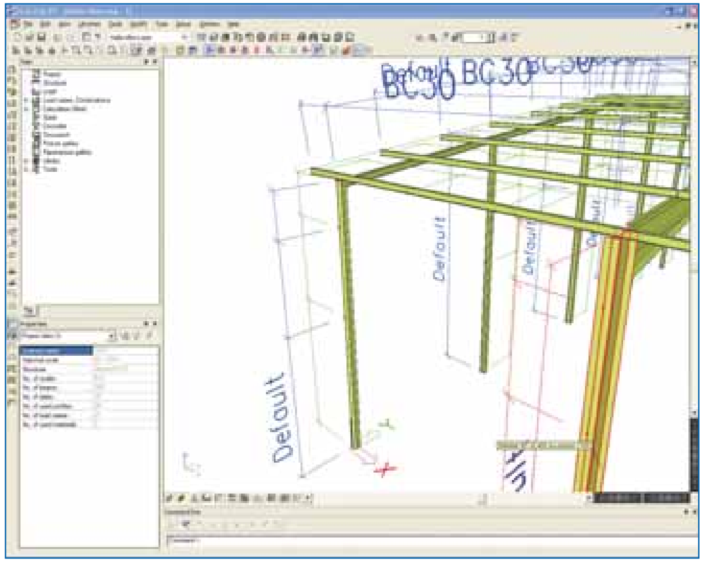
Die Hallen- und Büroteile sind zwar als eigenständige Bauten geplant (von einen Gasbetonwand getrennt), aber müssen wegen gemeinsamer durchgehenden Dachfläche und Übergängen in Bodenplatte und EG-Decke zusammen betrachtet werden. Um die Verformungsdifferenzen zu berücksichtigen und Folgeschäden auszuschliessen wurde die Planung auf dem Gesamtmodell vollzogen. Dabei wurden alle Bauteile mit deren Steifigkeiten einschliesslich Fundamente zusammen gerechnet und die erforderliche Optimierung erzielt.

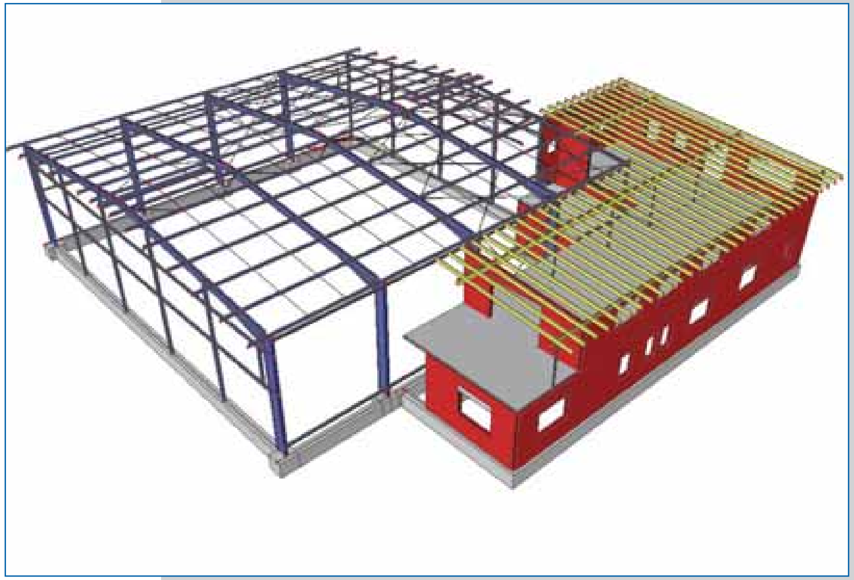
Bei den EG-Decken, die die Spannweiten bis 6.5m aufweisen und durch schwere nichttragende Wände mit anderen Einbauten belastet sind, wurde die Berechnung im gerissenem Zustand II geführt, um die übermässigen schädlichen Verformungen mittels optimierten Bewehrungeführung und Deckenstärke zu reduzieren.

Technische Daten

Abmessungen Halle: Länge - ca. 23.00m; Breite - ca. 24.50m; Traufenhöhe ca. 6.15m
Abmessungen Büro: Länge - ca. 24.00m; Breite - ca. 14.00m; Traufenhöhe ca. 5.85m







GBD ZT GmbH

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Contact Herr Flora Sigurd
Email s.flora@gbd.at
Website www.gbd.at

Historie

1952 Dipl.-Ing. Werner Rüsch gründet das technische Büro
1969 Dipl.-Ing. Karl-Werner Rüsch übernimmt das väterliche Büro.
1973 Dipl.-Ing. Rigobert Diem tritt ins Büro ein und mit Erlangung seiner Ziviltechnikerbefugnis entsteht
1978 das Büro rüsch & diem
1996 durch Eintritt von Dipl.-Ing. Eugen Schuler zunächst Rüsch, Diem & Partner, dann rds
2003 Austritt von Dipl.-Ing. Karl-Werner Rüsch eintritt von Dipl.-Ing. Heinz Pfefferkorn in die Geschäftsleitung der gbd ZT GmbH
2007 Eintritt von Dipl.-Ing. Sigurd Flora und Dipl.-Ing. Markus Beck in die Geschäftsleitung der gbd ZT GmbH

Qualität

Zu erzielen fassen wir als umfassenden Auftrag auf. Qualität bedeutet für uns nicht allein, wirtschaftlich durchoptimierte Lösungen anzustreben.
Eine enge Kooperation von Architektur, Tragwerksplanung, Fachplanung, Projektmanagement, sowie ausführenden Firmen ist uns ein wesentliches Anliegen, und die Grundbedingung dafür, optimale Lösungen in der Tragwerksplanung für unsere Auftraggeber zu finden.

Team

10 Diplomingenieure, 9 Ingenieure, 2 Sekretärinnen, 4 freie Mitarbeiter

Geschäftsleitung

Dipl.-Ing. Rigobert diem, Dipl.-Ing. Eugen Schuler, Dipl.-Ing. Heinz Pfefferkorn, Dipl.-Ing. Sigurd Flora, Dipl.-Ing. Markus Beck

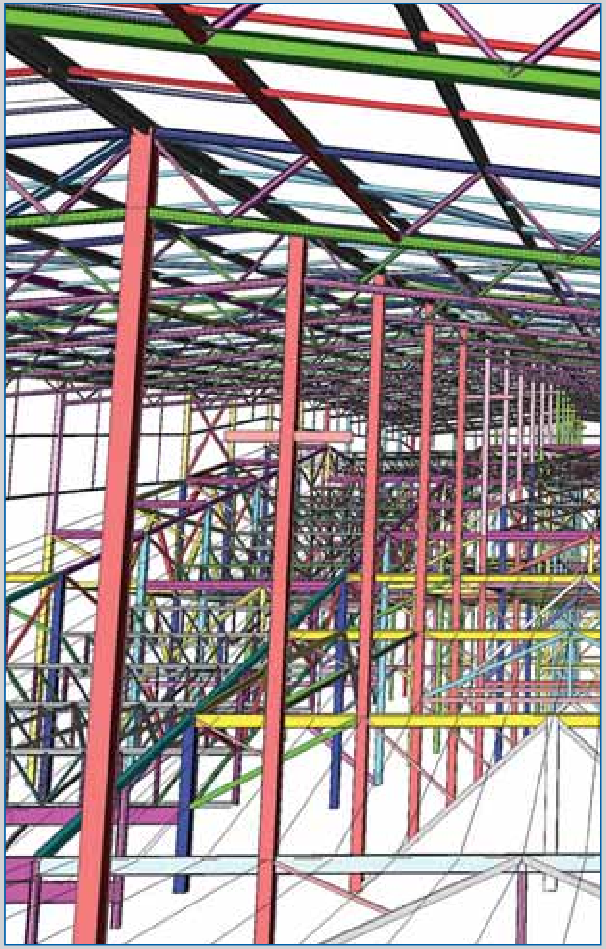
Schwerpunkte

Stahlblau, Glasblau, Fassadenbau, Holzbau, Massivbau, Forschung & Entwicklung
Bauleitung, Projektmanagement, bauKG

Software

Tragwerksplanung: SCIA•ESA PT, AEC mb Ing+2007, ANSYS 10.0, Nemetschek, AUTOCAD
Office: MS-Office, Lotus Notes
Bauleitung: PM-Tools 9.0, Abk

Snowfunpark Wittenburg



Used software • SCIA•ESA PT

Schihalle mit 330 m Länge, 80-135 m Breite und 66 m Höhe

1 Sessellift +1 Schlepplift + Kinderlift
Halfpipe mit 125 m Länge
Höhenunterschied ca. 56 m

Hotel mit 56 Betten
Restaurants
Wellnessbereich

Kinderwelt
Schischule, Schiverleih
GoCart-Bahn
Fahrradverleih

Bauherr: SnowFunPark Wittenburg GmbH

Stahlbau: Haslinger Stahlbau GmbH, Feldkrichen
Tragwerksplanung Stahlbau: gbd ZT GmbH
Tragwerksplanung Massivbau: WTM Engeneers
Prüfstatik: Seehase und Röpke, Wismar

Bauzeit: 9 Monate, Eröffnung 9.12.2006
Start der Tragwerksplanung für den Stahlbau: 1.12.2006
Profilbestellung: Ende Februar 2006

Kosten: 52 Mio. Euro, davon 9,5 Mio Stahlbau
Stahlgewicht: 6200 to
Montagebeginn Stahlbau: KW 21, 2006
Montageende Stahlbau: KW 47, 2007-02-07
Mannschaft
100 Mann in der Werkstatt
35 Mann auf der Baustelle, zusätzlich zur externen Montagefirma

05310 - Snow Fun Park: Statistik der Berechnungsmodelle

Projektgrunddaten:	HALLE			
	TEIL #0	TEIL #1	TEIL #2	TEIL #3
Anzahl Knoten	1543	1023	1789	1561
Anzahl Stäbe	1534	1141	2103	1875
Anzahl verwendeter Querschnitte	67	86	121	87
Anzahl Lastfälle	124	22	41	75
Anzahl Materialien	2	2	2	2
Berechnung nach	Th. I. O.	Th. II. O.	Th. II. O.	Th. II. O.
Prüffähige Stabwerksberechnung [Ordner]	4	4	6	6
Prüffähige Detailstatik [Ordner]	2	2	3	2
Größe des Bearbeitungsteams	5 Diplom-Ingenieure zu Spitzenzeiten			

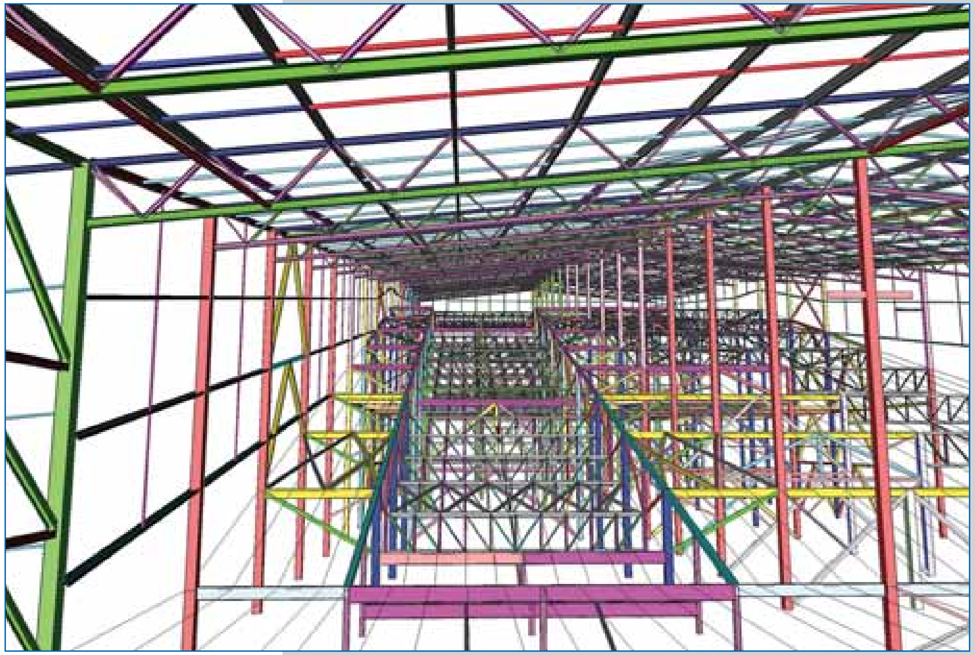
Die größte Herausforderung der statischen Bearbeitung diese Projektes war wohl die zeitliche Vorgabe. Der Start für die Tragwerksplanung fiel am 01.12.2005, Ende Februar wurden die ersten Profile bestellt und am 08.12.2006, also genau ein Jahr nach dem Start wurde der SnowFunPark eröffnet. Um das Projekt in statischer Hinsicht in dieser kurzen Zeitspanne bewältigen zu können haben wir die Halle, nachdem das Gesamtsystem (6653 Stäbe) samt Randbedingungen und Lasten in SCIA•ESA PT aufbereitet waren, in insgesamt 4 Teile gesplittet. Nur so konnte die Rechenzeit reduziert und das Projekt durch den Einsatz von bis zu 5 Tragwerkplanern abgehandelt werden.

Eine große Hilfe war dabei auch das „Dokument" in SCIA•ESA PT, da die gesamte Stabstatik über die vorab erstellte Dokumentenstruktur entsprechend dokumentiert werden konnte.

Auch sämtliche erforderlichen Pläne zur Erstellung der prüffähigen Statik, wurden über dieses Feature automatisch erstellt: Übersichtspläne, Lastenpläne, Schnittgrößen, Verformungen u.a.

Snowfunpark Wittenburg

This project regards the design of the Snowfunpark in the city of Wittenburg. It comprises a whole complex with a large ski hall, having a length of 330 m, a width of 80-135 m and a height of 66 m.
In the ski hall are realised a chair lift, a ski tow and a childrens' lift, a halfpipe with a length of 125 m. The whole has a height difference of about 56 m.
The park has also a hotel with 56 beds, a restaurants and a wellness centre.
The building period, from original design to the finished construction, has been 9 months.



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My company

My one-man company was estabilished in 1997. I am a static Engineer. My annual turnover is between 40.000 and 50.000 Euros.

- Structural engineering
- Civil engineering: all about static and construction
- Design of the static of residences and commercial buildings
- Diagnostics of bearing constructions
- Technical consulting

My projects since 1990

- Lift- shaft of 120 m height for Boiler Steam Structure 2 x 500 MW in Shen-Tou (China)
- Some platforms for Boiler Steam Structure 2 x 360 MW Jorge Lacerda IV (Brasil)
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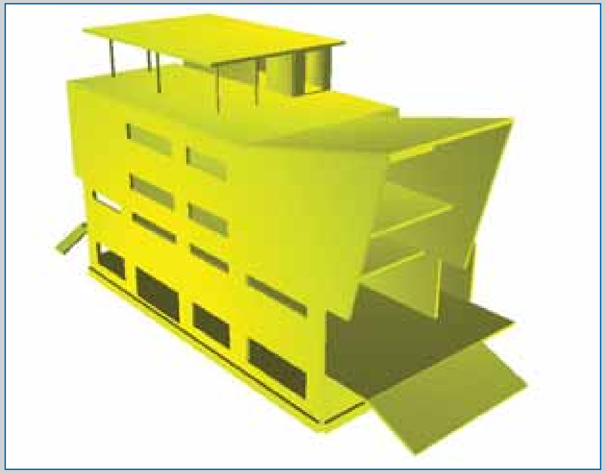
- Object of Furniture ATRIUM Bratislava (Slovakia) - see my project in SCIA User Contest Book 2005

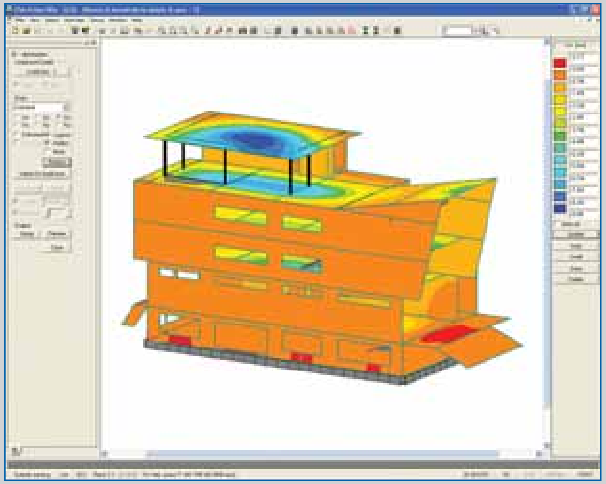
Shopping-storing project in Bratislava

This project contains the static of reinforced concrete structure (C20/25) for the shopping- storing project of the Wellington Company in Bratislava – Slovakia, where the object was mounted from September 2006 to January 2007. The length of this object is 88,5m, the width approximately 11,4 m, the surface 1000m² and the volume more than 20.000 m³. The total volume of reinforced concrete for the structure amounted up to 512 m³ and its weight was 1413,6 t. The building costs are 750.000 Euro.
The structure has 7 modules A-G, consisting of box girders type 4. The supporting structure of the object is made of reinforced concrete from spilt concrete, it is consisting of vertical wall and horizontal board elements forming a compact unit with transversal, as well as longitudinal stiffening in horizontal and vertical planes. On the supporting circumferential walls there are fastened, on the outside, warming panels of a planar weight of 30kg/m² protecting the hall from meteorological and precipitation influences of weather and thermal bridge.
The double-armed stairway is monolithic.

Used software • NEXIS (ESA-Prima Win)

Shopping-storing project in Bratislava





Technical data of the project

This project treats the static of a reinforced concrete structure (C20/25) for a shopping-storing project in Bratislava – Slovakia. The structure was mounted from September 2006 up to January 2007. The total length of this structure is 88,5 m, the width approximately 11,4 m, the area 1000 m² and the volume more than 20.000 m³. The total volume of reinforced concrete for the structure amounted up to 512 m³ and its weight was 1413,6 t. The building costs are 750.000 Euro.

Description of the structure

The reinforced concrete structure of the shopping- storing project of the Wellington Company has 7 modules A-G, consisting of box girders type 4. The storing object has a breadth distance of 11,40m with expansion gaps of min. 30mm; the overall length of the object will be 88,50 m.
The supporting structure of the object is made of reinforced concrete from spilt concrete consisting of vertical wall- and horizontal board elements forming a compact unit with transversal, as well as longitudinal stiffening in horizontal and vertical planes. On the supporting circumferential walls are fastened, on the outside, warming panels of a planar weight 30 kg/m², protecting the hall from meteorological and precipitation influences of weather and thermal bridge.
The horizontal structures of the ceilings are formed of monolithic plates with a thickness of 200 mm with a span of max. 6,30 m. The mutual clear distance of two supporting walls – the circumferential one and the internal stairway is 8200 mm, but the plates will be placed on the longitudinal monolithic extenders, 200 mm broad, with clear spans 6,30 + 5,60 +3,60 m and the last one will be a variable one, from 6,10 to 0,00 m, because 7 object of stores are gradually getting shorter by a constant length 900 mm. The double- armed stairway is monolithic too. Monolithic circumferential walls and an internal stairway- holding wall stiffen the individual objects. On the front shield wall of the stores dominant is the main entrance with an oblique monolithic roof supported by a monolithic joist 1500 mm high for a clear span 8,20 m.

Description oh the Parts of Concrete Structure

The primary supporting system of the object is combined in the transversal, as well as in the longitudinal direction and it has been calculated for every loading effect. The object of the project in the static calculation is especially the monolithic structure supported by circumferential walls from three sides (on the fourth side – the front one – there is a glassed- in wall) and several supporting columns in axial distances max. 3,00 m and is considered as one special unit. On the first storey from the rear side, the ceiling plate is dimensioned as a bracket with the span 1,20 m, on which the dodged rear wall of second and third storey will be placed.

The vertical supporting structures of the object, as well as the horizontal supporting structures of the ceilings will be consist of monolithic plates 200 mm thick from concrete C20/25, which according to the static calculation are mutually sticked.

The vertical communication areas – stairways – are situated in the stairway area limited by the internal supporting monolithic walls 200 mm thick. Both arms of the stairway are formed by bent monolithic plates sticked into pedestal and interpodestal supporting monolithic plates by anchoring stiffeners. The effective thickness of the plate is 150 mm.The main pedestal plates are, on the other hand, inserted into the internal supporting wall and into the circumferential walls 200 mm thick, which are limiting the stairway area approximately 5,30 x 2,60 m.
All stiffening elements of the object are monolithic structures of the supporting system, i.e. they are designed in the longitudinal, as well as transversal direction and in the ceiling plane monolithic wall elements and on the fourth storey also supporting columns.

Foundations

The ground of the object of the stores area – setting the lower parts of the walls will form a reinforced concrete foundation made of concrete of the class C16/20 as far downward as the non- freezing depth. Dimensions of the reinforced concrete foundation strip are transversally 600 x 600 mm approximately to the depth -3,275 m.
The fundaments for the circumference of the object and for the internal supporting walls around the stairway will follow form monolithic fundament strips under the supporting walls of the object.

Material and loading data

Foundation and bearing structures were designed acc. to ENV 1993-1-1:1992 Euro code 3. Design of the device consists of calculation and evaluation of a number of load cases and their complex combination effect: Except the dead load (own weight) was considered live load – for ceilings it is the standardized value 2,50 kN/m², for stairway 3,00 kN/m².

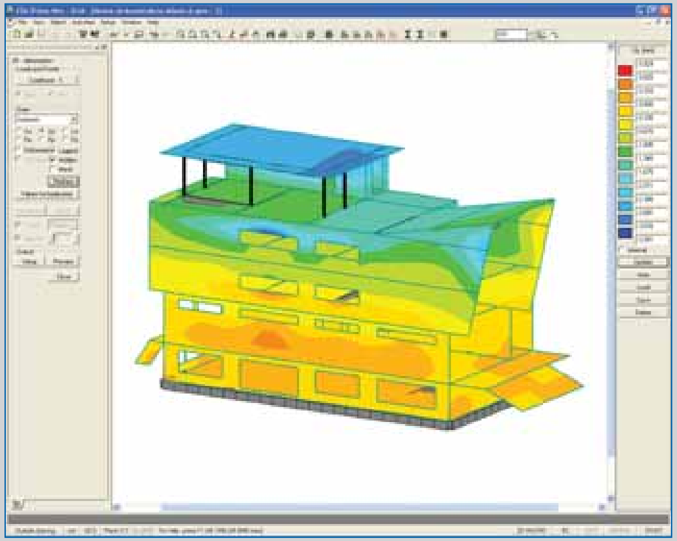
Snow loading (area II.) so = 0,70 kN/m² and wind loading wo = 0,55 kN/m² (during erection and on final building). After that was considered seismicity 7o MSK-64, category "A" and temperature loading (shell structure contains a higher temperatures as column support during operation).

Description of the method of Static calculation

Static calculation is prepared with software NEXIS rel. 3.70. It was calculated 65 most dangerous combinations acc. to ENV 1993-1-1:1992 Euro code 3 with coefficient 1,35 in two basic combinations (bearing capacity and deformations).
Model contains 385 macros 1D and 2D.

Bearing capacity, deformations of the walls and ceilings

- The text enclosure shows bearing capacity of the walls and ceilings in relevant load case combinations (the same in the graphic enclosure). The nodes were selected in all four corners on each floor elevation.
- Horizontal deformation in x, y direction should not exceed 1/1000 of node elevation above support (of the structure as whole) acc. to recommended limit deformations in ENV 1993-1-1:1992 Euro code 3. The software evaluates extreme deformations in every direction separately (x, y, z) as well as maximum node rotation around axes x, y, z.



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My company

My one-man company was estabilished in 1997. I am a static Engineer. My annual turnover is between 40.000 and 50.000 Euros.

- Structural engineering
- Civil engineering: all about static and construction
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- Some platforms for Boiler Steam Structure 2 x 360 MW Jorge Lacerda IV (Brasil)
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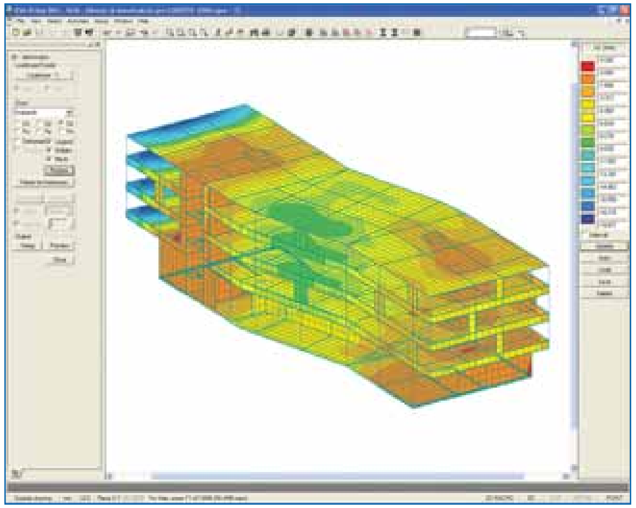
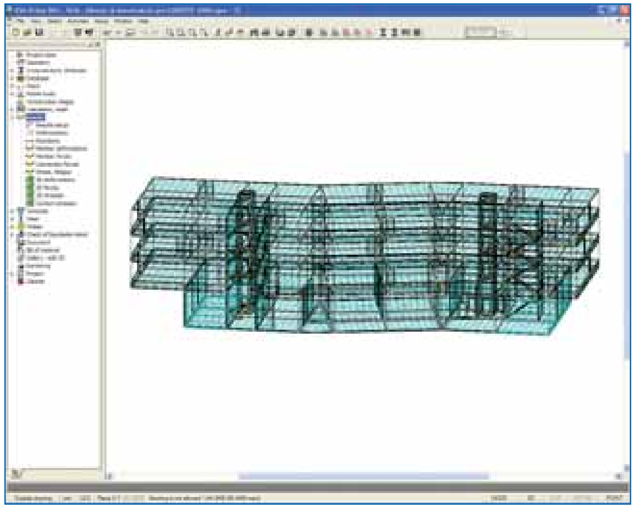




Used software • NEXIS (ESA-Prima Win)

Technologické centrum SSE (EOS) Žili

EOS Technological Centre

This project contains the static of the reinforced concrete structure (C30/37) for the Technological centre of the EOS Company in Žilina – Slovakia, where the object will be mounted from April 2007 to January 2008. The total length of this object is 61,95m; its width is approximately 22,6m, the surface 1400m² and the volume more than 30.000 m³. The total volume of the reinforced concrete for the structure amounted up to 1846m³ and its weight up to 5415,3 t. The building costs amount up to 1,750.000 Euro.
The structure has 10 modules, consisting of a space frame type of 4 storeys.
The supporting structure of the object is made of reinforced concrete from spilt concrete; it consists of vertical wall and horizontal board elements forming a compact unit with transversal, as well as longitudinal stiffening, in horizontal and vertical planes. On the supporting circumferential walls there are fastened, on the outside, warming panels of a planar weight of 30kg/m² protecting the hall from meteorological and precipitation influences of weather and thermal bridge.
The horizontal structures of the ceilings are formed of monolithic plates of a thickness of 250 mm (with a span of max. 7,30 m). The mutual clear distance of two supporting walls and columns will be variable from 6,50 to 7,50 m. The double-armed and triple-armed stairway is monolithic too. The individual objects are stiffened by monolithic circumferential walls and an internal stairway-holding wall. The main entrance, with an oblique monolithic roof, is very dominantly present.

Technical data of the project

This project contains the static of a reinforced concrete structure (C30/37) for the Technological centre of the EOS Company in Žilina – Slovakia, where the object will be mounted from April 2007 to January 2008. The total length of this object is 61,95 m; its width is approximately 22,6 m, the area 1400 m², the volume more than 30.000 m³. The total volume of reinforced concrete for the structure amounted to 1846 m³ and its weight to 5415,3 t. The building costs are 1,750.000 Euro.

Description of the structure

The reinforced concrete structure of the Technological Centre of the EOS Company has 10 modules 1-10, consisting of a space-framed type of a 4-storied construction having a width of 22,6 m and an overall length of 61,95 m.

The supporting structure of the object is made of reinforced concrete from spilt concrete consisting of vertical wall and horizontal board elements forming a compact unit with transversal, as well longitudinal stiffening in horizontal and vertical planes. On the supporting circumferential walls are fastened on the outside warming panels of a planar weight of 30 kg/m²; this is protecting the hall from meteorological and precipitation influences of weather and thermal bridge.

The horizontal structures of the ceilings form monolithic plates of a thickness of 250 mm in a span of max. 7,30 m. The mutual clear distance of two supporting walls and columns will be variable from 6,50 to 7,50 m. The double-armed and triple-armed stairway is monolithic too. Monolithic circumferential walls and an internal stairway- holding wall stiffen the individual objects. On the front occurs the dominant main entrance with an oblique monolithic roof supported by a monolithic joist of 1500 mm; at the second storey of the side wall is the bracket spread 7,40 m; due to mutual co-operation of the monolithic elements this could be solved in a satisfactory way.

Description of the Parts of the Concrete Structure

The primary supporting system of the object is combined in the transversal, as well as in the longitudinal direction and it has been calculated for every loading effect. The main object of the project in the static calculation is especially the monolithic structure supported by circumferential walls and several supporting columns in axial distances max. 7,50 m, this is considered as one special unit. On the first storey from the rear side the ceiling plate is dimensioned as a bracket with the span 7,40 m, on which the dodged rear wall of the second, third and fourth storey will be placed.

The vertical supporting structures of the object, as well as the horizontal supporting structures of the ceilings will be consist of monolithic plates of a thickness of 250 mm out of concrete C30/37, which according to the static calculation are mutually stuck.

The vertical communication areas – stairways – are situated in the stairway area limited by the internal supporting monolithic walls, 200 mm thick. All arms of the stairway are formed by bent monolithic plates stuck into pedestal and interpodestal supporting monolithic plates by anchoring stiffeners. The effective thickness of the plate is 150 mm.The main pedestal plates are, on the other hand, inserted into the internal supporting wall and into the circumferential walls (200 mm thick), which are limiting the stairway area approximately 7,00 x 2,80 m.
All stiffening elements of the object are monolithic structures of the supporting system, i.e. they are designed in the longitudinal, as well as transversal direction.

Foundations

The foundation is made out of reinforced concrete strips made of concrete of class C20/25. The dimensions of the reinforced concrete foundation strips are transversally 800 x 500 mm approximately with a depth of -2,15 m.
The strips will be mutually bound by a monolithic reinforced concrete base plate (400mm thick) in order to eliminate uneven settings. The fundaments for the circumference of the object and for the internal supporting walls of the cores around the stairway will follow the form of the monolithic fundament strips under the supporting walls of the object harnessed together with the base plate.

Material and loading data

The foundation and bearing structures were designed acc. to ENV 1993-1-1:1992 Euro code 3. The design of the device consists of the calculation and the evaluation of a number of load cases and their complex combination effect. Except the dead load (own weight) was considered the live load – for ceilings it is the standardized value 2,50 kN/m², for stairways 3,00 kN/m
Snow loading (area II.) – base value so = 0,70 kN/m² and wind loading wo = 0,55 kN/m² (during the erection and with the final building). After that was considered the seismicity 7o MSK-64, category "A" and temperature loading (the shell structure contains a higher temperature as the column support during the operation).

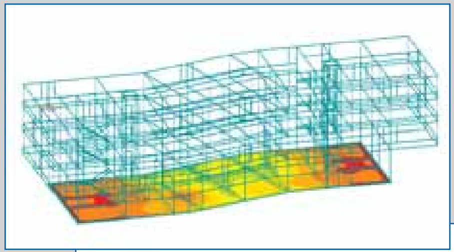
Description of the method of Static calculation

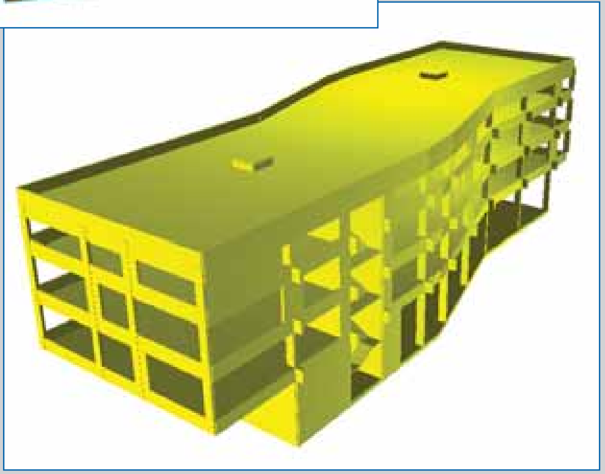
The static calculation is prepared with NEXIS rel. 3.70. The program calculated 325 of the most dangerous combinations acc. to ENV 1993-1-1:1992 Euro code 3 with a coefficient of 1,35 in two basic combinations (bearing capacity and deformations).
The model contains 865 macros 1D and 2D.

Bearing capacity, deformations of the walls and ceilings

- The text enclosure shows the bearing capacity of the walls and ceilings in relevant load case combinations (the same in the graphic enclosure). The nodes were selected in all four corners on each floor elevation.
- The horizontal deformation in x, y direction should not exceed 1/1000 of the node elevation above the support (of the structure as whole) acc. to the recommended limit deformations in ENV 1993-1-1:1992 Euro code 3. The software evaluates extreme deformations in every direction separately (x, y, z) as well as maximum node rotation around the axes x, y, z.

The text enclosure shows extreme deformations selected from all parts in the structure.





IGUBA, sro

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Contact	Mr Guba Ivan
Email	iguba.sro@mail.t-com.sk

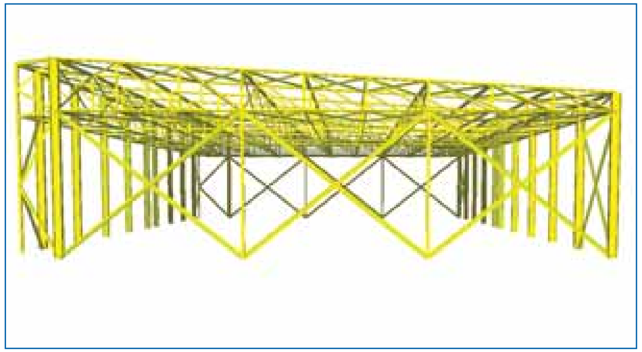
My company

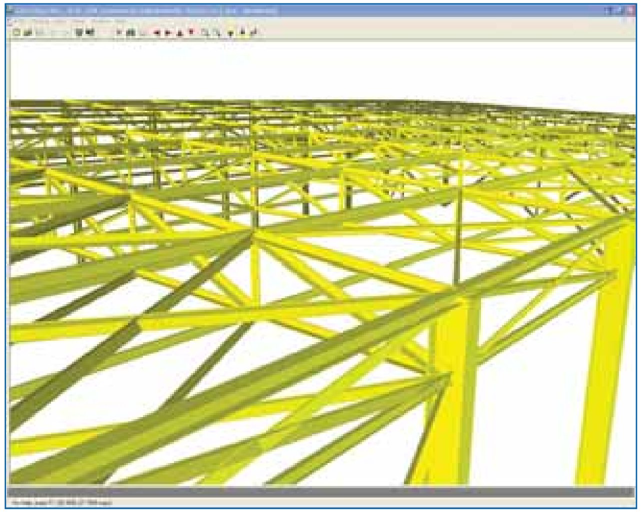
My one-man company was estabilished in 1997. I am a static Engineer. My annual turnover is between 40.000 and 50.000 Euros.

- Structural engineering
- Civil engineering: all about static and construction
- Design of the static of residences and commercial buildings
- Diagnostics of bearing constructions
- Technical consulting

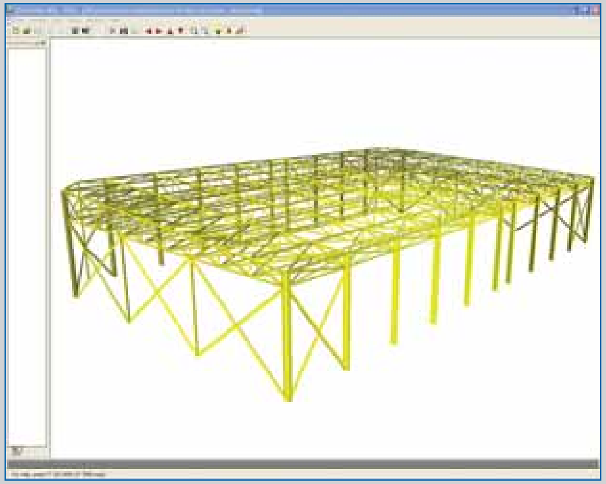
My projects since 1990

- Lift- shaft of 120 m height for Boiler Steam Structure 2 x 500 MW in Shen-Tou (China)
- Some platforms for Boiler Steam Structure 2 x 360 MW Jorge Lacerda IV (Brasil)
- Reconstruction of Bank object „METROPOL", Bratislava (Slovakia)
- Steel Structures of many Tank- and Oil- Stations „AVANTI" (now SHELL) in the Slovak Republic, Czech Republic, Hungary, Austria, Rumania, etc.
- Commercial building „Swietelsky" in Bratislava (Slovakia)
- Secondary Combustion Chamber & Steam Boiler and Flue Gas Cleaning in Nyborg (Danmark) – see my project in SCIA User Contest Book 2002, p. 80
- Object of Furniture ATRIUM Bratislava (Slovakia) - see my project in SCIA User Contest Book 2005





Hockeyball hall Macharova Street Bratislava



Hockeyball hall

This project contains the static of a 153t heavy steel structure (S235) for the Hall of the Hockey-ball in Bratislava – Slovakia, where the steel structure will be mounted during January to September 2007.
The total length of this object is 57.0 m, the width is 33.8 m, the area is 2000 m² and the volume is more than 20,000 m³.
The steel structure of the object of the hall has 11 modules A-K of transversal stiffened frames consisting of rolled profiles between which the axial distance is 6.00m, between the rows E-F a half modulus 3.00m is inserted, so that the overall length of the hall will be 9 x 6.00 + 3.00 = 57.00 m. The transversal joints have an axis span of 33,80 m; on the main columns are mounted stiffened beams with their lower edges at the height of 8.20m.
The supporting structure of the hall is made of a steel structure, consisting of vertical rolled columns HEA 500, stiffened cross beams and longitudinal rolled beams HEA 180 with transversal as well as longitudinal stiffening in horizontal and vertical planes. On the supporting steel elements there are externally affixed sandwich panels of a planar weight of 30 kg/m² protecting the hall from wind and weather influences.

Used software • NEXIS (ESA-Prima Win)

Technical data of the project:

This project contains the static of a 153t heavy steel structure (S235) for the Hall of the Hockey-hall in Bratislava – Slovakia, where the steel structure will be mounted from January to September 2007. The total length of this object is 57,0 m, the width is 33,8 m, the area is 2000 m² and the volume is more than 20,000 m³. The building costs are 1,000,000 Euro.

Description of the steel structure

The steel structure of the object of the hall has 11 modules A-K of transversal stiffened frames consisting of rolled profiles between which the axial distance is 6.00m, while between the rows E-F a half modulus 3.00 m is inserted, so that the overall length of the hall will be 9 x 6.00 + 3.00 = 57.00 m. The transversal joints have an axis span of 33,80 m, while on the main columns there are mounted stiffened beams with their lower edges at the height of 8.20 m. The supporting structure of the hall is made of a steel structure, consisting of vertical rolled columns HEA 500, stiffened cross beams and longitudinal rolled beams HEA 180 with transversal as well as longitudinal stiffening in horizontal and vertical planes. On the supporting steel elements there are externally affixed sandwich panels of a planar weight of 30 kg/m² protecting the hall from windy and precipitation influences of weather. On the lower strip of the stiffened beam, illuminators of a maximal weight of 5 kg/m² will be hanged.

Description of the parts of the steel structure

The primary supporting system of the object was taken in the static calculation as one special unit. The steel columns, consisting of profiles HEA 500, have a height of 11,000 mm on the higher side of the countertype of roof and 9200 mm on the lower side. On the columns there are inserted beams, strip bars, perpendiculars and diagonals, which have been designed of double angle- irons of various dimensions. The upper strips longitudinal beams, made of profiles HEA 180, are welded. They are statically taken as simple beams, on which sandwich panels of the roof are inserted. All stiffening elements of the object are bars of the supporting system, i.e. they are designed in the longitudinal as well as the transversal direction, in the roof plane from L- profiles against each other and in the crossings they are welded. Two bars are always crossed "X" shaped, while the drawn bar is only statically effective (the compressed one is eliminated from supporting due to bulge). Stiffeners in the perpendicular direction must equip the bars, to which the stiffening is connected. The connection to the columns and beams is made through steel sheet flanges and bolts. The floor beams are made of open- section rolled steel beams. The parts are connected with bolts in the erection phase.

Why is this Project so important?

The object is supplemented and enriched by the area of the hockey sport, the offer in this category was up to this time in Slovakia only very rarely realized.

Why is this Project so special?

As mentioned, up to this time in Slovakia objects connected with the sport are very rarely realized. That is the reason why the realization of these types of objects is very important and very interesting.

Foundations

Base of the object – the setting the lower parts of the steel columns will form a reinforced concrete foot made of concrete of the class C16/20 as far downward as the non- freezing depth. The dimensions of the reinforced concrete foots are in the ground plan 2200 x 2200 mm to the depth 2000mm. The four anchoring bolts with T- heads anchor the structure that was taken into the foundations. The steel concrete foots are on the concrete pilots (each one with a bearing capacity of 500 kN). The foundation of the building on the site was very difficult. The seismicity is of 7o MSK-64, category "A".

Material and loading data

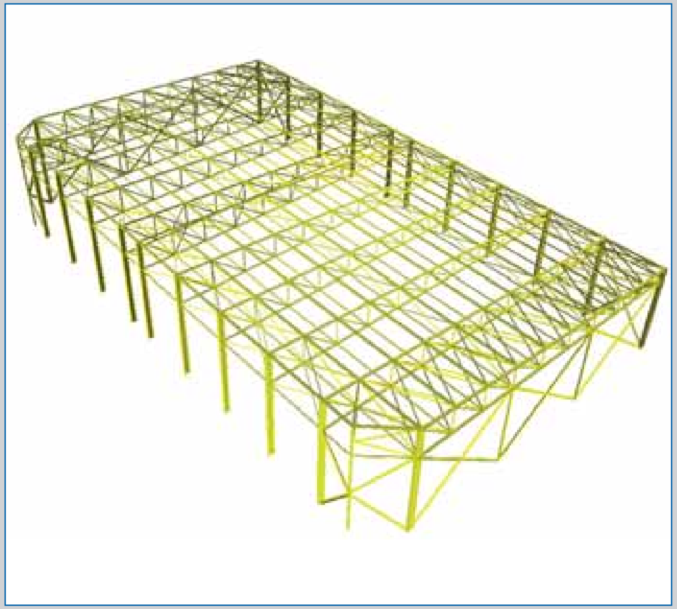
The foundation and bearing structures were designed acc. to ENV 1993-1-1:1992 Euro code 3. The design of the device consists of the calculation and evaluation of a number of load cases and their complex combination effect: Except the dead load (own weight) was considered live load – in this case it is only by the illuminators, because no service platforms were designed, which would load the supporting steel structure.
Snow loading (area II.) so = 0,70 kN/m² and wind loading wo = 0,55 kN/m² (during the erection and on the final building). After that was considered seism city 7o MSK-64, category "A" and temperature loading (shell structure contains a higher temperatures as the column support during the operation).

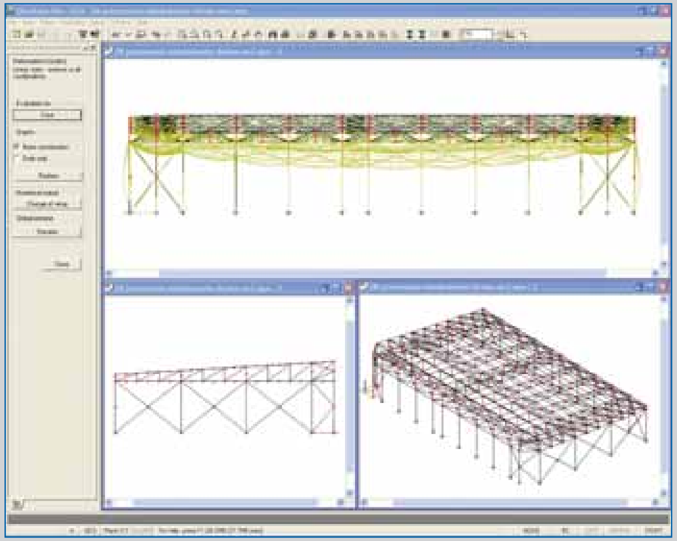
Description of the method of the static calculation

The static calculation is prepared with software NEXIS rel. 3.70. It was calculated on the 19 most dangerous combinations acc. to ENV 1993-1-1:1992 Euro code 3 with coefficient 1.35 in two basic combinations (bearing the capacity and deformations). The model contains 428 nodes, 794 bars and 446 macros 1D. It has 13 different profile sections of both basic materials – steel and concrete. The linear base modulus (3D frame) has solved over 10.000 equations. The cores were rated especially for the loading effects by reactions of the steel structure.

Bearing capacity, deformations of the nodes and bars

The text enclosure shows the bearing capacity of the bars and deformations of selected nodes in relevant load case combinations (this is the same in the graphic enclosure). The bearing capacity of the bars is different between 50 to 100%, t. m. 115 to 230 MPa.
Horizontal deformation in the x, y direction should not exceed 1/500 of the node elevation above support (of the structure as whole) acc. to the recommended limit of deformations in ENV 1993-1-1:1992 Euro code 3. The software evaluates extreme deformations in every direction separately (x, y, z) as well as the maximum node rotation around the axes x, y, z.
The text enclosure shows extreme deformations selected from all bars in the steel structure (this is the same in graphic enclosure). In this case, the maximum deflection should not be more than 1/350 of the beam length acc. to the recommended limit of deformations in ENV 1993-1-1:1992 Euro code 3, which was met in each case.





IMd Raadgevende ingenieurs

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Email m.moerman@imdbv.nl
Website www.imdbv.nl

Aula mediatheek Kennemer college

General

IMd Raadgevende Ingenieurs, formerly known as Ingenieursbureau Molenbroek, is an independent consulting company in the field of civil and structural engineering. It was founded in 1960 and throughout the years the number of employees has grown to the present number of 33.
The annual turnover of our office in Rotterdam for 2006 was 3.300.000 Euro.

Projects

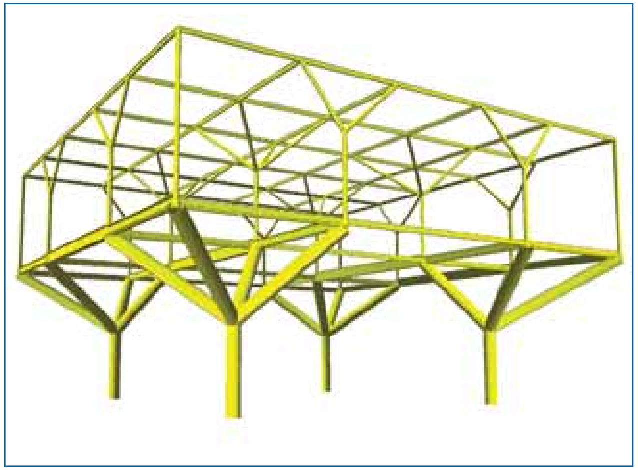
IMd provides services for real estate developers, authorities, construction companies, architects and more. Structures in concrete, brick, steel, wood and glass are designed and engineered. The projects vary from vast utility buildings to small residence projects. Each project, small or big, is a challenge for IMd.
Some of IMd's recent projects are: office building Rijnsweerd - Utrecht, Musis: a project in the city centre of Arnhem, residential building Hoge Erasmus - Rotterdam, shopping centre 'Entre Deux' - Maastricht, Rosada outlet centre - Roosendaal and the designer outlet centre of Roermond.
The main working area is in the Netherlands. On a small scale, also projects in other countries are designed, e.g. in Germany, Belgium, the United Kingdom, Italy, China and Surinam.

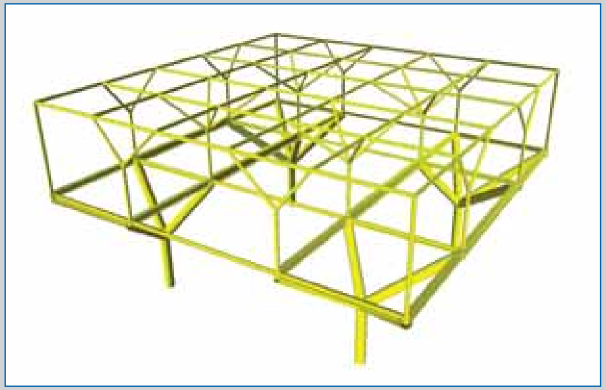
Specialities / working method

The speciality of IMd is designing buildings with several functions (such as parking lots, shopping centres and residences), underground building (for example one or multiple layer parking lots), utility buildings, high rise buildings, renovations and inner city projects.

From the start of the design process we actively participate in a creative way. In this way usually an optimisation can be found in the several designs.
Main words for IMd are: flexibility, inventiveness, enthusiasm, quality, creativity and knowledge of costs.

The quality of the work is founded in a book of quality set up according to the code NEN ISO 9001.





Used software • ESA-Prima Win

Short list

Client: Hevo bouwmanagement
Architect: Liag architecten
Construction company: Teerenstra bouw
Floor area ground floor: 400 m² (auditorium / media room)
First floor height: 6,5 m

General

The project includes a renovation and an extension of a college in Beverwijk (the Netherlands). In the centre of the existing buildings a new auditorium and media room have been designed. The concept of the new auditorium and media room will be further explained below.

In consultation with the architect, the new building has been designed in a steel structure with the shape of trees. The reason for this typical design for the structure is the demanded free space on the ground floor in combination with a light roof structure.

The steel structure of the trees will be visible in the final situation. In the middle section between the trees a ceiling is applied under the first floor to hide the installation facilities.

On the ground floor there are four trunks that carry the first floor and the roof. On the first floor there are also four trunks with each four twigs. On each side of the first floor there are two trunks with two twigs.
The trunks on the first floor are positioned on the twigs of the ground floor.

The geometry of the trees and the position of the trunks is optimised by making the twigs of the trees balance each other. Because of this the bending moment in the trunk by permanent loads was minimised. However, a bending moment will occur in the connection between the twigs and the trunk because of the variable loads on the floor and loading / unloading combinations.

The roof consists of a light steel plate supported by beams in two directions. The stability of the roof level is realised by the beams and the cold formed steel plate. In two directions the beams are supported by the trees with a distance of four metres.

The first floor is designed as a hollow core floor supported by the steel structure. The stability of this level is realised by a cast-in-place concrete topping on the hollow core slab. On this floor there will be a media centre with mainly computers for the students.
In some parts under the first floor steel beams extend out of the concrete floor, in these parts a ceiling has been placed. In the part without a ceiling the floor beams are integrated in the concrete floor.

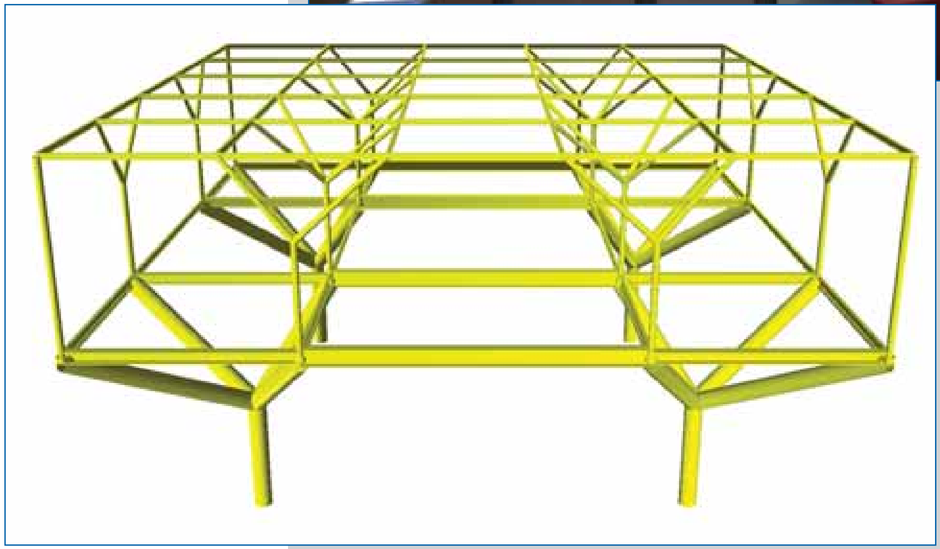
Because of the geometry and the dimensions of the trees, some of the twigs are welded on the trunk in the factory and then they are transported; on the construction site the other twigs are welded on the trunk.
For the horizontal stability the structure is supported by the main building.

It is not necessary to protect the whole steel structure against fire. In case of an emergency an escaping route can be found through the main building.
The round hollow section columns on the ground floor are filled with sand to reduce the possible occurrence of noises.

This project is a typical project for a three-dimensional calculation. Many projects can be designed and calculated with two-dimensional calculations but for this project a three-dimensional calculation has to be performed because of the complexity of the structure and the loads on the floor and on the structure.

Aula - Multimedia library of the Kennemer College

The expansion of a school is designed in a steel structure based on a tree structure. On the ground floor occur four trunks with each four twigs carrying the first floor as well as the trunks on the first floor. Special attention with regard to the calculation was given to the variable loadings on the floor. In the design progress, in consulting with the architect, the position of the trunks was optimised so the bending moment in the trunks was minimised.
With a three dimensional calculation the whole structure is designed. The roof is designed in a light steel plate resulting in a slender steel structure.



Ingenieurbüro OHR Büro für Hochbau GmbH

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Fax +49-911-969 773
Contact Herr Peter Ohr
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Website www.ib-ohr.de

Das Ingenieurbüro OHR wurde im Januar 1998 vom Geschäftsführer Peter Ohr gegründet.

Zum jetzigen Zeitpunkt beschäftigt das Unternehmen vier Ingenieure und einen Hochbaukonstrukteur. Dem Büro stehen außerdem zwei freiberuflich tätige Mitarbeiter mit langjähriger Berufserfahrung sowie ein freiberuflich tätiger Architekt zur Seite.

Die jungen Mitarbeiter können bei der Bearbeitung ihrer Aufgaben auf das Wissen der erfahrenen Statiker zurückgreifen. z.B. „Senior" Herr Ernst Ohr (Dipl.-Ing.) der sich in ca. 40jähriger Tätigkeit im Baubereich umfangreiche Erfahrung erworben hat. So fließen in die Abwicklung auszuführender Projekte modernste Berechnungsverfahren und fundiertes Fachwissen ein. Dies eröffnet Möglichkeiten, für den Kunden verschiedenste Lösungsvorschläge zu entwickeln, um am Ende ein kostengünstiges und konstruktiv einwandfreies Produkt zu liefern.

Seit der Gründung des Büros 1998 wurden ca. 1400 Aufträge unterschiedlicher Dimensionen für ein breit gefächertes Kundenspektrum erfolgreich abgeschlossen. Dazu zählen unter anderem Werksinstandhaltungen sowie Um- und Neubauten für die Firmen AEG, GRUNDIG, LEBKUCHEN SCHMIDT, MEDERER SÜSSWAREN-VERTRIEBS GmbH, LEONHARD KURZ, infra GmbH, KLINGELE Papierwerke und BOSCH.

Durch die einzelnen Mitarbeiter werden die Arbeitsfelder Stahlbetonbau, Stahlbau, Mauerwerksbau, Fertigteilbau und Holzbau abgedeckt. Dabei verstehen wir uns als Team, das gemeinsam die gestellten Probleme löst, und so die optimalen Konstruktionsvorschläge erarbeitet. Nur die gleichzeitige Betrachtung aller Aspekte kann zu einem sinnvollen Gesamtkonzept führen.

Wir bearbeiten Ihre Aufträge auf CAD mit dem Programm der Firma Nemetschek, Version Allplan 2005.

Im Statikbereich arbeiten wir mit Programmen der Firmen SCIA, PCAE, Friedrich und Lochner, Frauendorfer, DEHA, HILTI, Fischer, WEKA, Dlubal sowie eigenen Excel- und Bautextprogrammen.

Die Energieeinsparverordnung bearbeiten wir mit dem Programm Dämmwerk.

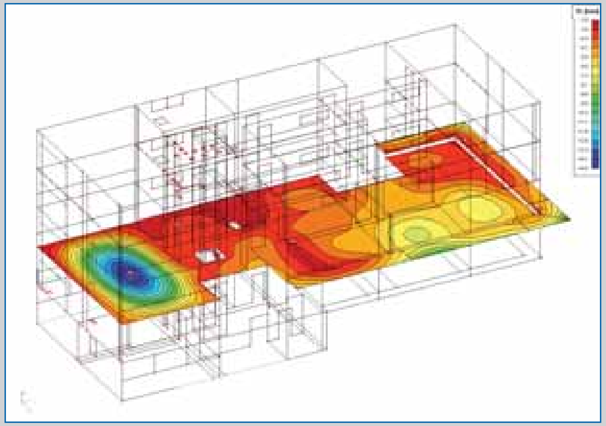
Im Archivierungsbereich arbeiten wir mit dem Programm Docuware.

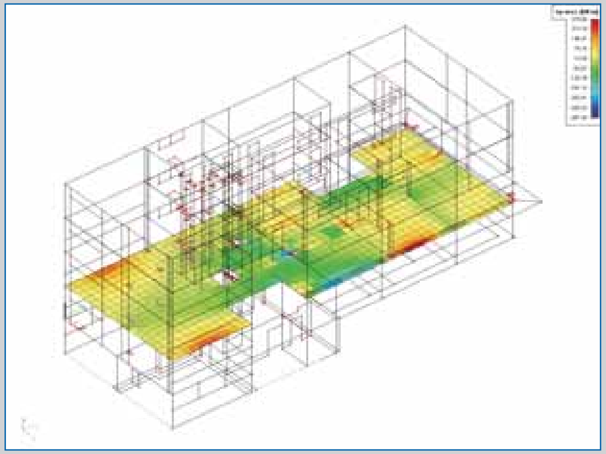
New Hardenberg Gymnasium in Fürth

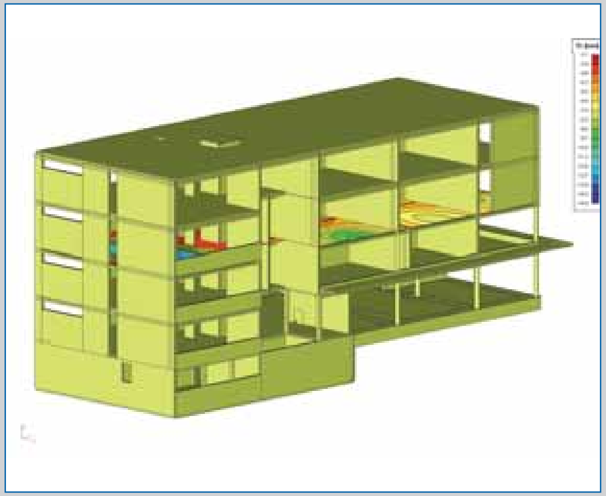
The „Hardenberg Gymnasium" is a school building with a length of 37,40 m, a width of 14,64 m and a height of 17,45m. The complete construction is carried out in reinforced concrete. The size of each classroom was given. On the ground floor was planned a dining hall with only 6 columns. The result was that some walls were standing only on one column at one end, the other end of the wall was standing on the floor. The analysis of this structure is very difficult to handle with "normal" computation. Only by considering the connection between all the 3D-construction-elements a good economical solution could be found.

Used software • SCIA • ESA PT

Neubau Hardenberg Gymnasium in Fürth







Projektbeschreibung

Durch die Einführung des G8 leidet das Hardenberg-Gymnasium in Fürth(Bayern) unter akuter Raumnot. Um den Bedarf an fehlenden Klassenzimmern zu decken wurde ein Neubau beauftragt. In diesem sollten zusätzliche neue Klassenzimmer, ein Speisesaal mit Küche und Verpflegungsbereich und die Erfordernisse für die Nachmittagsbetreuung einer Ganztagesschule untergebracht werden. Um auch für die Zukunft ausreichend Platz für die Unterrichtung vorzusehen, musste zusätzlich zu dem dreistöckigen Gebäude mit Teilunterkellerung die Errichtung eines weiteren Geschosses auf dem Dach sowie eine Erweiterung an einer Längsseite statisch und konstruktiv mit berücksichtigt werden.

Besonderheiten

Durch die engen Vorgaben des durch die Regierung geförderten Raumprogramms mussten die einzelnen Räume in Zusammenhang mit den tragenden Elementen regelrecht in den zu Verfügung stehenden Platz hineingepuzzelt werden.
Für jeden Raum mit der definierten Nutzung gibt es genaue Raumgrößenvorgaben, die weder unter- noch überschritten werden dürfen. Es kann also keine Rücksicht darauf genommen werden, tragende Wände übereinander zu stellen. Daraus ergab sich ein statisch sehr komplexes räumliches System, das mit herkömmlichen Berechnungsmethoden sehr schwer zu erfassen ist. Es kam durch die Aufteilungen der Räume zu tragenden Wandscheiben die nur an einem Ende durch eine Stahlbetonstütze gehalten werden wohingegen das andere Ende frei auf der Decke steht. Eine andere Wandscheibe steht 1,20 m neben einer sich darunter befindenden tragenden Stütze. Das andere Ende dieser Wand bindet in eine Querwand im gleichen Geschoss ein. Nur durch die räumliche Berechnung mit der Möglichkeit die Wirkung des Gesamtsystems zu betrachten anstatt den Blick nur auf die einzelnen Tragglieder zu richten ergab ein stimmiges, und schlussendlich wirtschaftliches Berechnungsmodell mit dem das Bauwerk erfolgreich abgeschlossen werden konnte.

Gründung

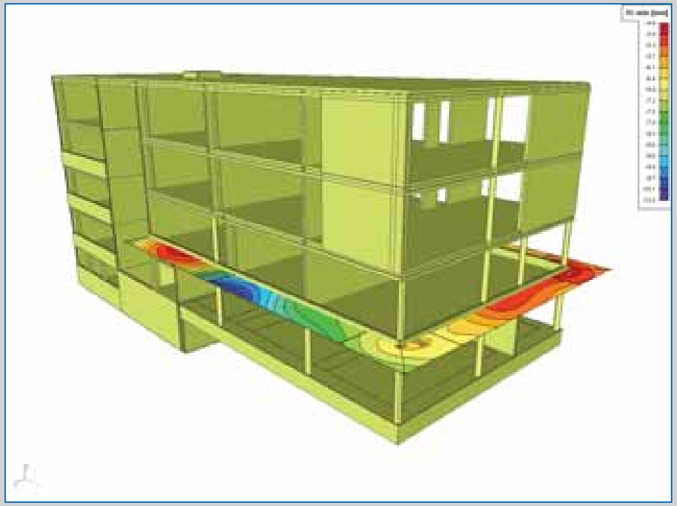
Um die Gründung durch die unterschiedlichen Bauteile (Bodenplatte, Bankette und biegesteif angeschlossene Einzelfundamente) realistisch abbilden zu können, wurden die Bohrlochprofile des Bodengutachtens als Grundlage herangezogen und die Bettungsmodule mit dem Modul SOILIN direkt in SCIA • ESA PT berechnet. Die so ermittelten Bettungsmodule ergaben ein wesentlich naturgetreueres Bild über die Interaktion zwischen Baugrund, Bauwerk und den auftretenden Lasten, als es mit einem einheitlich über die gesamte Fläche gleichmäßigen Bettungsmodul möglich gewesen wäre. So wurden die unterschiedlichen Lastabtragungswirkungen der Gründungselemente in der Konstruktion und Bemessung berücksichtigt.

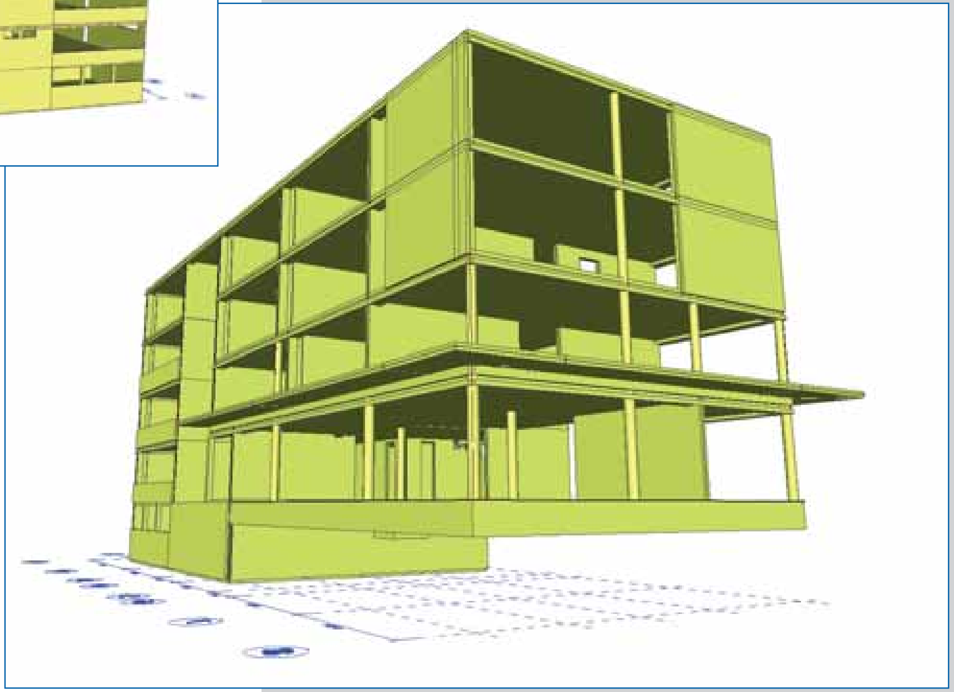
Deckenverformungen

Aufgrund der vorgegebenen Raummaße ergaben sich auch ziemlich große Stützweiten (8,66m einachsig gespannt) die in Verbindung mit den schwierigen Lastabtragungssystemen eine Betrachtung der Deckenverformung im Zustand II erforderte. Es wurde daher eine nichtlineare Berechnung mit gerissener Betonzugzone durchgeführt, um übermäßige Verformungen aus den auf den Geschossdecken stehenden Wänden auszuschließen. So konnten wir durchgängig eine Deckenstärke von 30cm realisieren.

Technische Daten

Abmessungen: Länge: 37,40 m; Breite 14,64 m; Höhe 17,45 m
Auskkragendes Fertigteilvordach in Decke über EG: 1,77 m
1450 m³ Ortbeton
66 m³ Stahlbetonfertigteile
144 to Bewehrungsstrahl
Betongüten: C20/25 – C35/45





Ingenieurgemeinschaft Gölkel IGG

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Email	info@igg-goelkel.de
Website	www.igg-goelkel.de

Leistungsbild

- Tragwerksplanung
- Objektplanung von Ingenieurbauwerken
- Projektsteuerung
- Gesamtplanung von Ingenieurbauwerken
- Digitale Bestandsdatenerfassung
- Bauphysikalische Nachweise
- Baudynamische Untersuchungen

Mitgliedschaften

- Ingenieurkammer Baden-Württemberg
- Arbeitsgemeinschaft Industriebau e.V. (AGI)

Geschichte

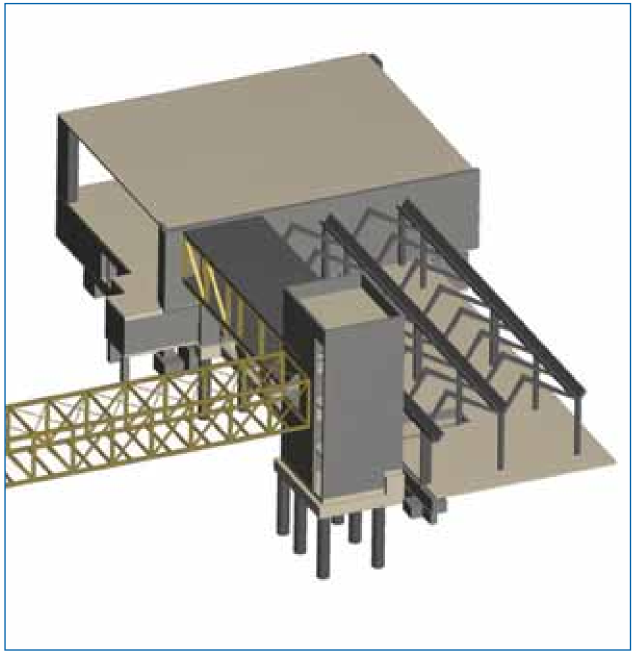
- **1965**
  Gründung des Büros von Diethelm Gölkel
  Beratender Ingenieur und Prüfingenieur für Baustatik
- **1993**
  Übernahme des Büros durch Max Gölkel
  Büroeintritt von Hubert Kunz

Philosophie

- Hoher Anspruch an Qualität der Planung
- Planung als Wertschöpfungsprozess für den Kunden
- Servicepaket aus fachübergreifender Beratung, Planung und Betreuung
- Ganzheitliche Betrachtungsweise unter Einbeziehung aller Interessen
- Ständige Weiterentwicklung im Hinblick auf Bildung, Ausstattung, Kundenbeziehung, Innovation
- Dauerhafte Kundenbeziehung

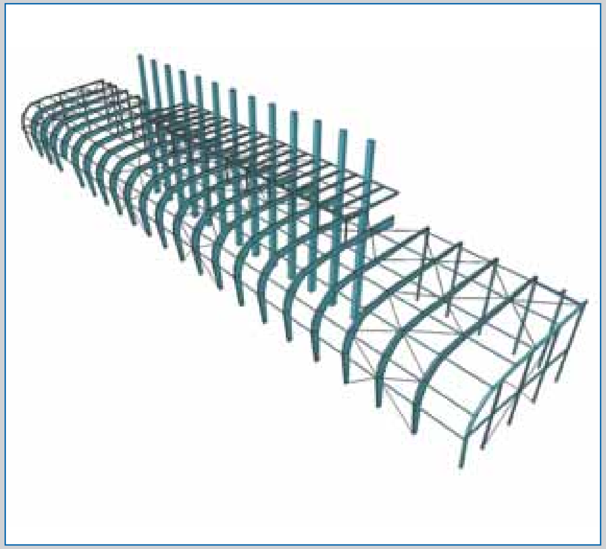
Ausstattung

- **CAD**
  Microstation V7, V8
  Speedikon M 6.5
  Nemetschek Allplan V 2003
  RIB Zeicon
  Glaser isb-cad
- **Statik**
  Bautext, Friedrich + Lochner
  Dlubal – RSTAB, STAHL, Dynam (3D-Stabwerk)
  SCIA – ESA-Prima Win, SCIA • ESA PT (3D-Faltwerk)
  PCAE – 4H-NISI, Stahlbaunachweise



Used software • SCIA • ESA PT

Maschinenhalle Herma in Filderstadt-Bonlanden



Machine hall Herma

The main building exists of two parts, which divide the building on the long side: the automatic warehouse and the production building. In between is situated a fire-resisting wall, hung up on approx. 30 m high ferro concrete columns (b/h=80/100). The upper floor of the production building, at the level +8.30 m, is the machinery hall, a steel construction of one-sided crooked frames. The calculation of the machinery building was carried out with SCIA • ESA PT.
About the construction – The profile heights are variable from 40 to 120 cm. The profile is conceived as a welded hollow box beam whose flanges (t=35 mm) overlap. The upper flanges and unterflanges run in the area of the frame corner in 2 different radii. Under the floor of ventilator engine the radii reach the horizontal, in the area covered by the roof they end in the roof inclination.
The stability of the construction is realised by a horizontal bracing under the roof along the fire-resisting wall, four crosswise bracings, which end to the curve on + 8.30 m - level. The roof bracing holds the frame on columns outside the fire-resisting wall area horizontally. The roof bracing is connected to the massive wall of the automatic warehouse and rests at bracings in the walls at the halls end.

Projekt

Die Firma HERMA erweitert Ihren Produktionsstandort in Filderstadt-Bonlanden. Erweitert wird die Haftpapierproduktion durch ein kompaktes Produktionssystem mit Hochregallager.

Gesamtanlage

Das Hauptgebäude besteht aus zwei Teilen, welche das Gebäude längs teilen: das Hochregallager und das Produktionsgebäude. Dazwischen steht eine Brandwand, welche in ca. 30m hohe Stahlbetonstützen (b/h 80/100) eingehängt wird. Der obere Abschluss des Produktionsgebäudes auf der Ebene 8.30m ist die Maschinenhalle, eine Stahlkonstruktion aus einhüftigen gebogenen Rahmen.

Die Berechnung der Maschinenhalle wurde mit SCIA•ESA PT vollzogen.

Konstruktion und Austeifung

Die Rahmen stehen im Abstand von 5 m, ebenso wie die Brandwandstützen. Über die Bauteillänge sind ihre Querschnittshöhen veränderlich von 40-120 cm. Der Querschnitt ist als geschweißter Hohlkastenträger konzipiert, dessen Flansche überstehen. Die Ober- und Unterflansche verlaufen im Bereich des Rahmeneckes in je 2 unterschiedlichen Radien. Unter einem Lüftergeschossbereich erreichen die Radien die Horizontale, im gedeckten Bereich des Daches enden sie in der Dachneigung.

Die Aussteifung der Konstruktion übernimmt ein horizontaler Dachlängsverband entlang der Brandwand, vier Querverbände, welche dem Bogen folgend auf der + 8.30 m – Ebene enden.
Außerhalb des Brandwandbereiches wird der Rahmen auf Pendelstützen in Verlängerung der Brandwand gestellt und horizontal durch den Dachverband gehalten. Der Dachverband wird an die Massivwandscheiben an den Stirnseiten des Hochregals angeschlossen und stützt sich am Hallenende auf Querverbände in den Giebelwänden.

Die Ebene des Verbandes wurde mit 20 cm unter OK Träger festgelegt. Dies wurde in SCIA•ESA PT durch die Stabexzentrizitäten für die Verbandsstäbe modelliert, um den Lastangriff oberhalb der Systemachse der Rahmen zu realisieren.

Die Aussteifung über die Ebene des gekrümmten Daches wird über die dreidimensionale Modellierung der Maschinenhalle berechnet und bemessen.

Berechnung

Die Hallenkonstruktion ab OK +8.30 m wird komplett mit Lüftergeschoss, Giebelwänden als 3D-Modell in der FEM Software SCIA•ESA PT abgebildet. Der einhüftige Rahmen liegt einseitig auf den Brandwandstützen auf. Diese Lagerung ist horizontal verschieblich, weil die Kragstützen horizontal gewisse Verformungen zulassen. Es sind zwei Zustände zu berücksichtigen:

Zustand 1 : kein Hochregal, kurzzeitiger Zustand, max. Verformung Brandwand

Die weiche Feder symbolisiert den möglichen Zustand 'kein Hochregal' und ist für die Bemessung des Stahlbaues maßgebend, weil eine maximale Verformung auf den Stahlbau wirkt.

Mit der horizontalen Auflagerlast aus dem Stahlbau und der horizontalen Verformung aus der Stahlbetonstützenberechnung, wurde durch Variation der Biegesteifigkeit der Stütze iterativ eine Federgröße ermittelt, welche für die Modellberechnung angesetzt wurde.

Zustand 2: Hochregal in Betrieb, hauptsächlicher Zustand, min. Verformung Brandwand

Die Brandwandstützen interagieren mit der steifen Konstruktion des Hochregales.

Die härteren Federn wurden ebenso, iterativ anhand der Stützenberechnung für diesen Zustand ermittelt und im 3D-Modell daraus die Verformung ermittelt, welche auf Verträglichkeit untersucht wurde.

Die härteren Federn waren für die Berechnung und Bemessung des Stahlbaues nicht relevant.

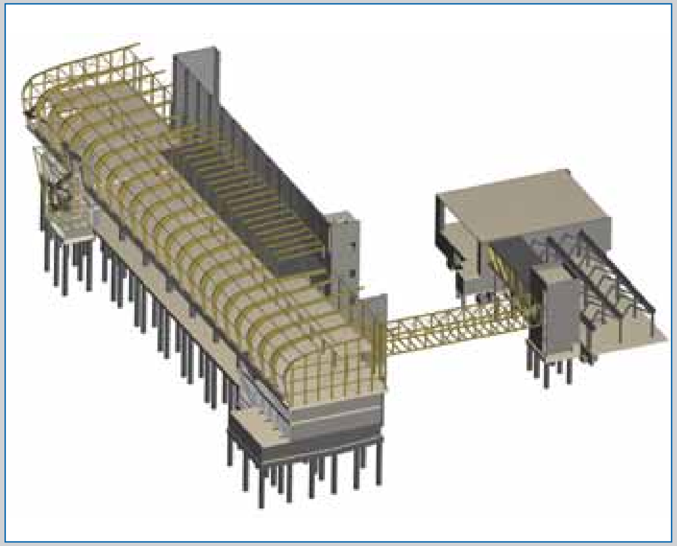
Die Konstruktion ist nach Theorie II.Ordnung berechnet worden unter Berücksichtigung der Knickformen.

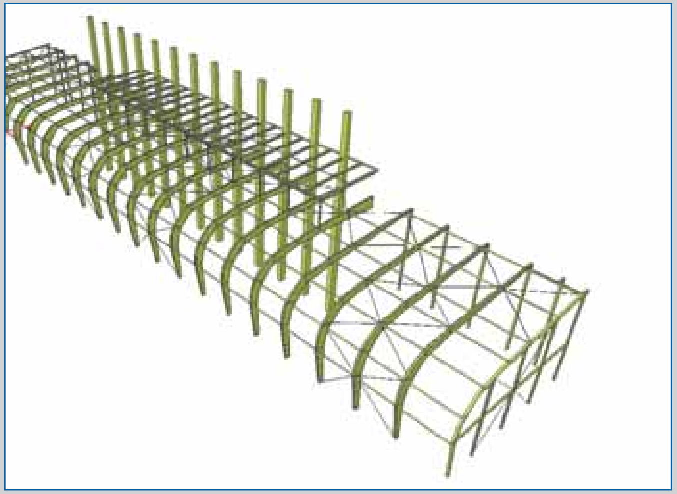
Ermittlung der Knickformen (Rahmen, Giebelwände, Verbände und Pendelstützen, ...)

Anhand der Lastfallkombinationen Th. I. Ordnung wird mittels Stabilitätskombinationen für jede Nichtlineare Kombination eine Knickform ermittelt, die in der Bemessung nach Th. II. Ordnung berücksichtigt wird.
In der Darstellung sind die auskragenden Stahlbetonstützen der Brandwand aus den ersten Berechnungen mit dargestellt.

Außer der Maschinenhalle wurden noch andere Gebäudeteile mit SCIA•ESA PT berechnet und bemessen :

- Ein ca. 25 m hoher Treppenturm.
- Eine Fördertechnikbrücke als Verbindung zum neuen Produktionsgebäude.
- Ein Überbau als Fachwerkträgerbrücke über bestehende Zufahrtsrampen im Betriebszustand.





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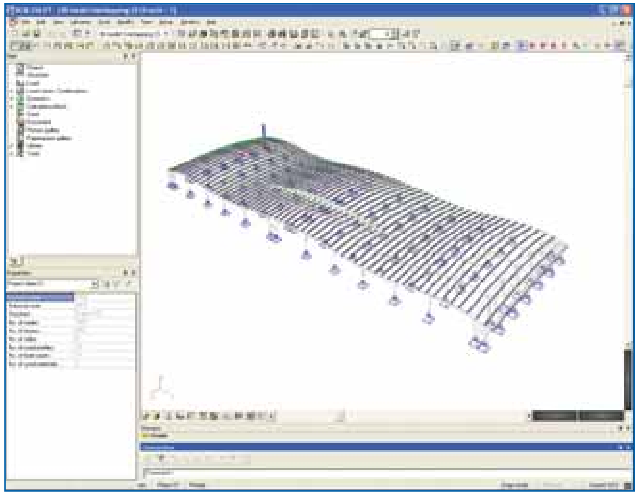
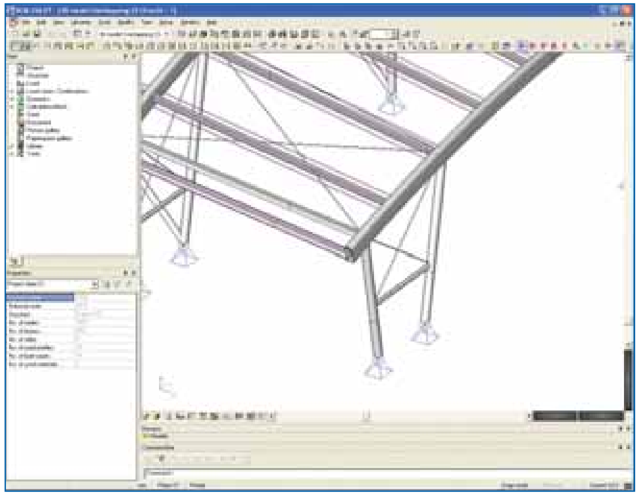
Kerngegevens

Movares is een dynamisch bedrijf, met een rijke historie, waar meer dan 1.400 professionals werken, met een omzet van ruim 140 miljoen euro.
Het hoofdkantoor bevindt zich in Utrecht. Movares bedient de lokale klanten vanuit vier regiokantoren in Zwolle, Weesp, Eindhoven en Zoetermeer.
In Europa zijn we aanwezig in Polen, Portugal en Duitsland.

Naamswijziging

Per 1 mei 2006 heeft Holland Railconsult haar naam gewijzigd in Movares. En niet zonder reden...
Holland Railconsult is geleidelijk uitgegroeid van een nichespeler tot een advies- en ingenieursbureau met een bredere scope. Daarbij staat de railsector nog steeds centraal, maar het is niet het enige segment waarin het bedrijf opereert. Zowel het element 'Holland' als het element 'Rail' in de oude naam dekten niet altijd meer de lading. We zijn steeds vaker actief in het buitenland, waar we al jaren opereren onder de naam Movares.
Movares roept associaties op met beweging en mobiliteit. In deze naam komt onze missie; vormgeven aan bereikbaarheid, passend tot uitdrukking.





Openbaar Vervoer Terminal Utrecht

Public transportation terminal

The design of Utrecht OVT has been made by Movares in co-operation with Benthem & Crouwel and was commissioned by ProRail, it will be carried out in phases. The integral station building will be able to handle up to 100 million travellers per year. The implementation will take place from 2007 up to 2012.
SCIA • ESA PT has been used to get the steel construction determined.
The main construction of the roof is made out of steel and consists of seven lines of curved beams supported by columns. Across these beams are mounted girders, which are curved in one direction. The roof is mounted on the girders. The platform where the people walk on is made out of concrete.

Used software • ESA

Inleiding

Het huidige gebouw van Utrecht Centraal heeft een capaciteit van 35 miljoen passagiers per jaar. Nu al verwerkt het station zo'n 55 miljoen reizigers per jaar. Dat aantal verdubbelt in de komende twintig jaar naar jaarlijks zo'n 100 miljoen reizigers. Het huidige gebouw kan deze aantallen niet verwerken. Ook heeft het station geen hoofdentree aan de Jaarbeurszijde van het station. Een dergelijk grote terminal met grootstedelijke allure vraagt een helder concept voor het afwikkelen van grote reizigersstromen waarbij bovendien alle publieksvoorzieningen geïntegreerd zijn.

De OV-Terminal, zoals het station in de toekomst heet, is qua omvang en vervoerswaarde het grootste station van Nederland. Waar Amsterdam airport en Rotterdam seaport van Nederland is, is Utrecht 'railport'. In de toekomst beschikt Utrecht over een integraal stationscomplex, dat binnen één gebouw de afhandeling en overstap regelt voor trein, tram, lokale en regionale bussen. De uitvoering van de OV-Terminal is gepland in de periode 2007 –2012. Omdat het station tijdens de ingrijpende vernieuwing volledig blijft functioneren, vindt de uitvoering in fasen plaats.

Ontwerp OV-Terminal

De OV-Terminal bestaat uit een betonnen vloerconstructie en een stalen overkapping. De betonnen traverse is een repetitie van betonnen kolommen onder moerbalken en PI-liggers die de moerbalken koppelen tot portaalconstructies. De grote overspanningen over de sporen gaat m.b.v. TT-liggers.

Omdat de stalen overkapping te divers is en niet opvalt tussen alle bebouwing is gekozen voor een geheel nieuw ontwerp. Dit ontwerp is gemaakt door Architektenburo Benthem & Crouwel.

Dak traverse

Voor de constructie van het traversedak is gekozen voor een hoofddraagstructuur bestaande uit 7 rijen stalen hoofdliggers opgelegd op stalen kolommen ter plaatse van de bestaande stramienen. De constructie is van staal in plaats van beton, vanwege het lage gewicht en de mogelijkheid tot grote overspanningen. Het constructieve ontwerp komt globaal overeen met de huidige constructie van de Markenhof-bogen, zij het dat niet alle oude steunpunten worden gebruikt. Hierdoor zijn de hoofdoverspanningen groter dan die van de bestaande situatie.

Ten behoeve van het (dubbelzijdig) gekromde dakvlak zijn de hoofdliggers enkelvoudig gekromd. Hierover worden in dwarsrichting de gekromde gordingen bevestigd. Deze worden tijdens de montage licht getordeerd.

Over de gordingen worden, conform de bestaande situatie stalen trapeziumvormige dakplaten aangebracht.

Ten behoeve van de enorme omvang van het dak en de daarbij behorende temperatuursuitzetting is het dak gedilateerd op twee plaatsen, zodat drie dakdelen ontstaan. De stabiliteit in dwarsrichting wordt gerealiseerd met een stalen trek-drukschoor per stramienpaar. In langsrichting is per stramien en per gedilateerd gedeelte een stalen stabiliteitselement voorzien. Dit stabiliteitselement bestaat uit twee kolommen gekoppeld d.m.v. een horizontale ligger en een windverband.

Ter plaatse van de daksnede, ook wel het "oog", is om architectonische redenen gekozen voor een stalen vierendeelligger tussen het hoge en het lage dakdeel. De hoofdligger splitst zich hier in 2 buizen die de boven- en onderrand vormen van de vierendeelligger.

Het dak wordt op diverse plaatsen van daklichten voorzien. Raveelliggers tussen de gordingen verzorgen de constructie hiervan.

De aansluiting met de Katreinetoren wordt voorzien met het op 100 mm van de gevel laten aansluiten van het nieuwe dak, om sneeuwophoping te minimaliseren. Er komt een bordes onder het dak als aansluiting op de verdiepingsvloeren van de Katreinetoren.

De brandwerendheid van de hoofddraagconstructie bedraagt 30 minuten en wordt bereikt door middel van de staalconstructie zelf. Vanwege de sprinklerinstallatie kon de brandwerendheid verlaagd worden met 30 minuten, vanwege de lage vuurbelasting nog eens met 30 minuten. Totaal dus 90 min.

Omdat rondom de traverse diverse hoogbouw aanwezig is wordt voorgesteld in de vervolgfase een windtunnelproef uit te voeren. Zo kunnen eventuele ongewenste effecten in kaart worden gebracht en de benodigde maatregelen worden voorzien. Onderzocht moet dan worden of de toegepaste windbelasting uit de norm voldoende is geweest.

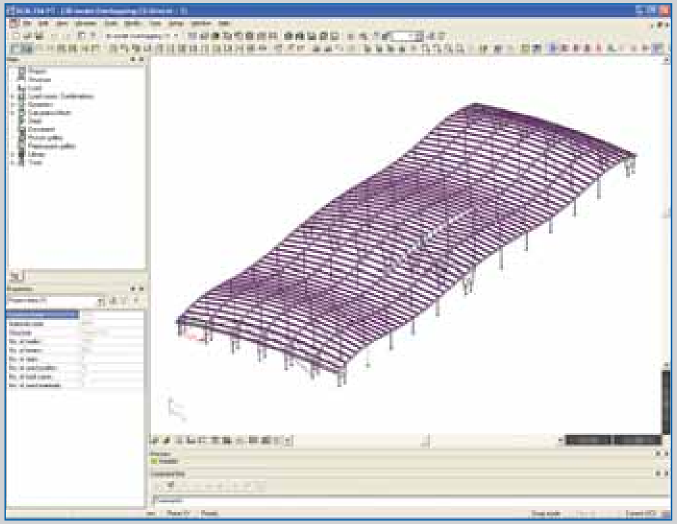
Gebruik van SCIA•ESA PT

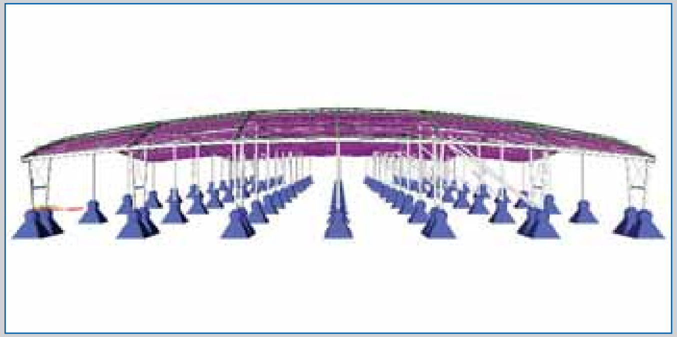
Voor de berekening van de stalen overkapping is gebruik gemaakt van het softwareprogramma SCIA•ESA PT omdat het dubbel gekromde dak 3-dimensionaal getoetst moet worden. Een model van de overkapping gemaakt in 3D Autocad is ingelezen in SCIA•ESA PT. Dit is aangevuld met alle gordingen en windverbanden en andere randvoorwaarden. Om de dilataties in de hoofdliggers te modelleren is gekozen voor scharnieren met de daarbij behorende randvoorwaarden.

Vanwege de windverbanden die alleen trekkrachten kunnen overbrengen, zijn deze dan ook als niet-lineaire elementen ingevoerd. De gebruikte resultaten waarop alle profielen zijn getoetst zijn afkomstig na niet-lineaire berekeningen.

Ook voor het bepalen van de kniklengte van de hoofdliggers is gebruik gemaakt van SCIA•ESA PT.

Dit geldt ook voor het bepalen van de eigen frequentie van de stalen overkapping.





High-Rise RC Building in New Street Square, London

Pell Frischmann

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Pell Frischmann and its subsidiary Conseco International are industry leaders since 1926 providing engineering consultancy services across a wide range of sectors. These include development, infrastructure, master planning, transportation, rail, water, energy, highways, environment, ports, airports and building developments for leisure, residential and commercial use.

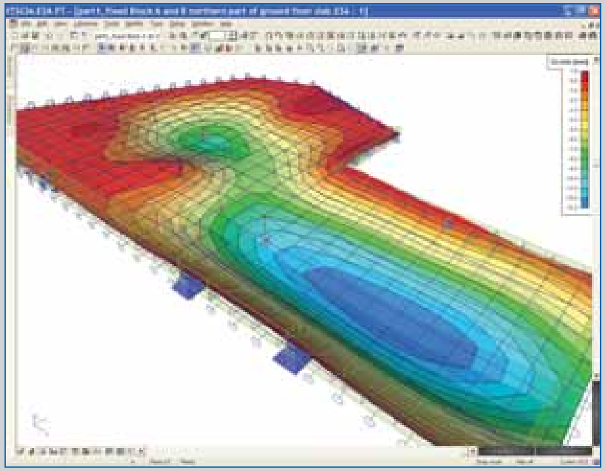
The company attributes its success to strong relationships with clients and partners who are valued contributors to the consultancy's expansion. The focus has been on developing a 'one-stop' presence in chosen markets through strategic alliances with private sector corporations and public authorities. Its continual commitment to innovate engineering has enabled the company to deliver major contracts both in the UK and around the world, notably in the Middle East. This paragraph briefly illustrates the horizon of clients Pell Frischmann works with.

Along with this Year's Queen's Award, the Firm's recent accolades include the coveted NCE/ACE Consultant of The Year Outstanding Achievement Award as well as a finalist certificate at the Quality In Construction Awards 2006. The company has also been recognized, through numerous awards, for projects including the new Home Office HQ in London, the A1 Darrington-Dishforth Highway and the highly innovative refurbishment of the Tay Rail Bridge in Scotland.

Other major projects undertaken by the consultancy include the 375 km^2 Aqaba Industrial Development near Abu Dhabi inspired by the vision of H.H. Sheikh Sultan Bin Zayed Al Nahyan. The company is involved in developing Dubai land, the world's largest proposed theme park, involving an unprecedented scale of planning and infrastructure works. It has also been making its mark in other overseas markets with commissions for the New Delhi Airport in India and the regeneration of the Historic Zone of Bucharest, Romania.

Pell Frischmann Awards Summary

- The Queen's Awards for Enterprise 2006
- Outstanding Achievement Award 2006 for exemplary work in the reconstruction of Iraq
- Winner of Certificate of Excellence by Concrete Society UK, November 2005
- Winner RIBA Award for Public Building Design 2005
- Winner Best Central London Development Award by London Development Agency, October 2005



Used software • ESA-Prima Win

The New Street Square site is an island site encompassing Bartlett Court and Pembroke Row in the north-south extremities and in the east-west extremities Printer Street and New Fetter Lane respectively.

The structural concept for the above site is divided into two sections:

Section 1 Sub-structure including Ground Floor Level, also called the Podium Deck.

Section 2 Superstructure which generally comprises 4 No. office buildings and a service building

New Street Square creates an impact on its surroundings rising boldly and with innovation to replace a cluster of post-war office blocks. It comprises five blocks of contemporary buildings, each with its distinctive characteristic complemented by a series of landscaped walkways.
For centuries in this part of the area the commercial impact has been large and it has been a stronghold of the legal profession, but now it will also be open to retail and provide a new focal point incorporating culture, entertainment and shopping to attract even more people.
This entry is focusing on 6 New Street Square, also referred to as Block A, which is the tallest of the five blocks with 17 storeys and faces onto the square with its dramatic and graceful architectural features. The building offers a total of 195,000 square feet of premium office accommodation.

Sustainability has been central to the design of the development with the holistic concept of social, economic and environmental sustainability guiding many of the key decisions. Although designed to the current Building Energy Regulations, the scheme aspires to approach the new regulations with an improvement of 15% in energy efficiency over the current target requirements.

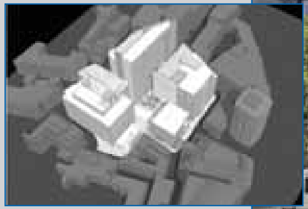
The main difficulties during this project were the existing retaining wall, existing pile foundation and the water pressure. It was a challenge to design new pile foundations for the entire job to avoid a clash with the existing. It required geotechnical expertise to utilize the capacity of the existing foundation as much as possible and to incorporate it into the new design. The requirement of large spans resulted in the use of post-tensioned slabs.

The SCIA software was used to undertake a global stability analysis and produce a preliminary design report. It was particularly important to gain knowledge about slab deflections, which was impressively easy to obtain by using the program.

With regards to the flat slab design at ground floor level the SCIA software was useful to evaluate Bending moment diagrams and reinforcement requirements for both ultimate and serviceability limit state design.

Detailed punching shear checks and designs were carried out using spreadsheets, which determined shear stressed around column supports. These stresses obtained were compared to results obtained from hand calculations. Using this approach provided a very reliable process of checking the design and evaluating the most economic structure.

The results obtained from the software have always been checked against manual calculations to check the validity of the output. Overall the program was a useful tool to have in order to enforce and ensure the correctness of manual hand calculations by incorporating the finite element approach.



High-Rise RC Building in New Street Square, London

New Street Square creates an impact on its surroundings rising boldly and with innovation to replace a cluster of post-war office blocks. It comprises five blocks of contemporary buildings, each with its distinctive characteristic complemented by a series of landscaped walkways.
For centuries in this part of the area the commercial impact has been large and it has been a stronghold of the legal profession, but now it will also be open to retail and provide a new focal point incorporating culture, entertainment and shopping to attract even more people:
Bars and Clubs: Match and St. John
Culture: Somerset House and Barbican Centre
Hotels: Renaissance and Waldorf Hilton
Restaurants: - Gaucho Grills and Rudland and Stubbs
6 New Street Square, also referred to as Block A, which is the tallest of the five blocks with 17 storeys faces onto the square with its dramatic and graceful architectural features. The building offers a total of 195,000 square feet of premium office accommodation.
2,3 New Street Square have been let by Deloitte. 5 and 6 New Street Square are available to let.
Sustainability has been central to the design of the development with the holistic concept of social, economic and environmental sustainability guiding many of the key decisions. Although designed to the current Building Energy Regulations, the scheme aspires to approach the new regulations with an improvement of 15% in energy efficiency over the current target requirements.

Profil du Futur

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PROFIL DU FUTUR
Groupe Arcelor

Frongia Filaire

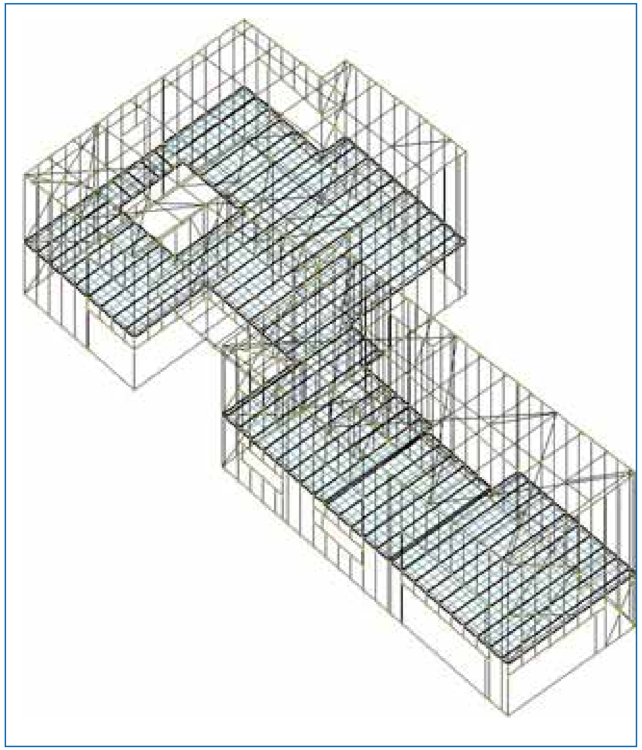
Filiale du groupe Arcelor-Mittal, Profil du Futur se distingue notamment par son activité dans le secteur de l'habitat.

Fort de son expérience par le biais de son système constructif à ossature acier, les procédés Styltech ® et Styltech Evolution ® s'inscrivent dans des programmes pavillonnaires et sur des ensembles ambitieux de R+2 à R+4.

L'utilisation de profilés minces galvanisés, de leurs assemblages par vis autoforeuses et/ou boulonnage laisse libre court à la créativité architecturale tout en permettant la réalisation de tout volumes, toutes formes et garantit un montage complet en filière sèche.

La légèreté, l'adaptabilité et la rapidité d'exécution sont quelques-uns des très nombreux avantages d'un concept structurel innovant et performant.

Implanté en France et de notoriété, les réalisations à l'export viennent nourrir les différents chantiers de références.



Used software • SCIA • ESA PT

Les spécifications

- Surélévation 2 niveaux
- Mezzanine intérieure
- Longueur : 23,10 ml
- Largeur : 10,50 ml
- Hauteur : 7,90 ml
- Ossature en profilés acier minces galvanisés de la gamme MULTIBEAM.

La réalisation a pu voir le jour grâce aux formidables propriétés mécaniques de l'ossature acier et à sa légèreté.

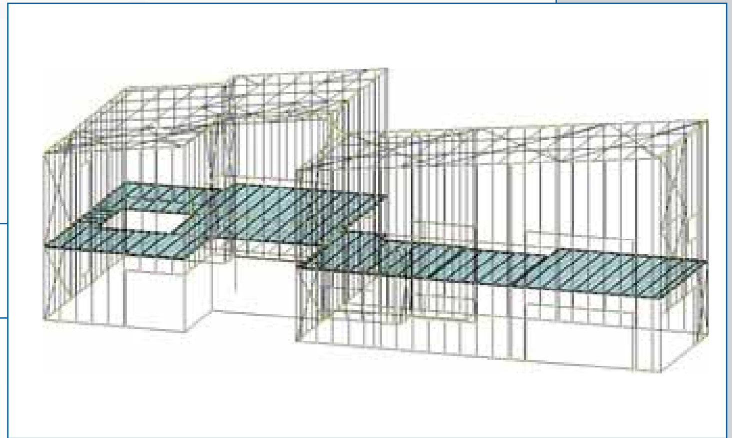
En effet l'optimisation des descentes de charges a permis de conserver les supports existants et de faciliter considérablement les éléments de levage et d'acheminement.

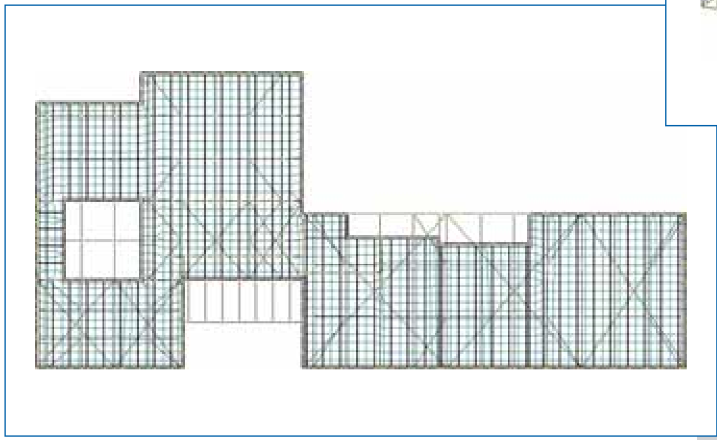
La conception et la méthodologie appliquées ont permis de réduire de manière significative le temps de montage tout en assurant une facilité de pose des interfaces (bardages, menuiseries, isolations,...).

L'ossature acier aura permis la création de deux duplex qui garantissent aux Maîtres d'Ouvrages une architecture privilégiant les volumes, la lumière et un confort de vie optimisé avec les possibilités de notre système constructif.

Slender steel construction in Longwy

Thanks to the tremendous mechanical properties and lightness of the steel skeleton, the realization could be conceived. The optimization of the descents of loads allowed to preserve the existing supports and to facilitate considerably the elements of lifting and routing.
The lightness, flexibility and speed of the execution are only a few of the many advantages of a concept that is structurally innovating and performing.
The time of assembly could be reduced considerably because of the conception and methodology. Two duplexes were created, the architecture privileges the volumes, the light and the comfort of life, all these features were optimized with the SCIA programs.





Rehabilitation Boulogne Billancourt

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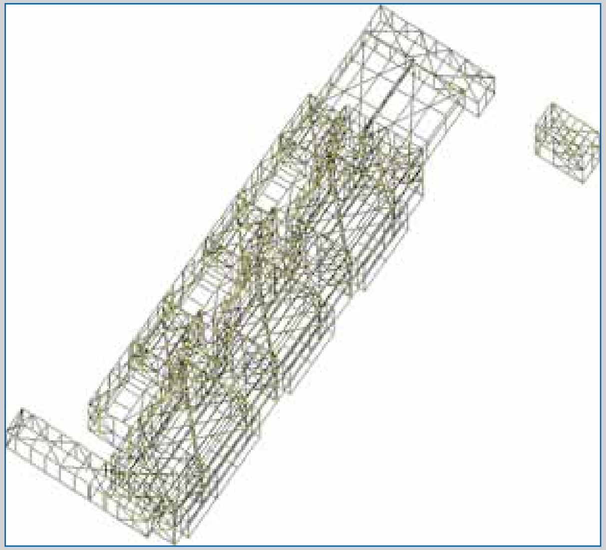
Fort de son expérience par le biais de son système constructif à ossature acier, les procédés Styltech ® et Styltech Evolution ® s'inscrivent dans des programmes pavillonnaires et sur des ensembles ambitieux de R+2 à R+4.

L'utilisation de profilés minces galvanisés, de leurs assemblages par vis autoforeuses et/ou boulonnage laisse libre court à la créativité architecturale tout en permettant la réalisation de tout volumes, toutes formes et garantit un montage complet en filière sèche.

La légèreté, l'adaptabilité et la rapidité d'exécution sont quelques-uns des très nombreux avantages d'un concept structurel innovant et performant.

Implanté en France et de notoriété, les réalisations à l'export viennent nourrir les différents chantiers de références.



Used software • SCIA • ESA PT

Les spécifications

Longueur : 39,00 ml
Largeur : 5,30 ml
Hauteur : 9,80 ml

Description

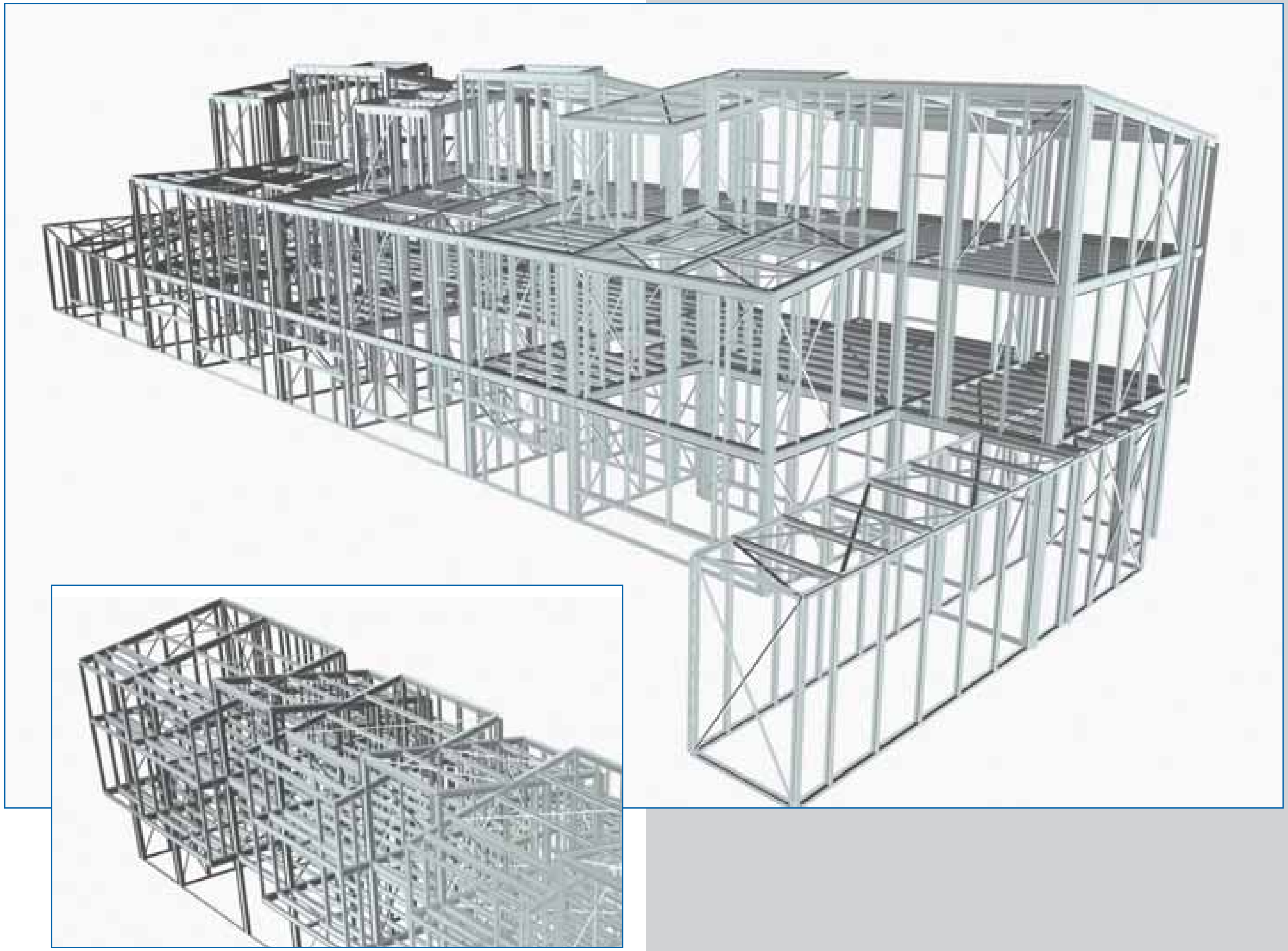
Situé aux portes de Paris dans une arrière cours, cette ouvrage bénéficie d'une utilisation ludique et optimisée de sa structure acier.

En effet, le challenge était de créer des volumes et des encombrements utiles tout en alliant des produits de hautes technicités.

Passages de gaines, hauteur sous plafond, encastrements des caissons de volets roulants,... les composants habillent naturellement et intelligemment les portiques et les profilés porteurs.

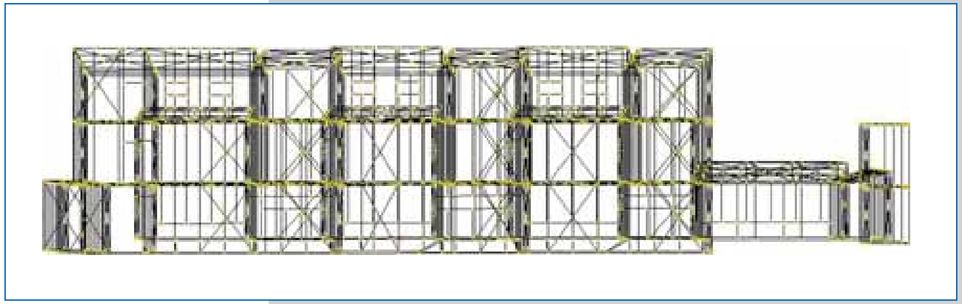
Le faible poids global de l'ossature acier aura permis une forte économie de budget des micros pieux. L'interface fructueuse entre la Maîtrise d'œuvre et le BET à réduit de manière très significative le temps de réalisation de cet ouvrage.

Le bâtiment dans sa finalité offre tout le confort thermique, acoustique et de sécurité que souhaitait le Maître d'Ouvrage vis-à-vis de ses clients.



Three adjacent building blocks, Boulogne Billancourt, Paris

This block has been realised in an inner courtyard in Paris.
It is very attractive due to a playful and optimized use of the steel structure. The challenge was to create volumes and spaces while allying high tech materials and products. Large elements cover the portals and profiles in a natural and intelligent way. A lot of time and money was saved resulting from the light weight of the steel skeleton.
The building looks nice and offers all thermal and acoustic comfort and safety, exactly what the client desired for his customers.



Reuby & Stagg Ltd

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Reuby + Associates was formed in 1984 and based in Poole until moving to its present location in June 2000. In July 2004 Reuby & Associates Ltd amalgamated with Roger Stagg Associates Ltd., Dartford, Kent formed in 1972, to form Reuby & Stagg Ltd., which operates from both Ringwood, Hampshire and Dartford, Kent.

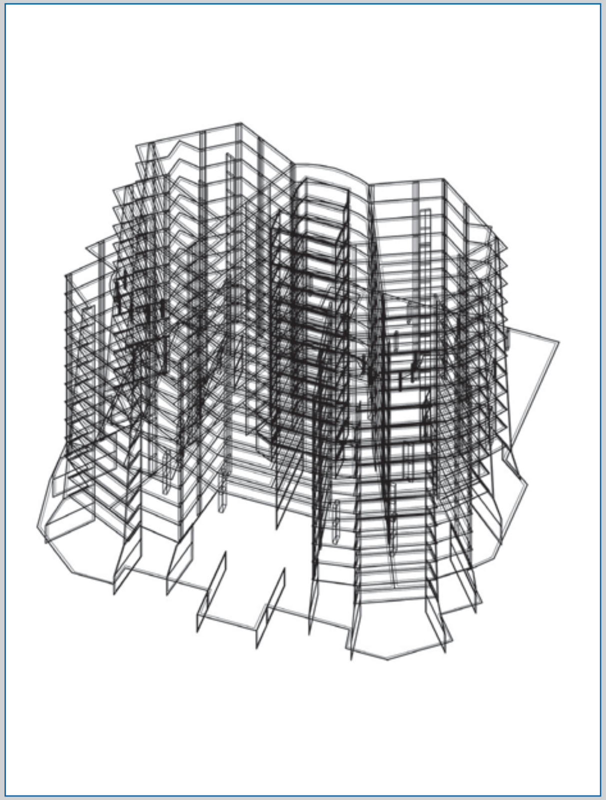
The company has an extensive experience in a wide range of structures covering residential, institution, commercial, industrial, medical and retail. We are familiar with all the common types of construction materials and have extensive experience in designing structures in concrete, both insitu and pre-cast, structural steelwork, timber and masonry. Our client base, which we work with on an ongoing basis, consists almost entirely of national plc companies and includes: Taylor Woodrow Developments, Barratt Developments, Miller Homes, Bluestone, Mansells, B&Q, Carillion, Linden Homes and Asda.

The practice has invested extensively in computerisation and all analysis, design and drawing production is by CAD systems. This investment has greatly increased the efficiency of the firm in terms of speed of production of working drawings and design, and also the efficiency and economy of the structures produced. We have been involved to a great extent with the residential market in low, medium and high-rise for private development companies and for housing associations, as well as a wide range of commercial developments.

These include:
- Sovereign Harbour, Eastbourne, Phase 6 - Prowting Homes
- Sovereign Harbour, Eastbourne - Westbury Homes/Taylor Woodrow Developments
- The Dell, Southampton - Barratt Southampton - redevelopment of Southampton Football Club
- Richmond Hill Bournemouth – Taylor Woodrow Dev - residential development of 98 apartments
- The Gardens, Eastleigh - Barratt Southampton/Eastleigh Housing Association
- Customs House – Barratt - 220 units Residential Development
- Lant Street, Bermondsey - A 7-storey concrete framed structure
- Thanet – Major Retail Development - Carillion Richardson Developments
- De Vere Grand Harbour Hotel, Southampton - A 5* hotel development.
- Blackwood Gwent - Mixed Food and non-food development
- Asda, Brynmawr - A major foodstore development
- Sainsburys, Maidstone - An 80,000 ft2 food store with parking for 450 cars
- B & W Loudspeakers, Worthing - A new production and warehouse facility
- Distribution Centre, Buckinghamshire - 38,500 sq.ft.

Used software • ESA-Prima Win

Landmark Residential Building in Bournemouth



Landmark Residential Building in Bournemouth

This landmark residential development situated at the top of Richmond Hill in the centre of Bournemouth was undertaken as a design/build contract with Taylor Woodrow Construction for client Taylor Woodrow Developments Ltd.

The building consists of thirteen stories above ground plus a basement level.

After careful consideration of the constraints imposed by the requirement to minimise the structural floor zones to keep within planning constraints, the irregular plan form of the building and the need to optimise the construction period, it was decided to use an insitu concrete frame up to 12th floor with structural steel framing for the penthouse. Careful attention was given to rationalising the reinforcement and concrete sections in order to simplify and speed the construction process.

Piled foundations were provided using continuous flight auger with a contiguous piled retaining wall to the perimeter of the basement where boundary constraints prevented the use of a conventional concrete retaining wall.

A final complication in the design of the foundation was the presence of a 1000mm diameter surface water sewer crossing the footprint of the building and the need to position piles to avoid surcharging the sewer with loads from the new construction.

The analysis needed to take account of the transfer of load from out of line columns above and below the first floor slab together with the enforced irregular pile locations. The arrangement of these stepped supports resulted in varying degrees of support to the upper floor slabs. The use of ESA-Prima Win enabled the whole structure to be modelled to provide an accurate and true reflection of the overall structural behaviour. Our experienced Chartered Engineers used the software to interpret the resulting distribution of moments in floor slabs and vertical load in columns to provide economic steel reinforcement quantities. Accurate values for punching shear were available to ensure all loads were safely transferred to foundation level where an economic arrangement of piled foundations was established.

Landmark Residential Building

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Ocean Boulevard - Large Mixed Use Development

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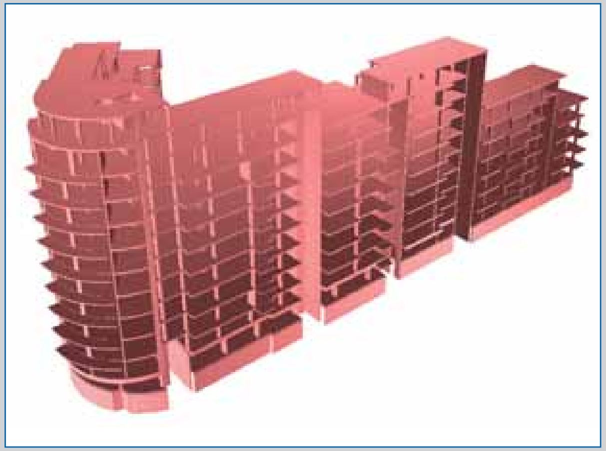

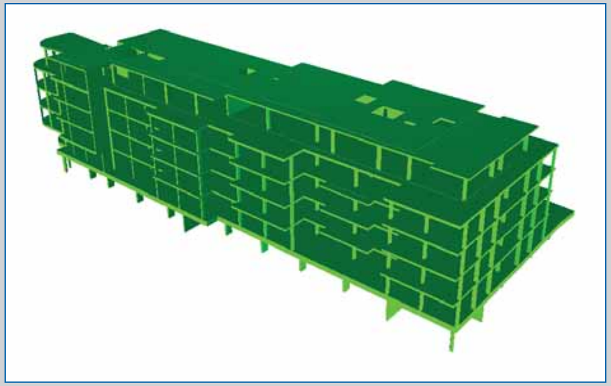

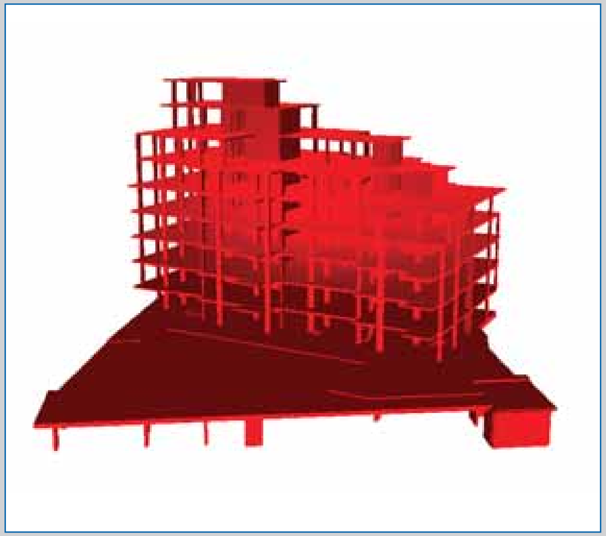

Used software • ESA-Prima Win

Ocean Boulevard - Large Mixed Use Development

This mixed use development in Southampton consists predominantly of luxury apartments with commercial units on the ground floor.

The proposed £13 million scheme currently takes the form of a U shape in plan, with a South facing courtyard, upper podium level and basement car park. The building steps up from 5 stories in the south to a 13 storey element located on the site of the existing Customs Building, with cascading south facing roof terraces, overlooking Queens Park and the sea.

Piled foundations using continuous flight auger have been utilised with a contiguous piled retaining wall to the periphery of the basement area. The super-structure consists of an insitu concrete frame designed as a flat slab reinforced with high tensile steel bars. Stability is provided by the concrete walls to the lift and core areas. External walls consist of an inner construction of blockwork with a masonry outer skin. The masonry is tied to the concrete frame using brick ties.

The attached folder provides a description, ESA-Prima Win extracts and photos of a 3 phase residential building for Barratt Southampton Ltd. This project is contained on numerous ESA-Prima Win files and no one file reflects the complete job.

The 2 separated jpeg files show a digital image of the model and the best of the site photographs. The Customs 1-2.gif file provides a 3D image of phases 1 and 2, note phase 3 is built in the foreground. Files 01.BMP to 06.BMP reflect phase 3.

ESA-Prima Win provided an accurate analysis of the whole structure, which produced quality information for the most economic piling requirements to be established. In addition, the design model provided frame moments and shears values from which the software, together with our experienced Chartered Engineers, were able establish the minimum reinforcement requirements.

Ocean Boulevard

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Royal Haskoning

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ROYAL HASKONING

Royal Haskoning: 11 divisies, in 26 landen, met 59 kantoren en 3200 medewerkers.

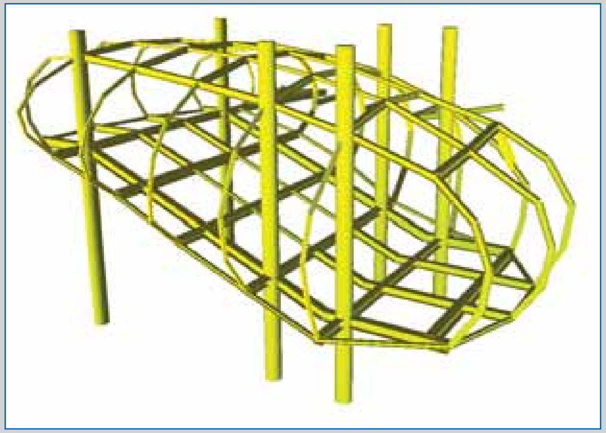
Royal Haskoning is een onafhankelijk, wereldwijd opererend, adviesbureau. De basis van onze onderneming werd in 1881 gelegd. Inmiddels zijn we uitgegroeid tot zo'n 3200 professionals. Opererend vanuit een technische achtergrond, bestrijken wij met onze adviesdiensten het brede veld van de interactie tussen de mens en zijn omgeving. Deze diensten zijn ondergebracht in de volgende divisies:

- Ruimtelijke Ontwikkeling
- Infrastructuur & transport
- Bouwmanagement & Advies
- Architectuur & bouw
- Gebouwinstallaties
- Industriële Installaties
- Milieu
- Water
- Kust & rivieren
- Maritiem
- Royal Haskoning Asia

Onze betrokkenheid met onze opdrachtgevers komt voort uit ons enthousiasme om gezamenlijk duurzame oplossingen te realiseren in een complexe, steeds veranderende maatschappij. De expertise en ervaring van onze specialisten in uiteenlopende vakgebieden verzekeren u dat alle technische, logistieke, juridische, organisatorische, bestuurlijke, sociale, milieutechnische en economische aspecten van uw project nauwkeurig worden bestudeerd, om vervolgens met praktische oplossingen te komen.

Royal Haskoning heeft diverse vestigingen, projectkantoren, dochterondernemingen en partners over de hele wereld. Daardoor kunnen wij op alle belangrijke markten ter plekke multidisciplinaire en geïntegreerde diensten aanbieden. Gecombineerd met onze persoonlijke dienstverlening dragen wij zo op een effectieve wijze bij aan een succesvolle voorbereiding, uitvoering en exploitatie van uw projecten en programma's.

Vrije Universiteit Amsterdam



Free university, Amsterdam

The structure of a new building was designed by Royal Haskoning for the Free University (VU) of Amsterdam . The building is very unique because of its round forms and complex system for the overall stability. Because there are only a few internal walls that can be used for the stability, the precast façade of the building was activated for this purpose. A 3D-model in ESA-Prima Win was used to determine which part of the horizontal wind loading was to be carried by the precast façade. The model was also used to determine the forces and bending moments needed to calculate the reinforcement in the precast elements.
A second model was made for the steel structure of the lecture-hall. The structure has very special round forms and hangs in a large vide of the building between six precast columns.

Used software • ESA-Prima Win

Inleiding

Voor de Vrije Universiteit Amsterdam verzorgde Royal Haskoning de constructie van de nieuwbouw van het Opleidingsinstituut Zorg en Welzijn.
Dit gebouw, ontworpen door Jeanne Dekkers Architectuur te Delft, maakt deel uit van het omvangrijke nieuwbouwprogramma van de Zuidas in Amsterdam en is zowel uit esthetisch als uit constructief oogpunt een bijzonder gebouw.

Projectomschrijving

De bouwput, in de eindsituatie kelder van het opleidingsinstituut, is met een voorgespannen betonnen damwand gerealiseerd. Naast de gebruikelijke functie van grond- en waterkering levert deze damwand tevens een groot verticaal draagvermogen. Hiervan is gebruik gemaakt door de damwand als funderingselement voor de gevelconstructie te gebruiken.

De binnenspouwbladen, kolommen en wanden zijn uitgevoerd in prefab beton. De gekromde gevel werkt als gevelbuis, doordat de penanten en lateien momentvast met elkaar zijn verbonden door middel van lasplaten, en zo in staat is het grootste deel van de stabiliteit te leveren. Het aantal wanden in het gebouw is daardoor tot een minimum beperkt wat de vrije indeelbaarheid ten goede komt.

De 12 verdiepingsvloeren bestaan uit bekistingsplaatvloeren met versterkte stroken. In de vloeren zijn grote vides opgenomen die ervoor zorgen dat zonlicht tot diep in het gebouw kan binnendringen. Voor de aansluiting van de zeer slanke kolommen op de prefab vloeren is een innovatieve oplossing ontwikkeld met geribbelde kolomkoppen die in de prefab vloerdelen zijn ingestort.

De draagstructuur van het dak is vanwege de vormgeving, hellend met rondingen in het horizontale en verticale vlak, als staalconstructie ontworpen. Bijzonder is de aansluiting op de bakstenen gevel die de rondingen van de dakopstand zowel horizontaal als verticaal volgt.

In een grote vide in het gebouw zweeft, hangend aan zes prefab beton kolommen, een collegezaal. De vormgeving ervan is vanwege zijn in alle richtingen gekromde oppervlak erg bijzonder.
Als draagconstructie is ook hier gekozen voor een staalskelet welke is ingevuld met een houtconstructie.

Betonskelet hoofddraagconstructie

Het gebouw heeft een complex stabiliteitssysteem bestaande uit betonnen lift- en trappenhuiswanden en een gevelbuisconstructie met daarin plaatselijk grote raamsparingen. Dit gecombineerd met de gewelfde peervormige plattegrond van het gebouw heeft er toe geleid dat er een ESA-Prima Win model is gemaakt. Geschematiseerd is de complete betonconstructie met 2D-macro's voor de bekistingsplaatvloeren en prefab wanden, en staafelementen voor de prefab kolommen. De gevelbuis is geschematiseerd door 2D-macro's voor de penanten te gebruiken en de lateien te schematiseren door middel van ribben aan de vloerrand. Doordat deze vloerribben door lopen over de breedte van de penant wordt de benodigde inklemming van de lateien op de penanten gerealiseerd.

Uit het model volgt welk deel van de windbelasting wordt afgedragen door de gevelbuis en hoeveel door de aanwezige wanden. Het blijkt dat circa 50% van de windbelasting op de langsgevels wordt afgedragen door de gevelbuis. Bij windbelasting op de kopgevels is dit circa 80%.

Het model bleek ook een goed hulpmiddel om de optredende belastingen in de prefab betonelementen over te dragen aan de leverancier van het prefab beton. Er zijn horizontale sneden gemaakt boven de vloer en onder de latei. Hierin is per penant de resultante van de snedekrachten opgevraagd en geëxporteerd naar een spreadsheetprogramma. Dit document is door de prefableverancier gebruikt om de elementen mee te wapenen.

Met de staafkrachten uit de lateien zijn de lasplaatverbindingen uitgewerkt en de lateien afgewapend.

Bij de verbinding tussen penant en latei is er voor gekozen de penanten verdiepingshoog door te laten lopen en de lateien er tussen te hangen. Ten behoeve van de dwarskracht zijn de lateien uigevoerd met een oplegnok. De oplegnok is ingelaten in de penant en zit daardoor in verticale richting opgesloten tussen de penanten van twee verdiepingen. De inklemmingsmomenten van de lateien worden overgedragen door aan de bovenzijde van de latei wapening op te nemen in de vloerrand en aan de onderzijde een trekverbinding te maken middels lasplaten.

Een ander opmerkelijk detail in de constructie is de verbinding tussen de breedplaatvloeren en de beton kolommen. De slanke prefab kolommen zijn gemaakt van hoge sterkte beton (B85). Bij normale stapeling zou daardoor een zogenoemd 'tompouce-effect' gaan optreden, waarbij de zachtere vloeren (B35) tussen kolomkop en bovenliggende kolomvoet weggedrukt en verpulverd zouden worden. Hiervoor is de ribbelkop bedacht. De verbinding met de betonvloeren wordt nu gevormd door een reeks ribbels van 35 x 35 mm in de kolomkoppen van de op elkaar gestapelde kolommen. Het systeem, dat ook bij betonpalen in onderwaterbeton-constructies wordt toegepast, is door de TU-Eindhoven getest.

Staalskelet collegezaal

Het staalskelet van de collegezaal hangt aan zes doorgaande prefab kolommen en kraagt ten opzichte van deze kolommen in alle richtingen uit. Om inzicht te krijgen in de stijfheid van de constructie is ook hiervan een ESA-Prima Win model gemaakt. Het model is tevens gebruikt om de optredende staafkrachten te genereren.
Om de momentvaste verbinding van het staalskelet aan de prefab kolommen te bewerkstelligen zijn stalen buizen opgenomen in prefab kolommen. Hierover werd in het werk een stalen kraag geschoven die werd vastgelast op de stalen buis. Tegen de stalen kraag konden de staalprofielen momentvast worden vastgebout.

Het gekromde oppervlak van de collegezaal is bereikt door het staalskelet uit te timmeren met houten ribben met daarop multiplex-delen. De buitenzijde van de collegezaal is afgewerkt met een pleisterlaag terwijl de binnenzijde van de collegezaal met textiel is bekleed.

SBE nv

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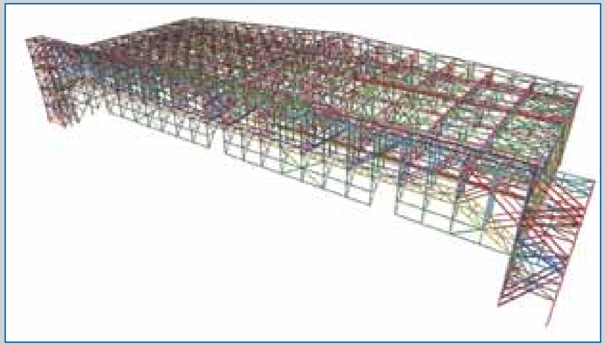
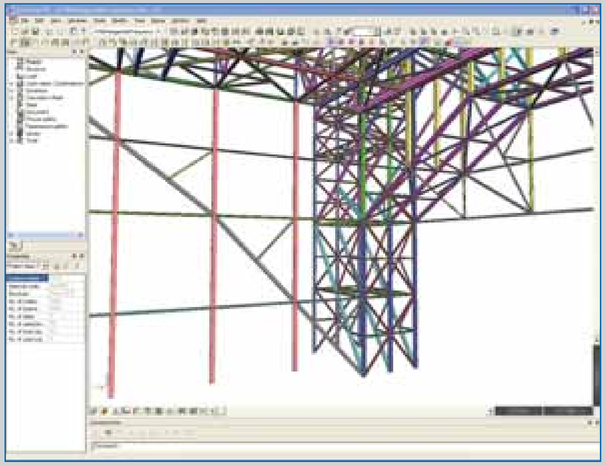
Vliegtuigloods Maleisië





Vakgebieden & specialisaties

Havenbouw: kaaimuren - sluizen; aanlegsteigers; dijken & oeverbescherming; renovatie.

Burgerlijke bouwkunde & gebouwen: algemene stabiliteitsstudies; speciale funderingen & geotechniek; bruggen in staal, gewapend beton & voorgespannen beton; tunnels, riolering- & wegeniswerken; eco-engineering.

Staalconstructies: ontwerp - berekeningen - overzichtstekeningen; werkhuistekeningen CAD - 3D.

Geotechnische & hydraulische modellering: 2D & 3D geotechnische modellen; 2D & 3D grondwaterstromingsmodellen; 1D, 2D & 3D rivier-, kust- en sedimentsimulaties.

Referenties

Havenbouw: Albertkanaal: diverse kaaimuren; containergetijdedok "Waaslandhaven"; verbetering waterkering Afgedamde Maas; Containerkade Noord Antwerpen; aanlegsteigers voor scheepvaart Linker Oevergebied Antwerpen en op de Schelde; Leie Doortocht Kortrijk; nieuw sluizencomplex Panamakanaal; nieuwe sluis Haven van Sevilla; restauratie en herstellingswerken van kaaimuren, sluizen en droogdokken (Zennegatsluis, D'Herbouvillekaai, droogdok Cadiz).

Burgerlijke bouwkunde & gebouwen: Petroleumbrug Antwerpen; Muidebrug Gent; tunnel onder startbaan Zaventem; Tunnels HSL: Centraal Station Antwerpen & Berchem: ondertunneling bestaande sporen; Bureelgebouw en parking Lieven Bauwens Gent; voorgespannen brug over de Leie te Wielsbeke; Appartementsgebouw Parklane II Gent; Parking Astridplein Antwerpen; Mercedes garage Sint-Niklaas; Brug te Halle; Waasland Shopping Center; Commercieel gebouw Wilma; HST-lijn Brussel-Amsterdam - diverse vakken; nieuwe Boulevardbrug Willebroek; Brug westelijke tangent Sint-Niklaas.

Staalconstructies: Verzinkingslijn met koeltoren Sidmar; Kontinugieterij 2; HQ2 Canary Warf; Efteling Kaatsheuvel Nederland; industriële gebouwen Baudour Frankrijk; diverse installaties op Petrochemische bedrijven zoals BASF, 3M, Solvay; Vliegtuigloods München; Denox-installaties Harelbeke, Houthalen, Brugge, Brussel; LNG-plant Hammerfest.

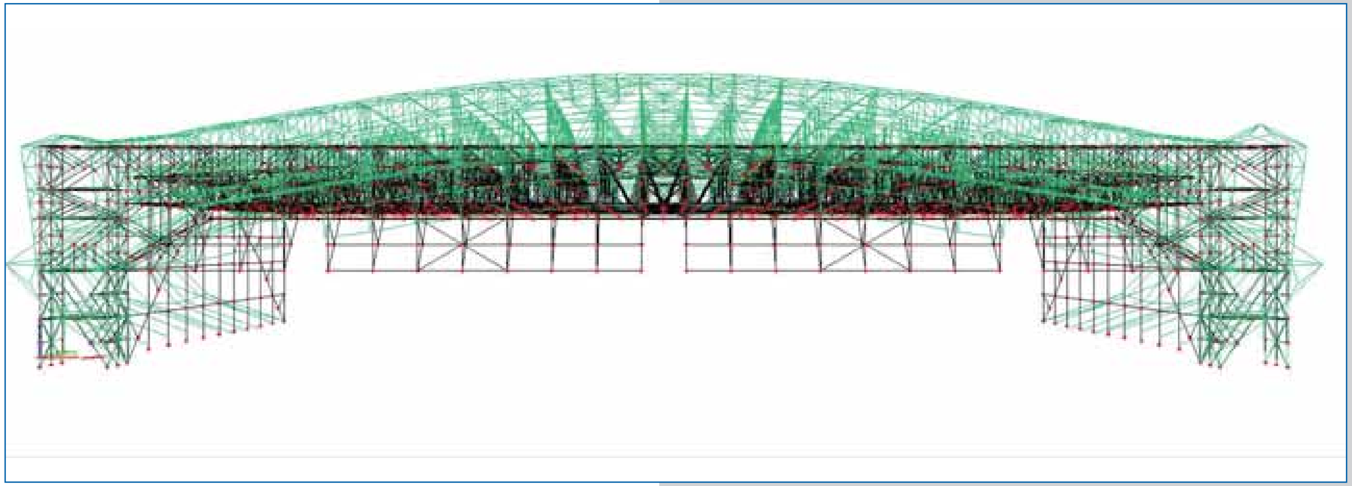
Geotechnische & hydraulische modellering: Leveren & ijken van numerieke modellen Scheldebekken Antwerpen; Grondwaterstromingsmodel & zettingsberekeningen Antwerpen Containerdok-West; Stabiliteitsberekening caissons Containerkaai Zuid Antwerpen met 3D model; Uitvoeringsstudie Deurganckdok; Stabiliteitsnazicht kaaimuur Verrebroekdok Antwerpen; optimaliseren wachtbekken Webbekom; ontwerp leefbaarheidsbuffer Doel.

Middelen

SBE werkt met een 35-tal medewerkers voornamelijk projectingenieurs, studie-ingenieurs en tekenaars.

Historiek

Reeds een 15-tal jaren profileert SBE zich als bouwkundig ontwerper met, afgezien de klassieke stabiliteitsopdrachten, een specifiek accent op water- en havenbouw, geotechnische problemen, staalstructuren en funderingstechnieken.



Used software • ESA-Prima Win

Gebouw

Onderhoudsloods voor de simultane onderhoudswerken aan 2 vliegtuigen van het type Airbus A380 en een kleiner model vliegtuig van het type Boeing 737 voor de luchthaven van Kuala Lumpur te Maleisië.

Aan het dak hangen grote werkplatformen die in het geval van onderhoud van een vliegtuig rondom het vliegtuig gepositioneerd worden.

Doel studie

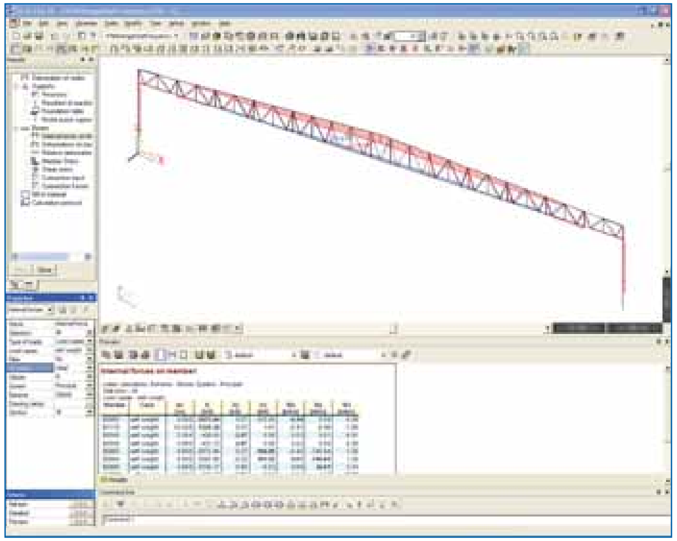
Optimalisatie van het staalgewicht voor de aanbesteding in opdracht van de staalconstructeur.

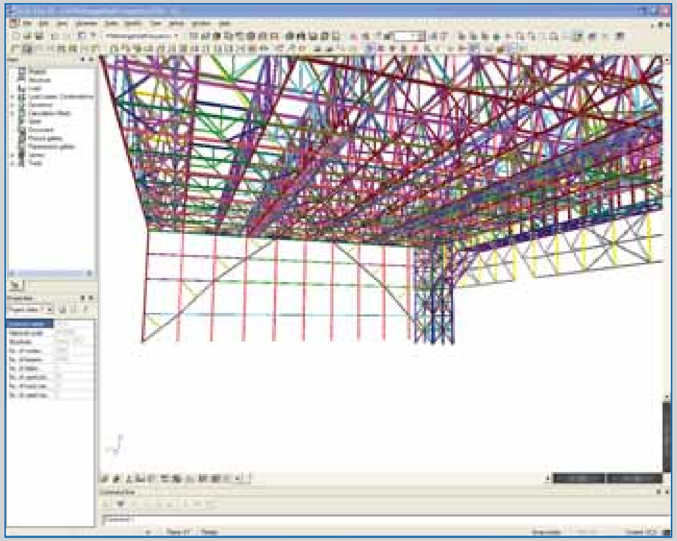
Voor deze structuur is het staalgewicht van het dak de voornaamste verticale last. Meer dan in een ander project is de optimalisatie van het dak een iteratief proces. Optimalisatie van het dak levert een gewichtsreductie op die opnieuw aanleiding geeft tot een fundamentele optimalisatie. Dit alle gezien de enorme overspanningen.

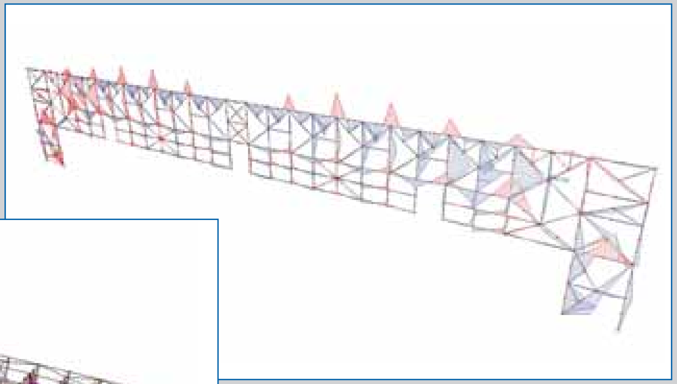
De uiterst lichte structuur als resultaat van deze oefening moet dan getoetst worden, voor wat betreft eigenfrequenties. Een te lage eigenfrequentie heeft een meer complexe dynamische studie van de windbelasting tot gevolg.

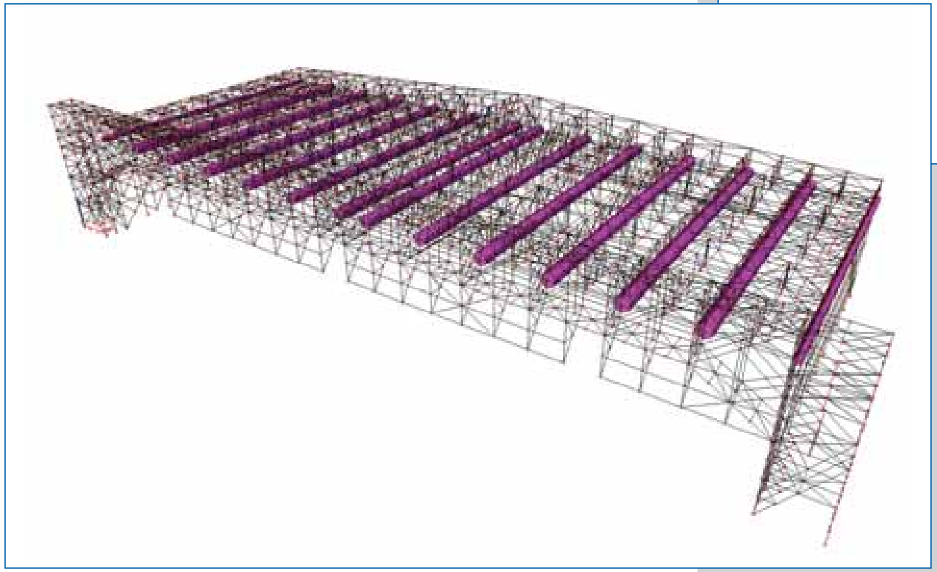
Gebruik ESA-Prima Win

Optimalisatie van het staalgewicht gebruik makend van de module “steel code check” volgens de British Standard.
Bepalen van de eigenfrequentie van de vliegtuigloods.









Airport hangar for A380 in Malaysia

The project regards a preliminary study concerning a shed for the Airbus A380 and the Boeing 737 at the airport of Kuala Lumpur in Malaysia.
In this shed, the maintenance of these two types of airplanes will be provided; to this end large work platforms are positioned at the ceiling, these platforms can be repositioned according to the needs.
The purpose of the study is an optimisation of the steel weight. For this structure the steel weight of the roof forms the main vertical load, the optimization is an iterative procedure. Optimisation of the roof produces a fundamental weight reduction, this in view of the enormous span of the shed.

Sigma Projekt d.o.o.

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SIGMA PROJEKT d.o.o.

Poduzeće Sigma Projekt d.o.o. osnovano je 1990 godine u Splitu.

Registrirano je za obavljanje poslova projektiranja, nadzora, gradnje i savjetovanja.

Područje naše djelatnosti je projektiranje svih vrsta objekata u visokogradnji i niskogradnji. Specijalizirani smo za proces proizvodnje i montaže armirano betonskih predgotovljenih elemenata za objekte industrijske, prodajne i rezidencijalne namjene.

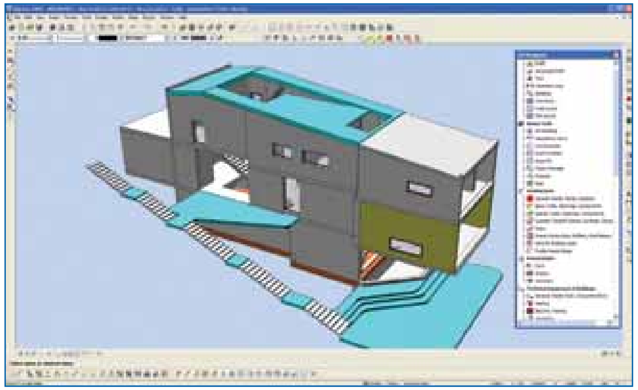
Danas zapošljava više od 12 djelatnika na poslovima projektiranja i praćenja projekata od kojih je većina visoke stručne spreme.

Ono s čime se možemo pohvaliti je da smo uspjeli povezati višegodišnje iskustvo iz područja graditeljstva sa najmodernijim tehnologijama, kako u proizvodnji tako i u projektiranju, a ono što nam daje poticaj za dalje je jasna vizija budućeg razvoja i usavršavanja.

Danas koristimo najmoderniju programsku podršku svjetskih proizvođača Nemetschek i Scia za projektiranje u graditeljstvu te s njima ostvarujemo za do danas nezamislive rezultate u smislu kvalitete cijelokupnog projekta ali i u brzini njegove izrade.

Ponosno naglašavamo da podjednako možemo zastupati sve građevinske materijale u konstrukciji, kako beton tako i čelik i drvo. Pratimo svjetske trendove i dostignuća pa tako kao posljednju novost možemo ponuditi projektiranje, proračun i ugradnju naknadno i prethodno napregnutih visokovrijednih čeličnih kablova u armirano betonske konstrukcije čime postižemo veće raspone i niže međuetažne konstrukcije.

Sigma Projekt d.o.o. je između ostalog i edukativni centar, koji u suradnji sa fakultetima u Hrvatskoj , obogaćuje znanje i primijenjene vještine projektiranja mladih studenata građevine u Hrvatskoj.



Cantilever construction, Croatia

The characteristic of this project was that at one place we have a connection of a concrete and steel structure built on waek soil. The steel construction is one big cantilever construction that streches almost 8 meters in length and is composed of two floors and a roof. The floor is a composite structure of HEA profiles and a concrete slab. SCIA • ESA PT helped us to combine all these materials and to analyse it. The dynamic analysis was performed along with the static analysis. The results were clearly presented in the document. Concrete and steel were designed to the current croatian national code HR ENV, in which automatic generators of combinations and the seismic spectrum were very helpful.
SCIA • ESA PT in collaboration with Allplan helped us to answer all requests.

Obiteljska vila u Zagrebu

Used software • SCIA • ESA PT, Allplan Engineering

Promatrani projekt obuhvaća oblikovanje, proračun i dimenzioniranje obiteljske vile na Pantovčaku u Zagrebu. Na padinama Pantovčaka arhitektonski studio 3LHD osmislio je lijepu rezidencijalnu vilu koja se svojim oblikom uklapa u okoliš i zadovoljava sve moderne zahtjeve obitelji koja će živjeti u njoj.
Kontrola i vođenje projekta povjereni su iskusnom poduzeću BBiS iz Zagreba.
Uloga Sigma Projekta (u ovom projektu) je bila da sudjeluje u oblikovanju te napravi proračun i dimenzioniranje konstrukcije.

Tijekom izrade projekta nailazilo se na niz problematičnih situacija koje je trebalo riješiti na inovativan i inženjerski način stoga je i sam proces bio vrlo zanimljiv i neuobičajen za ovakav tip objekta.

Objekt je smješten na padini u glinovitom tlu. Bilo je jako bitno i interesantno promatrati utjecaj objekta na tlo i međusobnu reakciju. Za objekt je bilo jako bitno izbjeći i ukoliko se pojave preuzeti diferencijalna slijeganja. Pri promatranju interakcije tlo-objekt od velike je pomoći bio SCIA•ESA PT modul „esas.06 soil interaction". Objekt je temeljen na temeljnim pločama, a SCIA•ESA PT 2006 nam je omogućio jednostavno i brzo modeliranje tih temeljnih ploča i tla kao elastičnih opruga Winklerovog modela. Opruge mogu biti modelirane sa nelinearnom krutošću ukoliko model to zahtjeva.

Sam objekt se sastoji iz dvije konstrukcijske cjeline. Armirano betonskog dijela koji se uzdiže iznad a.b. temeljne ploče i čini glavninu objekta te i iz čelične spregnute dvoetažne konzole.

Objekt je u tlocrtnom pogledu razvijen uzdužno u smjeru padine. Ukupna dužina objekta je cca 30 m, a širina je promjenjiva i iznosi od 8,0 m do 7,5 m.

Tlocrtno gledano zidovi čine vanjsku ljusku koja obima objekt. Samih nosivih zidova unutar raspona objekta nema. Dakle etažne ploče su oslonjene po rubovima uz dodatne otvore za vertikalne komunikacije. Zbog takvog konstrukcijskog oblikovanja i seizmičkog područja u kojem se nalazi objekt bila je nužna detaljna analiza dinamičkog ponašanja konstrukcije na seizmičke sile.
SCIA•ESA PT omogućuje vrlo jednostavnu konverziju statičkog opterećenja u mase za seizmičku analizu. Također od velike pomoći je i automatski generator seizmičkog spektra koji poštuje naše aktualne propise ENV 1998.
Rezultati proračuna prikazani su u jednostavnom grafičkom okruženju. Od velike važnosti bila je mogućnost interpretacije različitih rezultata i njihova kvalitetna transformacija na 2D plohu papira. SCIA•ESA PT odgovorio je svim potrebama i prikazao rezulatate grafički i tablično.

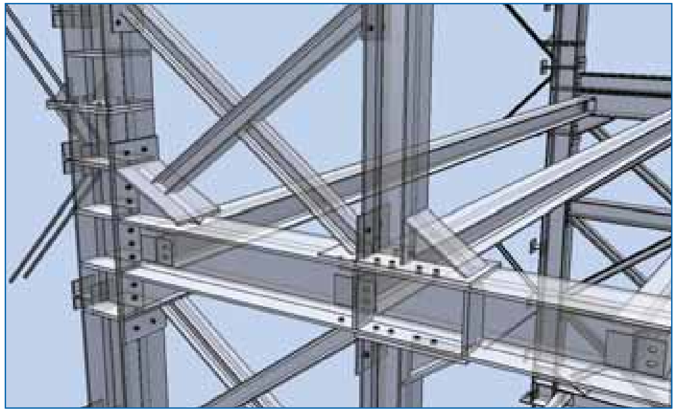
Dimenzioniranje armirano betonskog dijela napravljeno je poštujući aktualnu normu ENV 1992. Bitno je napomenuti da SCIA•ESA PT već sada podržava i buduću hrvatsku normu EC.

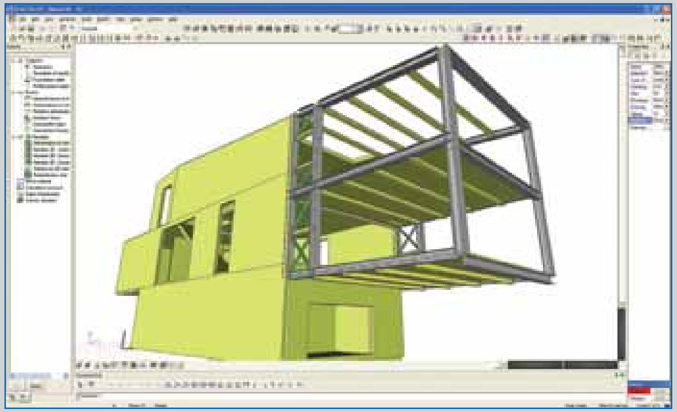
Tijekom razvoja projekta konstrukcija je doživjela niz promjena. Dodani su novi otvori, sama nosiva konstrukcija doživjela je niz manjih promjena itd. Jedino sa modernim alatom kao što je SCIA•ESA PT moguće je odgovoriti na vrijeme i pratiti takav dinamičan razvoj projekta. SCIA•ESA PT posjeduje dinamičku vezu sa već kreiranim dokumentom, što znači da nakon što smo dodali novi otvor i uklonili jedan nosivi zid ne moramo slagati ispočetka novi dokument. Oduševljeni smo mogućnošću regeneracije postojećeg složenog dokumenta sa novim izmjenjenim rezultatima. S tom opcijom moguće je generirati niz konstruktivnih rješenja uz minimalno truda.

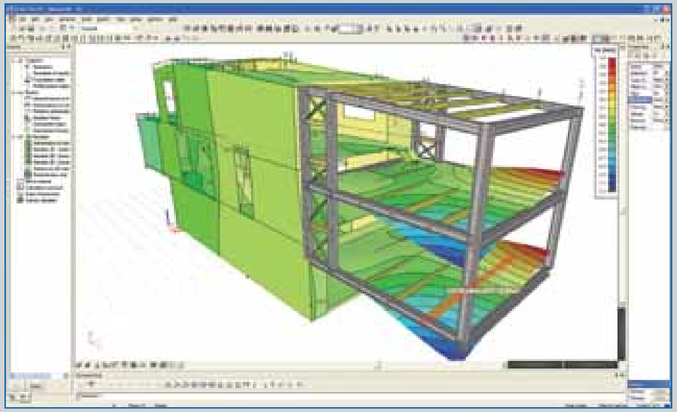
Drugi dio konstrukcije čini vrlo zahtjevna čelična konzolna istaka. Ona je dodatak na armirano betonsku konstrukciju. Dužina konzole iznosi promjenjivo od 7,5 do 8m. Osim što je velike dužine konzola je i dvoetažna. Konstruktivno konzolu čine HEA 300 konzolni štapovi ukrućeni rešetkom koja je spregnuta sa betonskom konstrukcijom. Etaže čine spregnute armirano betonske ploče spregnute za poprečne HEA 200 štapove. Svi spojevi su vijčani.

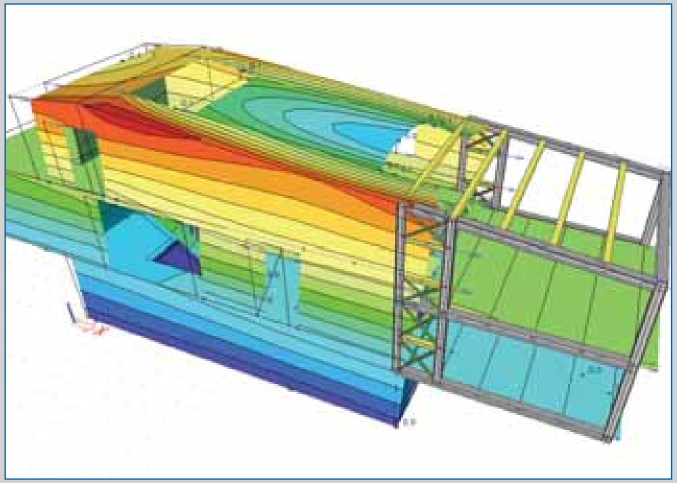
Tu je bila potrebna velika preciznost pri izradi CAD modela jer su čelični elementi pripremani u tvornici i pocinčani. Samim tim bilo je potrebno izbjeći bilo kakve naknadne intervencije nad čeličnim elementima. Ono što nam je puno pomoglo je veza između programa SCIA•ESA PT i Allplana. Cijela konstrukcija je izmodelirana do zadnjeg detalja u Allplanu kao 3d model. Podloga za taj 3D model bio je statički model iz SCIA•ESA PT-a. Potpuna optimizacija konstrukcije može se postići modelirajući stvarni spoj između dva čelična profila. Takav spoj u SCIA•ESA PT uzima u obzir stvarnu popustljivost što se može očitati kroz M-f dijagram. SCIA•ESA PT je potpun proračunski program i tako nudi potpunu provjeru svih čeličnih djelova konstrukcije pa tako i vijaka i čeličnih spojnih pločica. Proveden je i proračun otpornosti konstrukcije na požarno djelovanje uzimajući u obzir zaštitu.

SCIA•ESA PT pružila nam je jak alat za brzo i precizno modeliranje, proračun i dimenzioniranje te izradu tehničke dokumentacije kako betonske tako i čelične konstrukcije.









Ingenieursbureau Stendess N.V.

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Website	www.stendess.com

Covering of cinders' box - Ugine & ALZ Arcelor Group

A steel and concrete engineering company

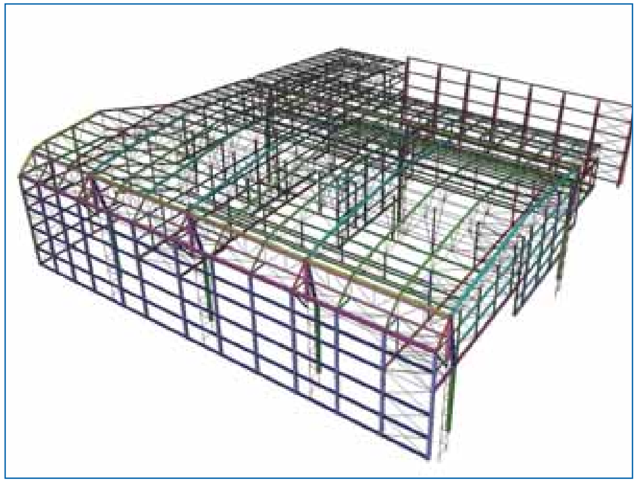
The engineering firm Stendess was founded by an experienced team specialising in the study and design of steel constructions. From its establishment in 2002, Stendess has made high quality and full service provision its top priority. Thanks to this integral service, where the design of the metal superstructure and the concrete substructure are calculated and drawn by experts in the same office, the building owner and principal contractor retain 100 % control over the complete structure.

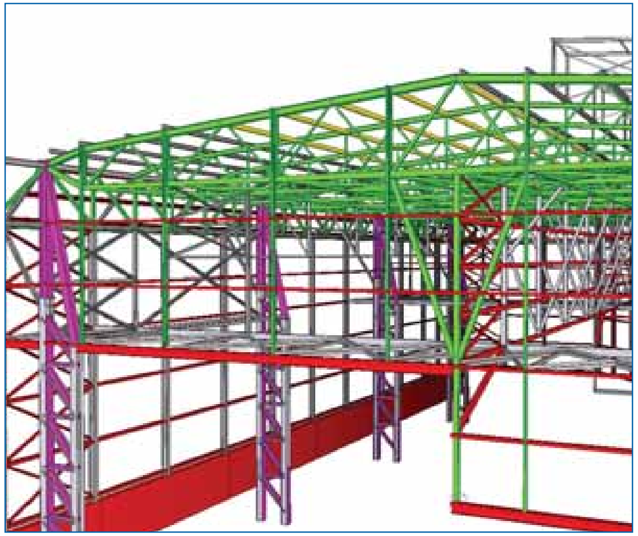
Stendess can follow up on cross-border projects in accordance with most standards and codes: Eurocode, NBN, NEN, DIN, NF, AISC, Britisch Standards and specific national codes.

Key activities

- Industrial buildings: steel factories, power plants, depots, etc,
- Other buildings: service buildings, concert halls, sport facilities, swimming pools, apartment buildings,
- Bridge constructions: arch bridges, cable –stayed bridge, suspension bridges, bascule bridges, swing bridges, orthotropic bridge, mixed steel-concrete bridges,...
- Off-shore projects: lock gates, Roro, oil rigs, ...
- Industrial equipment: silos, cranes, craneways, storage tanks,...
- Erection engineering: longitudinal and transverse repositioning, skidding, lifting, bridge launching...

Locations of the constructions: Belgium, the Netherlands, France, Germany, United Kingdom, Spain, Sweden, Saudi Arabia, Greece, Singapore, Chili, Brasil, Cameroun, Russia, Thailand ...





Used software • ESA-Prima Win

Project: Covering of cinders' box - Ugine & ALZ Arcelor Group
Location: Genk, Belgium
Owner: Ugine & ALZ Belgium N.V.
Engineering office: Ingenieursbureau Stendess N.V., Lovendegem, Belgium
Contractor: Frijns Industrial Group, Netherlands
Total steel weight: ± 400 tons
Building period: middle 2006
Dimensions: height: ± 20 m
Overall length: ± 80 m
Overall width: ± 60 m

Short description of the project

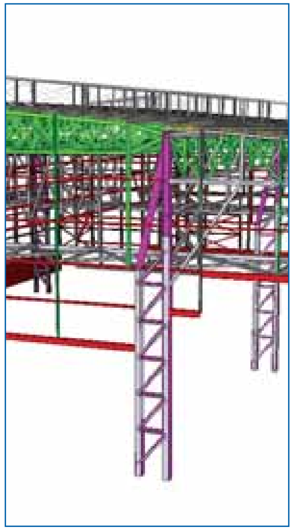
In order to concentrate and evacuate the gasses during the dumping and storage of the cinders, a building to cover the cinder boxes had to be designed and built.
The building consists of different hanging boxes, which are separated by hanging steel sheet walls.
One of the critical restraints in the design was that the amount of columns had to be minimal and that existing foundations were to be used. This resulted in a building of ± 80 m by ± 60 m supported by only 7 main columns and consisting of hanging external and internal walls.

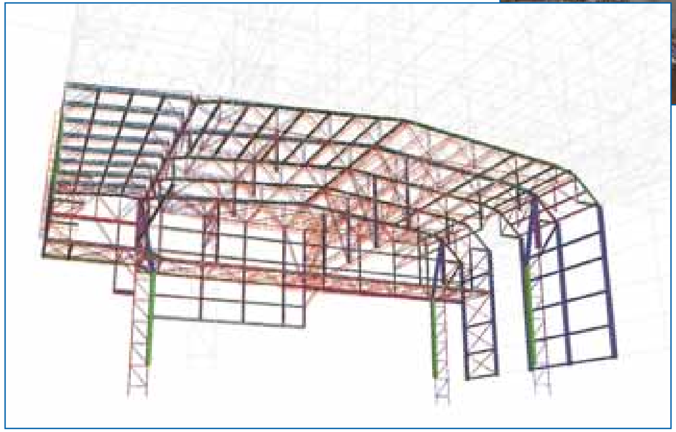
Use of ESA-Prima Win

Description of technical questions to be solved with ESA-Prima Win
The challenge in this project was to design a low budget steel construction taking into account the existing foundations and the severe restrictions that were to be met such as a minimal number of columns (7 main columns), maximum free height inside the boxes and the maximum use of existing steel profiles.
Because of the great amount of braced structures a non-linear calculation was needed.
Finding the balance between a low cost structure and taking into account the severe restrictions was a high creative demand in the static layout and the dimensioning of the structure.

Description of our experience with ESA-Prima Win when realizing the project.
For this project ESA-Prima Win proved its power to calculate at highspeed large structures with a great number of elements and a great number of combinations.
More, ESA-Prima Win proved that even for large structures the non-linear calculations could be done in an acceptable way and time.

Used modules:
- Base
- 3D frame
- Non linear calculations
- Steel code check (EC3)



Covering of cinders' box

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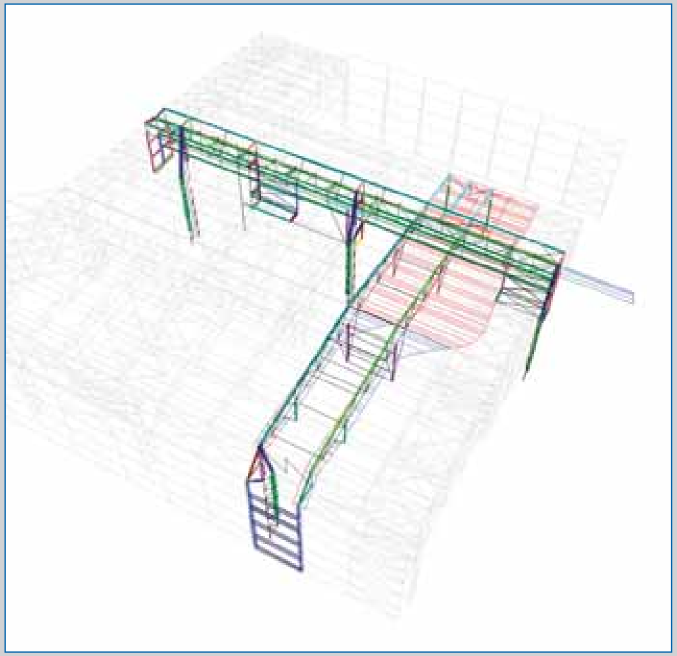

STRUCTO nv

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SPANBETON STRUCTO BETON PRECONTRAINT

Aanbouw Volvo Cars Gent - GA 1

In 1948 richt de familie De Clercq de vennootschap Constructo op, die kort daarna de nieuwe naam Structo krijgt toegewezen. Twee jaar na de oprichting start de productie aan de Noorweegse Kaai.

Geleidelijk aan verhuizen de productiehallen naar de nieuwe vestiging aan de Steenkaai, strategisch gelegen aan het kanaal Brugge-Oostende. In 1988 zijn reeds vier productiehallen operationeel aan de Steenkaai.

Beton is niet meer weg te denken uit de bouwwereld. Sinds 1948 specialiseert Structo zich in de prefabricatie van betonnen elementen. Structo speelde een pioniersrol in eigen land bij de introductie van spanbeton en wist ook in het buitenland een ijzersterke reputatie op te bouwen. Onze kennis van zaken, van voorstudie tot montage, wordt dagelijks aangewend bij de bouw van industriële gebouwen, kantoren, appartementen, scholen, ziekenhuizen, bruggen, ...

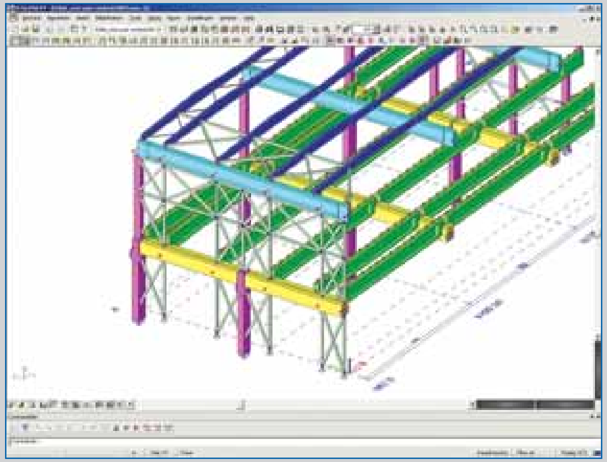
De prefabricatie gebeurt in gesloten hallen. Deze optimale werkomstandigheden en onafhankelijkheid van het weer garanderen prefab-elementen van de hoogste kwaliteit, geleverd binnen de kortst mogelijke termijn.

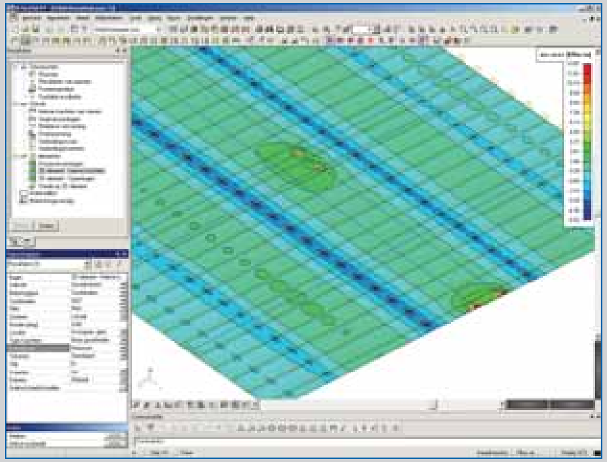
Bouw- en economische trends streven naar maximale bewegingsvrijheid in een gebouw, met een minimum aan dragende kolommen. Onze balken en vloeren in spanbeton bieden hier de beste oplossing. Balken tot 45 meter zijn voor Structo geen uitzondering.

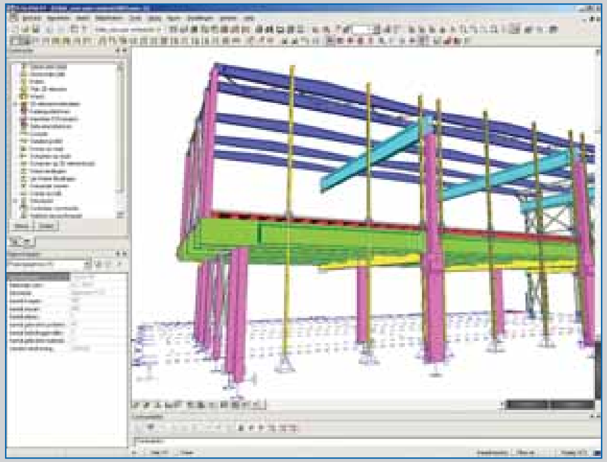
20 bedienden en 160 arbeiders stellen alles in het werk om aan de meest uiteenlopende verwachtingen van de klant te voldoen. Investeringen in soft- en hardware laten toe snel en adequaat te reageren op wijzigende omstandigheden.

Ons eigen studiebureau biedt de mogelijkheid om de meest aangewezen methodes uit te werken. Dit gebeurt steeds in overleg met de klant, architect en ingenieur met het oog op een optimale tevredenheid voor alle betrokkenen. Een vlotte communicatie, zowel intern als extern, vervolledigt het plaatje.

Ook op het gebied van kwaliteit legt Structo de lat steeds hoger. Onze eigen controledienst staat garant voor de constante en hoogwaardige kwaliteit van de afgewerkte producten. De talrijke realisaties door de jaren heen getuigen hiervan: kwaliteit betekent voor Structo continu verbeteren. Op hun beurt dragen de aanhoudende investeringen in machines, bekistingen, enz. bij tot de ontwikkeling van een technische uitrusting op niveau.







Used software • SCIA • ESA PT

Aanbouw Volvo Cars Gent - GA1

Zo ook is Volvo Cars Gent één van onze trouwe klanten.

Beschrijving van het gebouw

Specifiek gaat het hier over een aanbouw van 24 m op 54 m grondoppervlakte, met een hoogte van 20 m. Een typische industriële opbouw op een raster van 12 op 18 m, met een tussenvloer op 8m. Dit werd aangebouwd aan een bestaande structuur, gelijkaardig in opbouw. Er werd een mobiele belasting op deze vloer gevraagd van 1 ton per vierkante meter.

Voor de tussenvloer werd dan ook geopteerd voor het gebruik van TT-elementen TT/420/2400 met een druklaag van 120 mm beton C30/37. Elk element is 6 m lang en weegt 5.50 ton.

Deze zelfdragende vloer wordt gedragen door secundaire verdiepingsbalken van 18m lang. Dit zijn voorgespannen I-liggers IC/1600/600 met een hoogte van 1.60 m en een gewicht van elk om en bij de 24 ton. In de balken is een voorspanning aanwezig van 500 ton.

Aangezien aan een bestaand gebouw werd gekoppeld, liggen enkele van deze balken in overkraging. In voorgespannen beton betekent dit een buitenbeentje voor de projectingenieur!

De secundaire vloerbalken worden op hun beurt gedragen door ontdubbelde primaire liggers, met elk een rechthoekige sectie van 1.30 m hoog op 0.60 m breed. De lengte van deze balken bedraagt 12 m; elk element weegt ook zo'n 23 ton.

Enerzijds het eigen gewicht van de TT-elementen met hun druklaag, secundaire en primaire vloerbalken en anderzijds de mobiele belasting van 1 ton per vierkante meter wordt aldus afgedragen naar het weinig aantal kolommen.

Het dak heeft een gelijkaardige opbouw van secundaire dakliggers met variabele hoogte (IV/1000/375 – overspanning 18m – gewicht 7 ton), gedragen door primaire dakliggers IC/1600/600 van 24 m lang. Een dergelijke balk weegt zo maar eventjes 30 ton.

Zowel primaire vloerliggers als primaire dakliggers worden gedragen door kolommen met een variabele sectie. Bij de funderingen bedraagt deze 1.25 m op 0.75 m; eens voorbij de tussenvloer vermindert deze naar 0.60 m op 0.75 m.

De grote moeilijkheid van deze opdracht was het volledig loskoppelen van het nieuwe bijgebouw aan het bestaande. Dit impliceert het gebruik van glij-opleggingen en zware windverbanden.

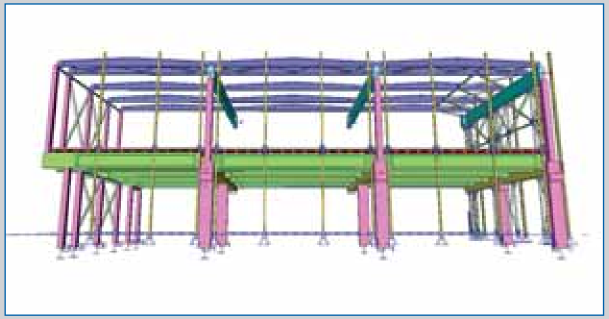
Technische hoogstandjes

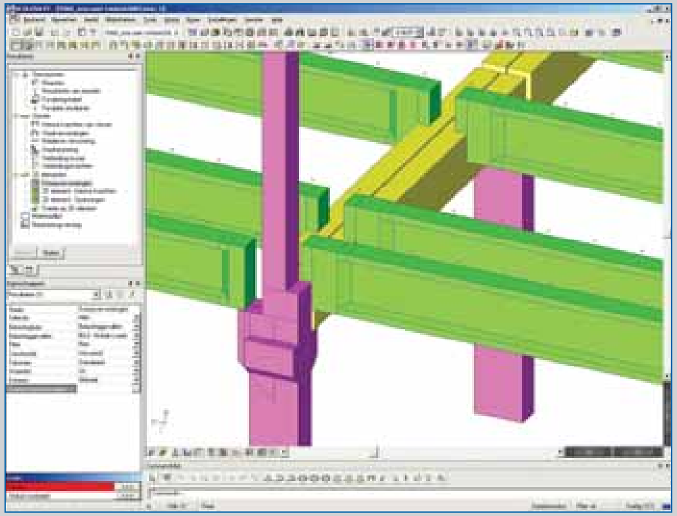
Bij voorgespannen beton komt het niet veel voor dat balken in overkraging liggen. Waar men de drukspanningen onderaan de balk ontwikkelt, creëert men meer druk. Ook omgekeerd bovenaan de balk: door het negatief moment krijgt men een grote trekspanning. Als klap op de vuurpijl steunen op het uiteinde van de overkraging nog eens kolommen, die een groot deel van de dakconstructie opnamen. Niet evident dus! Het aanwenden van zware passieve wapening was noodzakelijk in combinatie met de reeds aanwezige (zware) eindblokwapening.

SCIA • ESA PT

Steeds vaker gebeurt het dat er zeer kort op de bal gespeeld moet worden. Er wordt aan een gebouw nog gekneed, terwijl de helft van de constructie er al staat. Er worden andere belastingen gevraagd, er komen onverwachte omstandigheden op de proppen, enz.

Het programma SCIA • ESA PT geeft ons de mogelijkheid om steeds snel en accuraat met deze wijzigingen om te gaan. Een steunpunt valt weg, een reeks kolommen wordt een meter opgeschoven, allemaal zaken die in een vingerknip kunnen aangepast worden. Eventjes herrekenen, en de nieuwe resultaten zijn beschikbaar!





Extension of Volvo Cars, Ghent

This 20m high building is a construction with a length of 54 m and a width of 24 m, mainly realised in concrete. With as less columns as possible (so as not to interfere with the production area), the second floor (with a level at 8.00 m) had to be designed with secondary floor beams, leaning on the main floor beams. These are all prestressed. The contruction is part of an existing building, but had to react fully independent. Wind bracings and special supports were necessary. The structure is designed and calculated with SCIA • ESA PT.

Studie10 ingenieursbureau bvba

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Website	www.studie10.Be

Greenpartners te Sint-Katelijne-Waver

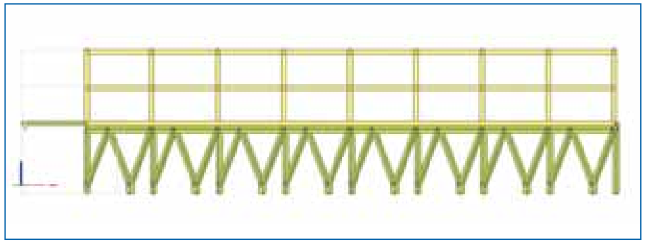
Studie10 is een jong ingenieursbureau dat in 2005 opgestart werd door de twee zaakvoerders Werner Goris en Bart Bruyns. Ondertussen is het uitgegroeid tot een bureau met 6 mensen.

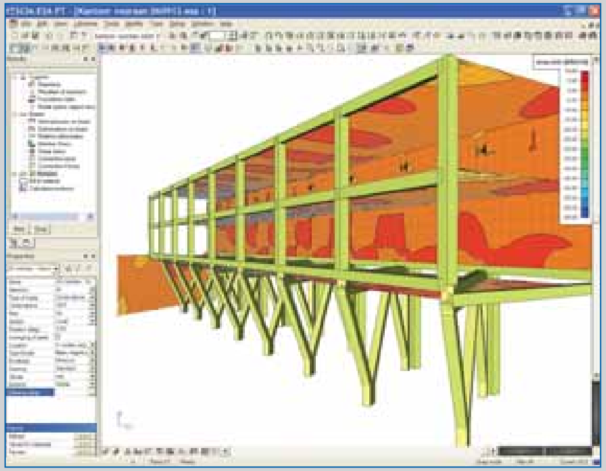
Hun medewerkers combineren een sterke bouwtechnische kennis met ervaring. Elk van hen is een specialist in een specifiek studiegebied waardoor het bureau zich kan profileren met optimale resultaten in een totaalconcept. Men draagt deskundig zorg voor de realisatie van plannen en projecten, zo mogelijk vanaf de eerste gedachte tot en met de definitieve oplevering. Of het nu gaat om villa- en appartementsbouw, kantoor- en industriebouw, openbare gebouwen, burgerlijke bouwkunde of civiele constructies bij industriële installaties: de meest optimale technische én economische oplossing wordt gezocht waarbij men streeft naar het afleveren van een maximale kwaliteit en het respecteren van de vooropgestelde termijnen.

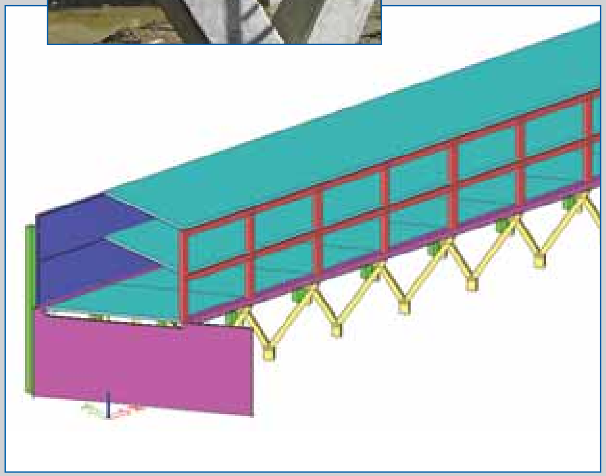
Studie10 wil uitgroeien tot een begrip in Vlaanderen als leverancier van kwalitatief hoogwaardige diensten op het brede terrein van stabiliteit, technieken, energieadvies, projectcoördinatie, infrastructuur en veiligheidscoördinatie.

Bij het opmaken van de studies worden de volgende softwarehulpmiddelen gebruikt :

SCIA • ESA PT, MSheet, Capsol (thermodynamische simulaties), AutoCAD en ADT.







Used software • SCIA • ESA PT, MSheet

Greenpartners uit Sint-Katelijne-Waver is een coöperatieve vennootschap van tuinbouwers die hun producten rechtstreeks aan de distributiesector verkopen. Door hun groei hebben zij nood aan extra koel- en overslagruimtes.

Het gebouw is gelegen in Sint-Katelijne-Waver en brengt in één volume 4 aparte delen onder. Het grootste deel bestaat uit de ontvangst-, verzendings-, en opslagruimte (1.700 mm²). Deze bevindt zich in een traditionele opslaghal met een betonnen structuur. IV-liggers overspannen 30m en dragen het dak dat uit cellenbetonpanelen bestaat. De hal heeft zijn kolommen gemeenschappelijk met de rondliggende delen van het complex. Deze ingeklemde kolommen zorgen samen met de betonwanden en de schijfwerking van het dak voor de horizontale stabiliteit van het geheel.

Aan de voorzijde bevinden zich de 9 laadkades. De vrachtwagens moeten onder een hoek van 36° aanleggen. Dit verklaart dan ook de zaagtandvorm waarin ze ingeplant werden.

Een trap aan de voorzijde van het gebouw leidt naar de hoofdingang op de eerste verdieping boven de laadkades. Hier en op de tweede verdieping bevinden zich 770 m² aan directie- en administratiekantoren, vergaderruimten en de cafetaria. De twee niveaus, die opgebouwd werden met een skeletstructuur van kolommen, balken en welfsels, worden gesteund door een driehoekige vakwerkstructuur in beton die de schuine inplanting van de laadkades volgt.

De 5 koelcellen met een totale oppervlakte van 800 m² situeren zich aan de achterzijde van het gebouw. Boven deze koelcellen biedt een volledige verdieping ruimte voor opslag van verpakkingsmaterialen.

Het rechtse deel van het gebouw biedt plaats aan een kantoorgedeelte met 3 niveaus en een vloeroppervlakte van 855 m². Op het gelijkvloerse niveau bevinden zich de technische ruimtes, de werkplekken en voorzieningen voor de arbeiders. De eerste en tweede verdieping zijn ingericht als kantoren. Ook in de laatste twee delen werden een skeletstructuur toegepast.

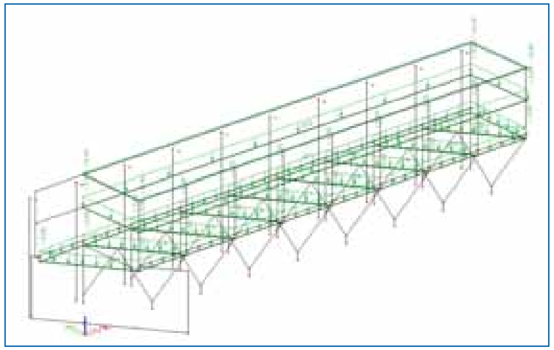
Zowel de hoofdtrap als de binnentrap hebben teruggetrokken-steunpunten, de indruk gevend van zwevende elementen.

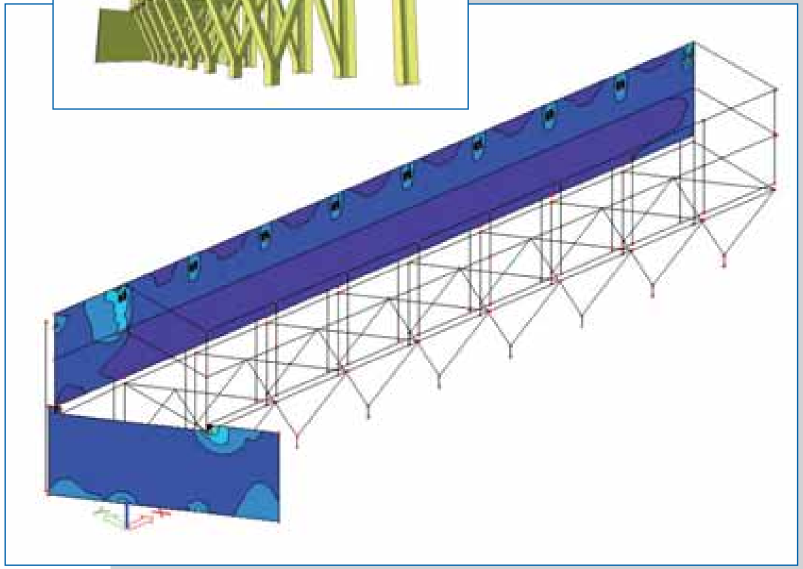
Het gehele gebouw is gefundeerd op palen.

Het grondoppervlak van het gebouw bedraagt 3.145 m². Rekening houdend met de verdiepingen komt dit op een totale vloeroppervlakte van 4.875 m².

Buiten de doorsnee berekeningen werd het SCIA programma ook aangewend voor 3-dimensionele calculaties. Het gehele gebouw werd gemodelleerd om de windstabiliteit na te gaan. Ook het voorste kantoorgedeelte, steunend op het betonnen driehoekig vakwerk, werd volledig ingegeven. Dit om accuraat beeld te krijgen van de interne krachtverdeling in het vakwerk.

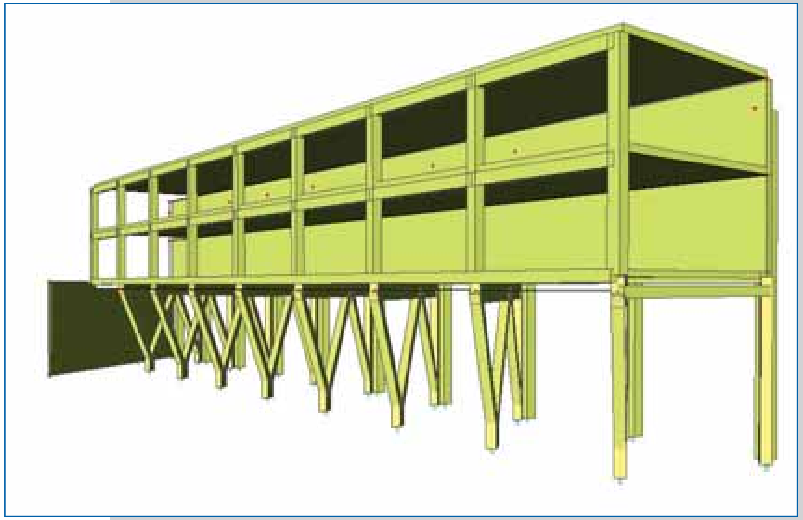
Project: Bouwen van een opslagruimte en kantoren
Bouwheer: Greenpartners cv, Kempenaerestraat 46, 2860 Sint-Katelijne-Waver
Bouwplaats: Heisbroekweg, 2860 Sint-Katelijne-Waver
Architect: Gert Colliers, Alfsberg 21, 2550 Kontich
Aannemer: Cosimco nv, Satenrozen – Kartuizersweg 1, 2550 Kontich
Studiebureau stabiliteit en infrastructuur:
Studie10 ingenieursbureau, Berlarij 76, 2500 Lier
Start van de werken: september 2006





Cooling and storage space for Greenpartners

Greenpartners is a co-operative producers' association of horticulturists who sell their products directly to the distribution sector. Due to a growth of the handled volume they needed extra cooling and storage space.
The building houses four utility areas in one volume. A large storage hall is a construction of frames with prestressed IV beams that span 30m, a cooling space and two office buildings. One of these office buildings is supported by a triangle shaped frame.
SCIA software was used to dimension the frame and to define the horizontal stability of the building.



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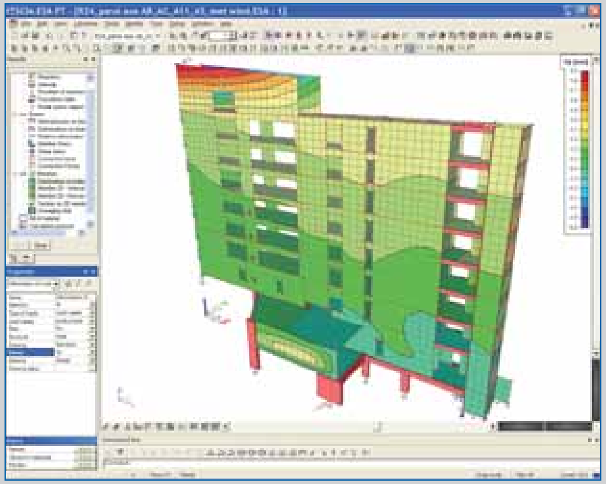
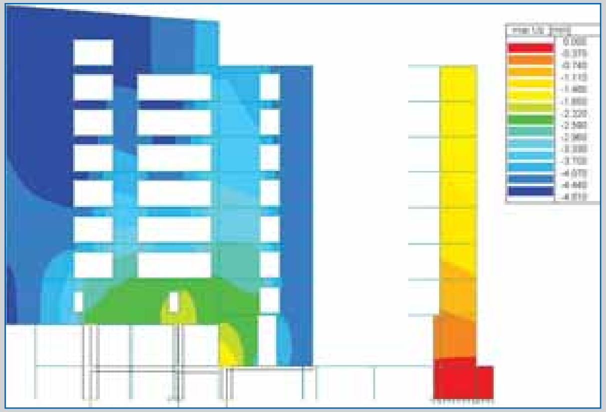
Hieronder vindt U enkele referentie-projecten met hun specifieke kenmerken:

- Perscentrum Olympische Spelen Athene 2004: seismische berekeningen
- Kinepolis Brugge: realisatie termijn van 6 maanden, structuur uit prefab beton
- Bridgestone Zeebrugge: industriële loods met houten liggers (85.000 m²)
- Dagconsultaties Heilig-Hart Ziekenhuis, Roeselare
- Fides Oostende: stalen productie toren
- Jatbecha te Jabbeke: appartementsgebouw
- Skipiste te Komen: staalbouw gecombineerd met gelamelleerde houten liggers

Meer informatie en referenties vindt u op www.tab.be.

Kantoorgebouwen Romarin Quartz & Crystal





Office buildings of Romarin Quartz & Crystal

General

The office buildings ‘Crystal and Quartz’ are constructed in the urban centre of Lille. Both buildings consist of a concrete skeleton backed up by concrete cores. The Crystal building has a length of 90 m, 18,5 m of width and a height of 34m. The ‘Quartz’ building is very similar but has a length of 70 m. Each building has 9 floors and a basement, the total usable area just exceeds 20.000 m².

Points of interest

The partitioning of the windows is irregular in the exterior bearing walls, this results in a more complex bearing system and thus reinforcement. These walls were designed and realised as monolithic walls.

At one side of the building, all floors above floor level are cantilevered up to 12 m.

Used software • ESA-Prima Win

Algemeen

Euralille is een urbanisatieproject in het Noord-Franse Lille van de hand van architect Rem Koolhaas. Op een oppervlakte van 90 hectaren werd tien jaar geleden rond het TGV-station Lille Europe een complex van kantoorgebouwen en sociale centra opgetrokken. Ondertussen is een tweede fase, Euralille 2, in uitvoering. Daartoe behoort de ontwikkeling van de kantoorgebouwen Crystal Europe en Quartz Europe. De gebouwen zijn aan de zuidkant over ongeveer 12 m vrijdragend, wat één van de redenen was om te opteren voor ter plaatse gestort beton.

De twee gebouwen zijn opgesteld in open waaiervorm in de richting van Euralille. De zuidelijke kopgevels zijn volledig beglaasd en kragen uit boven een talud; ze bieden een adembenemend uitzicht op Euralille. De originele dakvorm vormt een uniek herkenningselement. Een gelijkvloerse doorgang voor voetgangers verbindt de Place Vauban met het voetpad langs de avenue de la République.
De gebouwen zijn respectievelijk 70 en 90m lang en 18,20 m breed, met aan de gevels beuken van 6,70 m en in het midden een beuk van 4,80 m. In de buitenste beuken kunnen gesloten kantoren worden ingeplant, grenzend aan een gang, of landschapskantoren. Het gevel-ramenraster van 1,35 m laat een grote flexibiliteit naar modulering toe.
De vrije hoogte onder plafond bedraagt 2,70 m op de verdiepingen en 3,80 m op de begane grond. Elk niveau kan in twee onafhankelijk compartimenten worden verdeeld met eigen lift- en trappenkokers.
De nuttige belasting bedraagt voor de begane grond 8 kN/m² en voor de verdiepingen 4 kN/m² en plaatselijk 8 kN/m² voor de archiefruimtes.
Elk gebouw heeft 9 verdiepingen en een kelder. De kelders van beide gebouwen grenzen aan elkaar en vormen een grote ondergrondse parking. De totale bruikbare oppervlakte van beide gebouwen is ongeveer 20.000 m².
De noord- en langsgevels zijn bekleed met aluminium cassettes en beglaasde raamchassis. De zuidgevels en de gevels op begane grond bestaan uit gordijnwanden beglaasd over de volle hoogte op een metalen raamwerk.

Constructie / Stabiliteit

De grootste uitdaging vormde de uitkraging van 12 m aan de zuidzijde.

Volgende alternatieven werden onderzocht:
- Een op de werf nagespannen betonplaat van 1.35 m. dikte.
- Een oplossing met stalen PRS profielen (profilé reconstitué soudé) S355.
- Gebruik maken van de langse betonwanden.

Uiteindelijk werd voor de laatste oplossing gekozen waarbij de uitkraging opgenomen wordt door enerzijds de oostgevel en anderzijds door een betonnen kokerprofiel gevormd door beide binnenwanden en de betonvloer van de middenstrook. Er werd een voorspelling gemaakt in verband met de te verwachten doorbuiging door middel van een fysisch niet-lineaire berekening waarbij de invloed van kruip op de uiteindelijke doorbuiging werd meegenomen. Hoewel uit die berekeningen bleek dat na storten en verharden van de koker tot het eerste verdiepingsniveau, deze in staat was om het eigengewicht van de bovengelegen verdiepingen op te nemen, stond het controlebureau erop dat, gedurende de uitvoering, desalniettemin steunen geplaatst werden. Deze bestonden uit stalen profielen welke onderaan ontdubbeld werden om het plaatsen van hydraulische vijzels toe te laten. Na voltooiing werden de vijzels voorzichtig gelost en werd de zakking gemeten in drie punten. De maximum zakking bedroeg 5,2 mm.

De stabiliteit in langsrichting wordt verzorgd door de betonwanden in de gevels en de middengang.

De dwarse stabiliteit door de betonnen lift- en trappenkokers. Deze bleken echter niet voldoende omdat dit leidde tot een uitkraging (in horizontaal vlak) van meer dan 30m.Er werden dan ook extra dwarse betonwanden aangebracht ter plaatse van de sanitaire blokken.
De draagstructuur bestaat uit vier ter plaatse gestorte betonwanden van 0,20 m dikte namelijk de beide lange gevels en twee binnenwanden aan weerzijden van de centrale 4,80 m brede beuk. Daartoe werden stalen bekistingen van verdiepingshoogte gemaakt.
De reden waarom beslist werd alles ter plaatse te storten is tweeërlei. De uitkraging gaf reeds aanleiding tot belangrijke delen ter plaatse gestorte wanden (die bovendien nog een heel stuk naar binnen moesten doorgetrokken worden) en bovendien was de raamverdeling in de gevels zó willekeurig dat dit nauwelijks een verdeling in prefabonderdelen toeliet. Een vraag naar de architect toe om de raamverdeling ietwat te wijzigen bleek architecturaal niet haalbaar.
De vloeren bestaan voor de twee buitenste beuken uit kanaalplaatvloeren met druklaag, de middelste beuk werd uitgevoerd als breedplaatvloer. Deze vloeren dragen via schijfwerking in hun vlak de horizontale windlasten af naar de hoger vermelde wanden en naar de trap en liftkokers. Bijkomende complicatie was dat, om architectonische redenen, verschillende stabiliteitswanden niet doorgetrokken konden worden tot in de ondergrondse parking. De krachten aan de voet van deze wanden dienden via de gelijkvloerse vloer omgeleid naar verderop gelegen betonwanden van de ondergrondse parking.Daartoe werden gedeelten van de vloer in volle beton uitgevoerd en extra gewapend.
De willekeurige posities en afmetingen van de ramen in de lange gevels maakte een eindige-elementanalyse noodzakelijk.

Gebruik van ESA-Prima Win

De volledige hoofdstructuur (tot de uitzettingsvoeg) werd ingegeven in ESA-Prima Win. Via dit model werd de lastendaling gerealiseerd voor zowel de verticale als horizontale lasten. Er werd eveneens gebruik gemaakt van de module om de wapening te bereken in de EEM-elementen.

De verdere detailberekeningen werden uitgevoerd in aparte bestanden.

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Productietoren Fides

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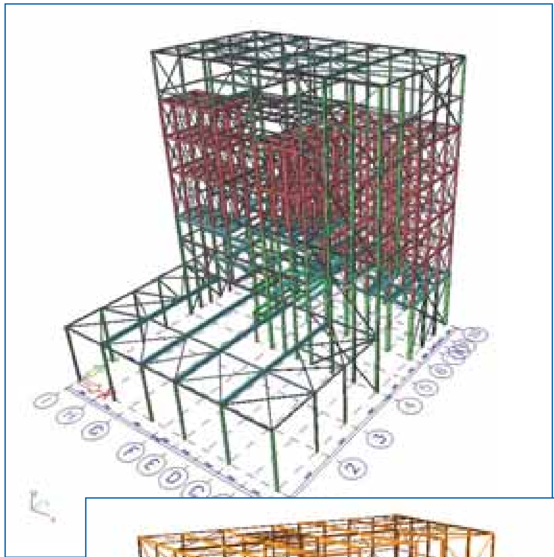
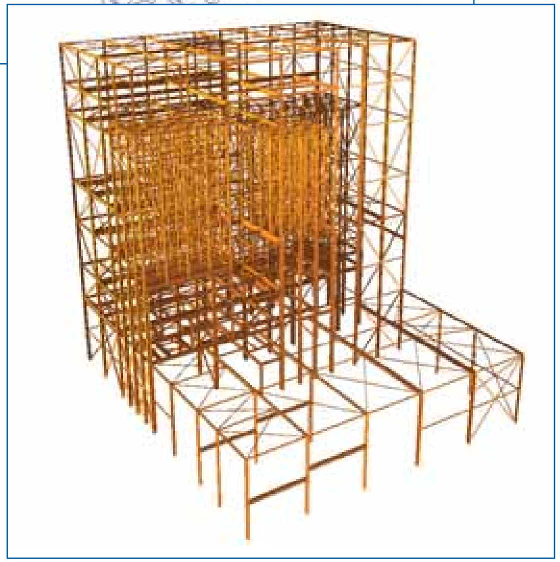




Used software • ESA-Prima Win

Algemeen

Fides Petfood, onderdeel van de groep Depre, heeft een volledig nieuwe fabriek gebouwd op het industrieterrein van Zandvoorde (Oostende). Men wil er jaarlijks zo'n 17.000 ton droge diervoeding produceren. Meest opvallend in het vlakke polderlandschap is de 28 m hoge productietoren. Daarnaast bestaat de site ook uit een laagbouw magazijn (2000m²), wat in de toekomst mogelijk kan uitgebreid worden en een kantoorblok over 2 verdiepingen.

Productietoren

Het bovengrondse gedeelte van de productietoren is volledig opgebouwd uit staal. Er zijn een 8-tal tussenniveaus met een totale vloeroppervlakte van 2760 m². Een centrale trap verbindt de verschillende niveaus. Op en tussen de vloeren zijn de vele machines opgesteld. Omwille van de verschillende afmetingen van de machines, de inplanting van de ondersteuningen onder de machines en de vele openingen in de vloeren voor doorvoeren, is de staalstructuur niet regelmatig. Het ontwerp van de staalstructuur moest gelijktijdig en in voortdurende interactie gebeuren met het ontwerp van de machinebouwer. De uitdaging was om ondanks de vele randvoorwaarden en eisen van de machines toch een zo regelmatig mogelijk raster te krijgen in de staalconstructie. Uiteindelijk werd een kolommenraster, zij het onregelmatig, vastgelegd, en de niveaus van de verschillende vloeren bepaald. Vertrekkend vanuit dit kolommenraster werden vloer per vloer de hoofdliggers geplaatst en dan de vakken verder ingevuld met de secundaire structuur. De vloeren bestaan immers uit stalen traanplaten welke ongeveer elke 0.5 m een steun vereisen. Op 2 plaatsen binnen de toren zit dan ook nog een zone betonvloer. Deze werden voorzien om akoestische redenen, maar ook om de trillingen afkomstig van de machines te dempen.

Verdeeld binnen het volume van de toren zitten ook nog 3 vaste siloblokken. Op een stalen draagraster worden stalen kokerkolommen geplaatst. Onderaan komt de trechter te hangen en tussen de kolommen worden ontdubbelde stalen wanden geschoven. Bijzonder aan deze blokken is dat ze niet achteraf gemonteerd worden, maar deel uitmaken van de draagstructuur van het gebouw. Onder de silo's zit de staalstructuur. De silo's worden hierop opgetrokken. Rond de silo's sluiten vloeren aan op de silowanden. Bovenop de silo's komt een vloer met hierop machines. Op de silokolommen komen opnieuw de voetplaten voor de staalstructuur die verder gebouwd wordt op de silo's.

De ondergrondse structuur van de productietoren is in beton. Een kelder, ook weer in verschillende niveaus, bevat de storttrechter voor de binnenkomende grondstoffen en de installaties om deze grondstoffen naar de silo's te krijgen. De kelder is zo'n 5 m diep. Met de hoge stand van het grondwater was het niet evident om deze uit te voeren, waterdicht te houden en opdrijven te beletten. De volledige toren, inclusief kelder, is gefundeerd op een paalfundering.

Berekeningen

De grootste complexiteit zit, zoals hierboven aangehaald, in het ontwerp van de geometrie van de staalstructuur.

Specifiek naar de berekeningen toe moest nog op enkele andere zaken gelet worden:

- Het maken van de combinaties van belastingen: windbelastingen uit 4 verschillende richtingen, belastingen op de verschillende vloeren, belastingen van machines (inclusief trillingen), belastingen van de silo's, ... In totaal zijn er 31 verschillende belastingsgevallen.
- De stijfheid van de siloblokken: dit zijn in wezen oneindig stijve blokken. Dit moest gesimuleerd worden door het plaatsen van vele verbanden. Anderzijds mocht de belasting van de siloblokken door die stijfheid niet naar de buitenkanten getrokken worden. Dit werd gesimuleerd door onder aan de kolommen verticaal glijdende scharnieren te plaatsen en de belasting van de silokolommen rechtstreeks op de onderliggende structuur te plaatsen.
- De algemene stabiliteit: de toren is een volledig geschoorde structuur. Er zitten windverbanden in het dak en de 4 gevels. De zijwanden van de siloblokken zijn ook te beschouwen als stijve wand. Windbelasting op de gevels wordt via schijfwerking van de vloeren overgebracht naar de langse gevels. Doordat niet alle vloeren continu zijn over de volledige oppervlakte moest dit toch in detail bekeken worden.

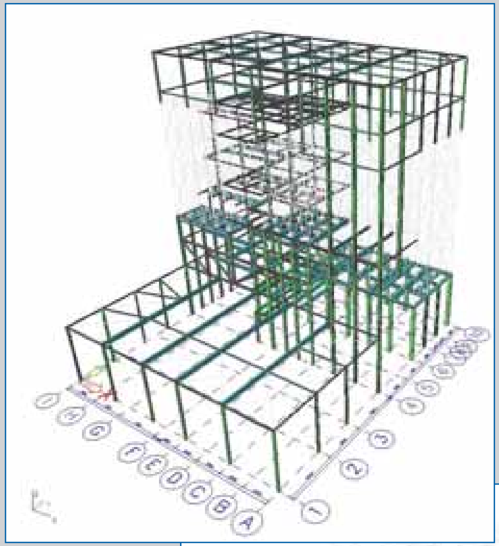
Niet alleen in definitieve toestand, maar ook tijdens de montage moest de stabiliteit gegarandeerd worden.

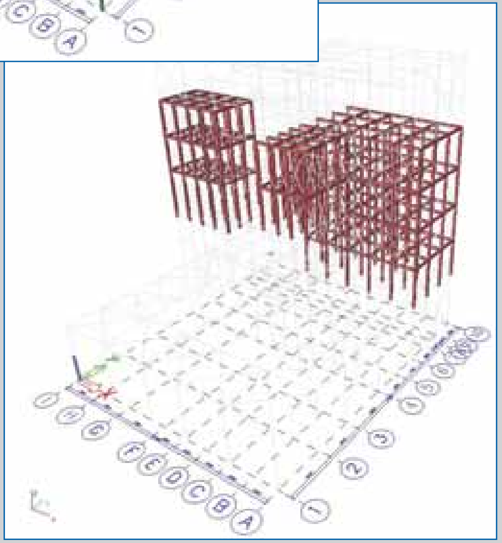
Het begint al bij het vermijden van opdrijven van de kelder. Bij het bepalen van het tijdstip van uit werking stellen van de bemaling moest rekening gehouden worden met het eigengewicht van de reeds geplaatste structuur en de door de paalfundering opneembare trekkracht.

De coördinatie van de montage van de opgaande structuur was ook zeer belangrijk. 2 aannemers waren gelijktijdig aan het werk: montage staalstructuur en montage silo's. Naar veiligheid toe moest men vermijden dat men in elkaars werkveld zit. Dit zorgde ervoor dat op bepaalde momenten de silo's al veel hoger opgetrokken waren dan de staalconstructie. De silowanden werden mee gemonteerd, dus die vangen onmiddellijk de volledige windbelasting. Op elk moment moest gecontroleerd worden dat er reeds voldoende stijfheid was in de vloeren en de staalconstructie om die windbelasting over te brengen naar de funderingen.

ESA-Prima Win

Het gebruik van verschillende lagen en activiteiten in de ESA-Prima Win-file maakte het mogelijk om deze overzichtelijk te houden. Uiteindelijk is de montage en ingebruikname zonder noemenswaardige problemen verlopen.





Production tower for Fides

The project concerned a new plant for the production of petfoods for the company Fides Petfood in Oostende.
The production unit has a tower with a height of 28 m and a total usable surface of 2760 m². The horizontal equilibrium is achieved by bracing the structure.
A special point of attention are the silos, these are considered as a structure within the tower. The design of these silos is standardised, so it has known rigidity to take into consideration.

Technum nv Hasselt

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Technum N.V. is a dynamic, internationally orientated and strongly growing multidisciplinary office for engineering and consultancy with establishments in the various Flemish provinces.
Technum provides services for the authorities, industrial and service-providing companies, project developers, international institutions, etc. for each project, single- or multi-disciplinary, and for each project phase.
Technum has the capacity, expertise and creativity required to guarantee clients specialised and complete guidance in numerous fields.
Technum consists of three seats (Ghent, Hasselt and Ostend) and has also an office in Leuven. The companies' headquarters is located in Antwerp. These seats with their different departments are geographically spread over Flanders. Each of them has a reputation for expertise, passion and flexibility. This geographical distribution and the individuality of each seat, allows the maximum use of professional knowledge and skills, experience and creativity for each project in line with the wishes of the client. This means an additional organisational advantage in view of the proximity to specific markets and specific knowledge sources.

Technum is :

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- Buildings
- Infrastructure
- Town & country planning
- Hydraulic engineering & engineering structures
- Acoustics, vibrations & structure dynamics
- Project management & consultancy

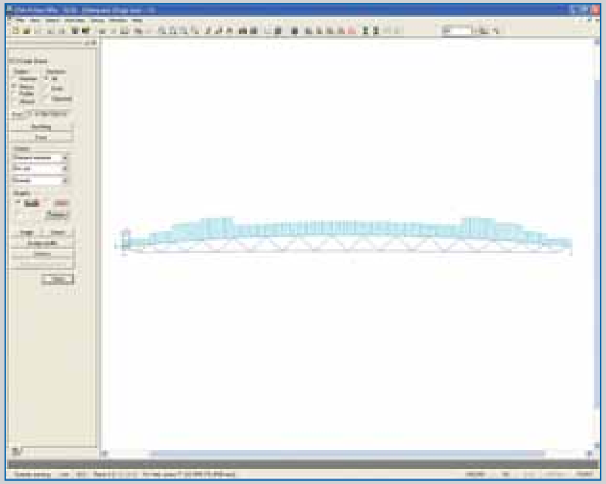
A merger of
- Groep Swartenbroekx, Hasselt
- Groep Varendonck, Gent
- Citec, Houthalen-Helchteren
- Studiebureau Somers, Hasselt
- Ingenieursbureau CV Gyselynck, Gent

ESTABLISHED ON
- 17 april 1995

Number of employees : 269

Some references (for dept. Buildings): Caterpillar Belgium, Siemens Germany (site Libya), SES Tienen, Ubizen Leuven, Procter & Gamble Mechelen, Ford Genk, Sportscomplex Leuven, Swimming pool Geel, Sportscomplex Tongeren, ...

Roof span - sports complex - Leuven



Used software • ESA-Prima Win

Roof span - sports complex - Leuven

At the old Philipssite in Leuven a great project for sports accommodation was planned for several years. The building should contain a multifunctional hall for sports, a swimming pool and facilities for fitness, judo, meeting rooms, ...

The design was based on an oval ground floor with a rectangular central part with cafeteria, circulation space (staircases, elevators), rest rooms, a kitchen and other technical rooms. This central part divides the oval base in half: one half is dedicated to swimming, as well recreational (wild water course, pool for children, jacuzzi, ..) as for competition, with side activities like fitness, sports practice and dining. The second half is totally dedicated to the multifunctional hall where several (inter)national sport competitions can take place and where about 3 000 people can be seated.

Structurally seen the central block is constructed as a stiff concrete core, while the rest of the building is existing of concrete columns (and some concrete walls) with a rather lightweight roof structure: mostly laminated wooden beams but because of the wide span and the limited constructional height a steel truss over the hall was designed.

This steel truss needed to be calculated for stability by software that can give answers to the following questions:

- Which steel sections have to be used to build a sufficient frame, and is an enhanced steel quality needed to maintain the (limited) truss height and still be economical?
- What is the maximum possible deflection and following: what initial negative deflection does the structure need to be given to guarantee the officially needed height under the trusses in the hall? What will be the horizontal transposition at the 'sliding' support when the truss reaches its maximum deflection, so the suitable support apparatus can be determined?

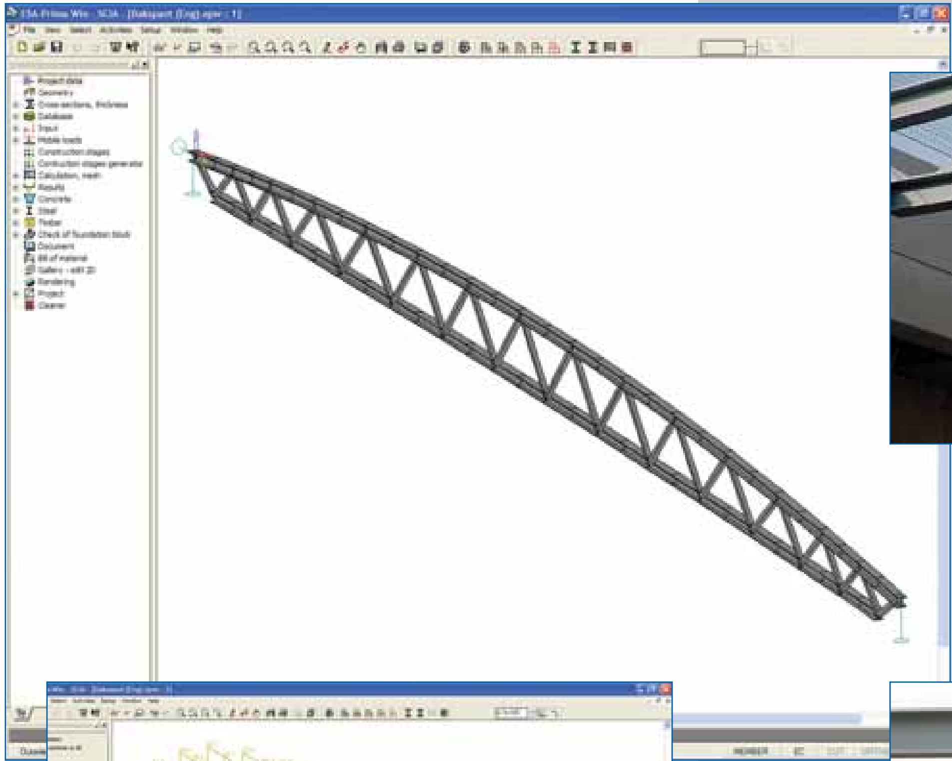
The fixed specifications for these steel trusses were :

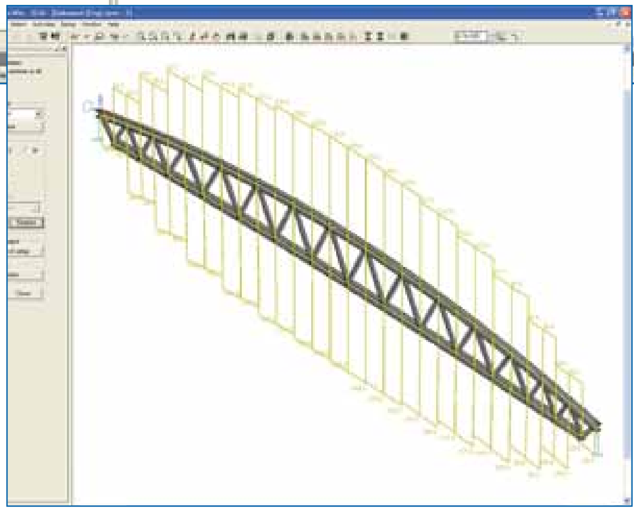
- Total span: 60 m
- Maximum constructional height: 2,5 m
- Loadings: self weight roof (30 kg/m²), sprinkler (10 kg/m²), acoustic ceiling when needed (60 kg/m²), snow/mobile loads (40 kg/m²)

With these specifications the truss was analysed with the ESA-Prima Win software with the following results: the most economical solution (taken into account the steel stresses, including buckling) seemed to be that the upper beam and the lower beam were constructed with improved steel quality S 355 and that an HP-section will be used.

The vertical calculated deflection was 29 cm under full load and 22,5 cm under permanent loading so a negative deflection of 30 cm was chosen for the construction of the truss.

For the 'sliding' support in ESA-Prima Win was determined that a horizontal deformation of almost 3 cm should be possible.





Roof span - sports complex

A new building for sports accommodation was build at the old Philips-site in Leuven.
For the longest roof trusses (span 60 m) above the playing fields the ESA-Prima Win software was used to design the most economical steel construction. The limited truss height and the possible deformations, the vertical deflection as well as the horizontal displacement, were taken into account.

Thomasons LLP

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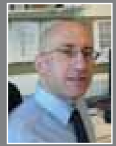
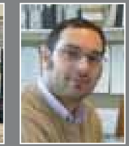




Thomasons

Thomasons was founded over 60 years ago and is now one of the longest established independently owned consulting engineering practices. The Practice has maintained a deserved reputation for engineering excellence and innovation and a high quality of customer service that is measured year on year through our customer surveys. The Practice prides itself on its success rate for building long term relationships with its customers, some of whom have been Thomasons' clients since its foundation.

The Practice and its associated Companies currently operate from 5 regional offices in Guildford, London, Leeds, Manchester and Southend-on-Sea with a staff of over 120.

Thomasons undertakes commissions in all arenas of Civil, Structural and Glass Engineering including major town centre and residential redevelopments. These include projects in Oxford, Farnham, Hemel Hempstead and Camberley. Commissions are also currently being undertaken in the residential, education, retail, office and industrial sectors.

The Practice has a reputation for solving unusual and complex technical problems. It also has extensive experience in the design of infrastructure and civil works, particularly for the larger developments. The design of roads and drainage to adoptable standards is also a normal part of our activities. The open structure of the practice allows us to tackle projects ranging from minor works to those costing many millions of pounds, in a cost and technically efficient manner. Thomasons also provides engineering and surveying advice for litigation, and various members of the practice provide specialist advice on numerous technical matters.

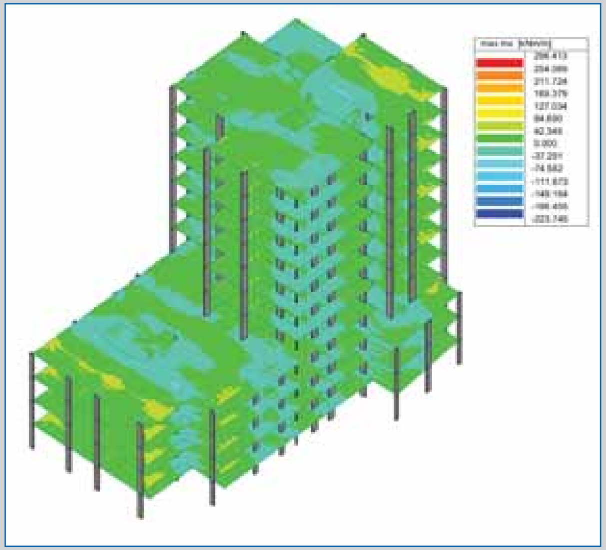
Thomasons is committed to modern design and management techniques and is at the forefront in the application of information technology. Each of our offices has modern computer and communication networks and full Autocad and 3 dimensional drawing capabilities. The Practice keeps abreast of emerging environmental issues.

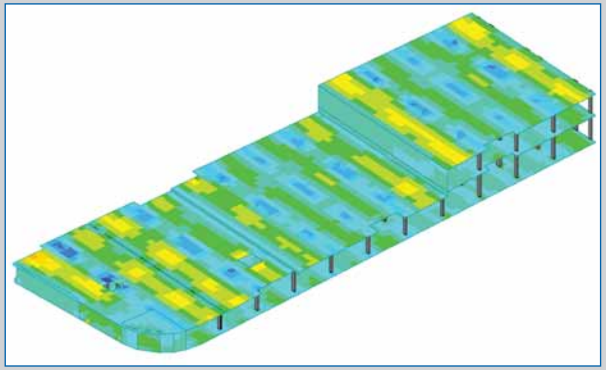
Despite its growth Thomasons still retains a very personal approach with the senior members of the practice being involved at all stages of a project.

An ISO9001 Quality Management System is operated in all offices and externally audited by UKAS accredited assessment bodies.

Used software • ESA-Prima Win

Multi-storey residential complex





Multi-storey residential complex

The Elm Road Project comprises a 13 storey reinforced concrete frame with 1 to 2-storey underground car parks supporting timber frame residential buildings, a residential concrete tower block and landscaped gardens. The timber and concrete frame buildings mainly comprise of flats; these will be used for residential purposes. The underground car park below the timber frame buildings comprise piled foundation raft, concrete columns and flat slab. The underground car park below the concrete frame buildings is similar except that pile caps with suspended foundation slab were adopted instead of a piled foundation raft. The concrete frame buildings also comprises columns and flat slab construction. Thomasons undertook the detailed design of the entire concrete frame structure and foundation raft; this was modelled using ESA-Prima Win FE analysis package.

Project Details

Location: Elm Road, Wembley, Middlesex HA9
Size: Approx plan area is 130m long by 30m wide
Height: 1 to 2-storey underground car parks with 4 to 5-storey timber framed buildings, 4-storey reinforced concrete framed buildings and a 10-storey reinforced concrete tower block.
Cost: Approx £17 million

History

The Client tendered for the Elm Road Project from the London Borough of Brent as part of a regeneration package. The site was previously used as a poor quality ground level car park on semi-derelict land. The agreement between the Client and London Borough of Brent was to develop the site for affordable housing with the provision of underground car parking. Furthermore, the site was surrounded by three roads, two of which were poor quality surfaced service roads.
The Client, as part of the agreement, upgraded the two poor quality service roads to highway works standards which will later be adopted by the Local Authority following final completion of the project.

Project Overview

The underground car park covers the entire site area (i.e. between gridlines 01 to 18 and A to F). As a consequence of the site being on a fairly steep slope, the underground car park comprises two independent car parks each on separate floor levels (i.e. lower and upper underground car parks).
These independent underground car parks overlap in the central portion of the site hence creating a two-storey underground car park. Both lower and upper car parks have entrances at ground level. The concrete framed superstructure occupies just under a third of the site plan area (i.e. between gridlines 13 to 18). The timber framed superstructure and ground floor landscaped gardens extend over the remaining area of the site (i.e. between gridlines 01 to 13).

Timber Frame Buildings Support Area

The timber frame building support area comprises 1 to 2-storey underground car park supporting 4-storey timber frame buildings referred to as Blocks A to E and a 5-storey timber frame building referred to as Block Z. The remaining area of the site consists of a ground level landscaped area. The timber frame buildings will be used for residential purposes only.

The timber frame buildings are supported on a 550mm thick reinforced concrete transfer slab. The one to two storey underground car park is below the transfer slab hence supporting the timber frame buildings. The single storey underground car park comprises a piled foundation raft with concrete columns supporting the transfer slab. The two storey underground car park comprises a piled foundation raft with concrete columns supporting an intermediate car park flat slab and further columns supporting the transfer slab. Thomasons undertook the detailed design of the concrete frame structure; this concrete frame structure was modelled using ESA-Prima Win finite element analysis.

Concrete Framed Buildings Area

The concrete frame buildings area comprises 1 to 2-storey underground car park supporting 4-storey concrete frame building and a 10-storey concrete tower block. The concrete frame buildings will be used for residential purposes only.

The concrete frame building and tower block are supported on a 900mm thick reinforced concrete transfer slab. The one to two storey underground car park is below the transfer slab hence supporting the concrete frame building and tower block. The concrete framed tower block and underground car park form a single independent structure; this structure is entirely a reinforced concrete structure supported on a piled foundation.

The floors for both the concrete framed buildings and tower block are of flat slab construction. The single storey underground car park comprises pile caps with concrete columns supporting the transfer slab. The two storey underground car park also comprises pile caps with concrete columns supporting an intermediate car park flat slab and further columns supporting the transfer slab. The car park basement slab was designed as a suspended slab spanning between the pile caps. Thomasons undertook the detailed design of the entire concrete frame structure; this concrete frame structure was modelled using ESA-Prima Win finite element analysis.

Design Challenges

1) Void formers were not adopted below the suspended foundation slabs in order to reduce the excavation depth. The reduced excavation depth was a requirement for a number of reasons which included (a) reducing excavation process, (b) reducing the spoil quantity that would need to be removed from the site and (c) reducing the height of cantilever retaining contiguous piled wall along the entire perimeter of the site in order to limit the ground deflection due to the close proximity of nearby existing buildings. As a consequence of omitting the void formers, the foundation slabs were designed for ground heave pressures. As the site is on a fairly steep slope, the ground heave pressure varies uniformly across the site. Using ESA-Prima Win, we were able to accurately simulate this varied loading directly onto the FE model foundation slab hence provide a more efficient foundation slab design and a more accurate pile design for the piles in tension. Furthermore, the reduced excavation depth enabled the adoption of a cantilever contiguous piled retaining wall along the entire perimeter of the site therefore reducing construction costs by keeping the site clear from any temporary prop obstructions.
2) The timber frame loadings were produced by the timber frame building consultant. There were many timber frame loadings on the transfer slab comprising of point loads and line loads. Nevertheless, although a time consuming and tedious process, the application of these loads using ESA-Prima Win was easy to apply. However, after completion of the detailed design of the concrete frame supporting the timber framed buildings, the timber frame loadings were changed therefore the whole exercise had to be redone. Fortunately it was easy and quick to re-apply these new loads to the ESA-Prima Win FE model.
3) Architectural changes included re-profiling a corner of the transfer slab within the landscaped area. The transfer slab was modelled as a single 2D element with all the timber frame loadings applied to this single 2D element. Nevertheless, using ESA-Prima Win we were able to modify the corner profile of the transfer slab without loosing any of the numerous timber frame loads.
4) The introduction of large openings within the slabs during late stages of the design process required modifying the FE model. This was easily undertaken with ESA-Prima Win and the areas affected were re-assessed and re-designed accordingly.
5) One of the tower cranes was founded on the piled foundation raft below the timber framed buildings in order to utilise the piled foundations. The crane base foundation was analysed using ESA-Prima Win which resulted in an economical crane base slab design and a reduction in the number of additional piles that would have otherwise been needed for an independent crane base.
6) ESA Prima was also used to model the complex core pilecap below the concrete framed tower block. This resulted in an economical pilecap design and pile design.
7) After reviewing the results from the ESA-Prima Win finite element model we were able to reduce the reinforced concrete transfer slab thickness hence provide considerable cost savings to the Client.
8) By modelling the tower block using ESA-Prima Win finite element package we were able to accurately assess the deflections of the cantilever concrete balconies. As a result we were able to maintain the long cantilever balconies detailed by the architect whilst meeting the maximum deflection requirements. Where deflections were excessive, in particularly at the glazed corners of the tower block, structural steelwork posts were provided to limit cantilever balcony deflections to acceptable magnitudes.
9) The degree of accuracy using the ESA-Prima Win finite element package enabled us to reduce the project cost by some £2 million, which was instrumental in making the project viable.

VK Engineering

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VK Engineering is the new identity of Ingenieurs- en Architectenbureau Van Kerckhove (Roeselare, est. 1952), Studium (Bruges, est. 1963), Bureau d'Etudes Coget (Brussels, est. 1974) and Ingénieurs Associés (Brussels, est. 1977).

Ingenieurs- en Architectenbureau Van Kerckhove, established by Hubert Van Kerckhove and managed by Peter Van Kerckhove since 1982, took over Studium in the same year and Coget in 2000. The expansion of the Van Kerckhove-group urged a more streamlined organization under the joint VK-label, regrouping the engineering services in 2002 in VK Engineering Building Services and Civil & Structural. Ingénieurs Associés reinforced VK in 2004.

With its steady expansion, VK enlarges its action radius, with regard to expertise and knowhow, as well as geographically. With offices in Brussels, Merelbeke, Bruges and Roeselare, employing about 150 people, VK is one the largest engineering firms of Belgium.

VK Engineering offers its knowhow and knowledge especially to the private market, more specifically offices, industrial, hospitality & leisure and the residential market. Through the years, it has put challenging and large-scale projects to its name. The new NATO-headquarters, the Mondrian business center, the Marriott-hotel (Ghent), the GlaxoSmithKline-complex (Waver), the new Antwerp Law Courts, the Charlemagne building (Brussels) and the Bruges Concert Building are but a few examples.

VK Engineering consists of a team of multidisciplinary consulting engineers. The firm is subdivided into cells, each one guided by an expert project director, and undertakes studies in building services and civil & structural engineering of prominent projects. It engages into various missions, from the study of new buildings, to renovations of (protected) monuments, assessments and management developments.

VK Engineering supports the architectural and industrial concept by its creative approach within a rational structure. In maintaining a smooth and coordinated cooperation in the various construction phases, the project is realized according to the concept of the designer and to the satisfaction of the client.

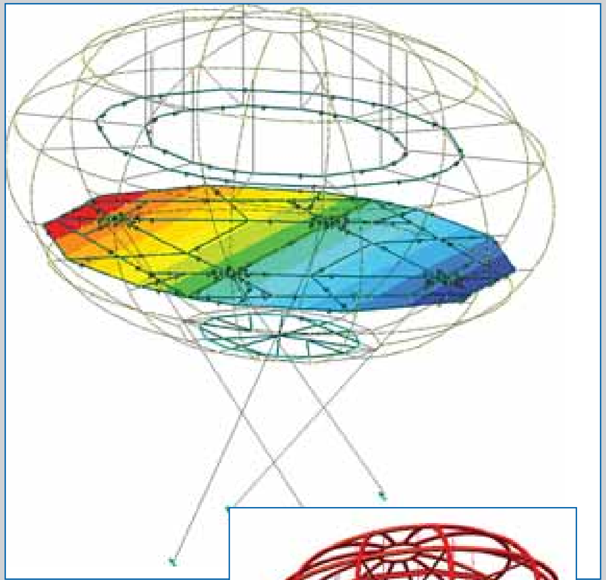
As a well-established engineering firm, VK Engineering evidentally also closely follows the newest and future developments, such as CDF simulations, night cooling, natural ventilation, activation of the concrete nucleus, geothermal studies, co- and trigeneration, solar collectors, ...

As such, VK Engineering is capable of offering its clients an integrated study and performing end product.

VK Engineering is equipped with an extended library, containing the most recent standards and technical data, and disposes of advanced soft- and hardware.

Used software • SCIA • ESA PT

City Hall Koksijde



City Hall Koksijde

The project regards the new town hall of the city of Koksijde; the engineering studies were entrusted to VK Engineering. VK Engineering created a 3D-drawing model of the entire construction that served as a working base for the architect and a starting point for all further execution drawings. The entire construction was modelled in 3D-software, keeping all necessary degrees of freedom in mind.
The building consists of 2 office wings, with an atrium in between of 25 by 25 metres, with a clear height of 20 metres. The office wings count 4 floors above ground level, which contains landscape offices. Slender steel constructions and the glazed atrium symbolize the transparency the town council wants to emanate.
The building can be accessed by a footbridge on the ground level.
In the atrium the central council chamber catches the eye, it is shaped like an elliptic structure, "floating" above the ground.

Introduction

At the moment, the communal services are scattered on different locations around the coastal town of Koksijde. The town of Koksijde organized a competition, to build a new town hall in the centre. Storme-Van Ranst made the design and the engineering studies of this project were entrusted to VK Engineering.

General description

The building consists of 2 office wings, with an atrium in between of 25 by 25 metres, with a clear height of 20 metres. The office wings count 4 floors above ground level, which contains landscape offices. Slender steel constructions and the glazed atrium symbolize the transparency the town council wants to emanate.
The building can be accessed by a footbridge on the ground level, and also has an entrance at the lowered square in front of the building. This lowered square can be accessed through huge steps, which can also be used as sitting benches during events.
In this atrium stands the central council chamber shaped like an elliptic structure, "floating" above the ground.

Technical data

Client: Town of Koksijde
Architecture: Storme-Van Ranst
Start date of works: April 2004
End date of works: December 2006
Glass façade atrium: 30 x 22 m (width - height)
Measurements atrium: 25 x 25 x 20 m (width - length - height)
Height columns: 6 m
Diameter columns: 711 mm
Thickness columns: 25 mm
Measurements elliptic volume: 14,5 x 19,5 x 11,5 m (width - length - height)

Importance, approach and result

Office wings

The entire building stands on a steel foundation, shaped like a floor plate. The office wings are constructed with columns and beams, that carry the on-site cast monolith floors. The flat plate floors guarantee a maximum of flexibility in arranging the office space. The ceiling plate stays visible and is used as a massive element in the night cooling process.

Atrium

The atrium is formed by the sidewalls of the office wings and by two impressive glazed curtain walls, supplying extra transparency. In order to neutralize gusts of wind, horizontal trusses on each level support the glazed surfaces.

The roof of the atrium is shed-shaped, with slanting sandwich boards and vertical glazing, in order to allow a levelled entrance of the northern daylight.

Central council room

The elliptic volume stands on 4 metal supporting columns, all slanting, and 6 meters high. All building services of the council room are housed within these columns. One 'leg' contains electricity and cables for data, another the plumbing. The other columns function as the supply and drainage of air of the HVAC-installations.

The council room is accessible through footbridges, connecting to the main footbridge that connects the two office wings.

The elliptic structure contains 3 levels.
- A technical room, transformable into an informal meeting room.
- The council room
- A public area

The volume is constructed from 12 vertical elliptic trusses, consisting of round steel pipes. Horizontally, connecting rings were inserted, also consisting of round steel pipes.

Inside the elliptic structure, 2 horizontal platforms form a pulling construction, preventing the trusses from opening up. The platform on the public level is hanging from the vertical trusses, in order to avoid disturbing supporting columns in the underlying council room.

The transit of the building services could not be interrupted at platform-height. The platforms were fixed with welding and bolts on massive transverse plates, with openings roasted in.

The steel structure is filled in with laminated elements, made specifically to fit. On top of this framework, a wooden boarding is attached, serving itself as rest for an aluminium coating. The inside of the volume is finished with insulation and a gyproc-coating.

The entire construction has a fire resistance of one hour, by means of fire-resisting paint that was applied after assembly.

SCIA software

VK Engineering created a 3D-drawing model of the entire construction that served as a working base for the architect and a starting point for all further execution drawings. The entire construction was modelled in 3D-software, keeping all necessary degrees of freedom in mind.

After calculating the structure, the most important distortion appeared to occur in a horizontal rotation, resulting from the slanting position of the supporting columns. This distortion was important for the locating of the main footbridge with the connecting footbridges that access the elliptic volume.

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Acoustic Enclosure Braemar GT13E2 Outdoor

Always ready for the future! WENDT SIT.

More than 125 years have now passed since the foundation of the first WENDT company in April 1874 in Berlin and the name WENDT SIT keeps on going for a high customer satisfaction through quality and service. In 1960 WENDT group shifted their activities to Ludwigshafen and around the turn of the century to Frankenthal.

From the classical supplier and manufacturer, WENDT advanced to be a service industry on technical matters presenting complete solutions from project planning to final assembly.

Highly motivated, flexible and experienced employees ensure a high quality standard documented by the certificates according to ISO EN DIN 9001 and the security management system (SCC).

The worldwide WENDT SIT activities comprise deliveries/ supplies of customized sound proofing systems, heat and low temperature insulations in terotechnology and the installation of power stations as well as high temperature insulations of various kinds in engine construction. Technical advice, specific solutions to problems, development of acoustic systems and silencers on which WENDT SIT has patents as well as individual engineering performances made us famous.

The WENDT SIT products are manufactured in own workshops and mounted through qualified employees worldwide. The documentation drawn up for this purpose enables the customer even to self-mounting. The WENDT SIT reference list reveals the trust of international companies: Alstom Power; BMW; EVOBUS; GHH; LINDE; MAN; KSB; MWM; SIEMENS; KAWASAKI; AUDI; BASF; VW; HOECHST; Braden Europe BV; DaimlerChrysler; Freudenberg; KK&K; LURGI; MTU; Rheinbraun; VEBA; VBA; Shell; BP; Esso. On a surface of 18.000m² is WENDT SIT in the position to realize all the customer's demands-both subject-specifically and fit in to schedule by means of fully automatic production lines controlled electronically.

In the year 2005 WENDT SIT had 120 employees and a turnover of 23 million euro.

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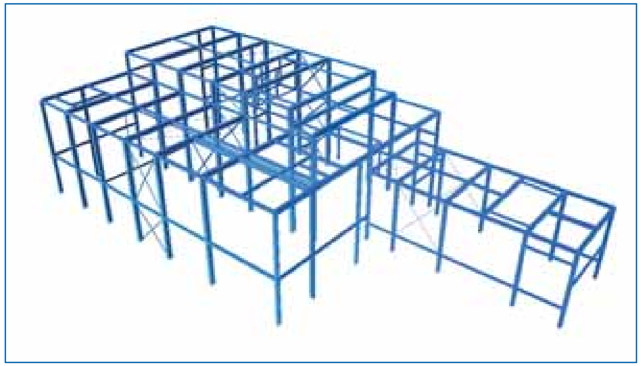
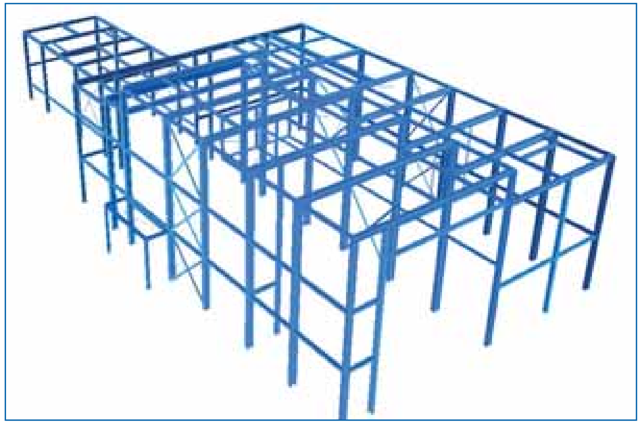




Acoustic Enclosure Braemar Outdoor

The outdoor acoustic enclosure is a part of a power station located in the west of Dalby in Australia. Wendt SIT GmbH & Co. KG was ordered to deliver three equal acoustic enclosures with a completely new design, which is expected to become an execution standard for future projects.
The enclosure is designed for an outdoor arrangement with the benefit to replace the turbine building of the power plant. This way of working leads to an enormous cost reduction and was one of the important arguments for the positive decision of the customer for this kind of execution.
The static system of the enclosure consists in the transverse direction of frameworks; in longitudinal direction it is stabilized by the roof and vertical bracings.
The static analysis acc. EC3 is calculated using a 3D-model.
Technical Data of the enclosure: Length 30,23 m; Width 14,13 m; Height 8,0 m; Weight of steel structure: ~ 70 tons per unit; Area of wall and roof elements: 1200 m²

Used software • ESA-Prima Win

Project Description

The outdoor acoustic enclosure is part of a power Station located in the west of Dalby in Queensland Australia. The site is described as Lot 128 on SP121102. The Owner is Wambo Power Ventures (ERM Power + Babcock & Brown Bank).
Three units (3xGT13E2-2 MXL, Turnkey EPC), which are designed in an equal way, will be executed. Wendt SIT GmbH & Co. KG was ordered to deliver these acoustic enclosures with completely new design, which is expected to become an execution standard for future projects.

The acoustic enclosure is designed for an outdoor arrangement with the benefit to replace the turbine building of the power plant. This way of working leads to an enormous cost reduction and was one of the important arguments for the positive decision of the customer to this kind of execution.
The shown acoustic enclosure has the function to reduce noise emissions caused by a gas turbine and its connected generator. The enclosure is divided into 4 different compartments, one for the gas turbine, one for the auxiliary, one for the diffuser and one for the generator. Special operation conditions have to be considered during design period to meet the technical requirements of the project.

The enclosed machinery has a big heat loss, so the acoustic enclosure has to be equipped with a ventilation system to fulfil maximum interior temperatures lower than 60°C. Higher temperature inside would be harmful for the electrical equipment and would also not allow access of maintenance personnel during operation. Special attention was paid to the hazardous area inside the gas turbine compartment, which is possible to occur, by a leakage in the turbo machinery system.
The acoustic panels of the enclosure have the advantage to be removable without loosing any connection elements. The wall and roof elements are executed weather- and gas tight as well.
Over the generator building is a filter house. The loads resulting from it are derived by their own steel structure.
The structural steel structure is used to support the piping of the machinery.

A lot of interfaces of components by others had to be considered during design period. Several penetrations caused by the generator bus duct, turbine diffuser, ventilation ductwork and piping are integrated into the design of the acoustic enclosure.

Static System:
The static system of the acoustic enclosure consists in transverse direction of frameworks. The building in the longitudinal direction is stabilized by the roof and vertical bracings.
The static analysis acc. EC3 is calculated using a 3D-model to optimise the weight of the structural steel.

The columns of the steel structure are aligned in a way that the front flanges of the column sections have the same outline dimensions to allow easily assembly of the wall elements.

Therefore additional eccentricities had to be considered. The steel structure is designed for easy disassembly to allow fast access to the machines for maintenance and repair purposes.

Wendt SIT GmbH & Co. KG delivered the following components

Software:
Acoustic design of the enclosure elements including splitters silencers of the ventilation system
Complete design, layout -, outline-, detail- & erection drawings
Static analysis of the steel structure and structural parts of the enclosure including the consideration of seismic & wind loads.
Design of ventilation system, fans and filters
Design of electrical equipment & illumination calculation

Hardware:
Structural steel structure
Platforms, stairs and ladders
Wall and roof panels
Ventilation systems and filters
Fans
Lighting
Seaworthy Packing

Technical Data of the enclosure:
GT-Compartment
Length 13,9 m; Width 7,7 m; Height 8,0 m

GENO-Compartment
Length 10,9 m; Width 4,9 m; Height 4,2 m

AUX-Compartment
Length 13,9 m; Width 6,3 m; Height 6,5 m

Diffusor-Compartment
Length 5,4 m; Width 14,0 m; Height 8,0 m

Weight of steel structure: ~ 70 tons per unit
Area of wall and roof elements: 1200 m²

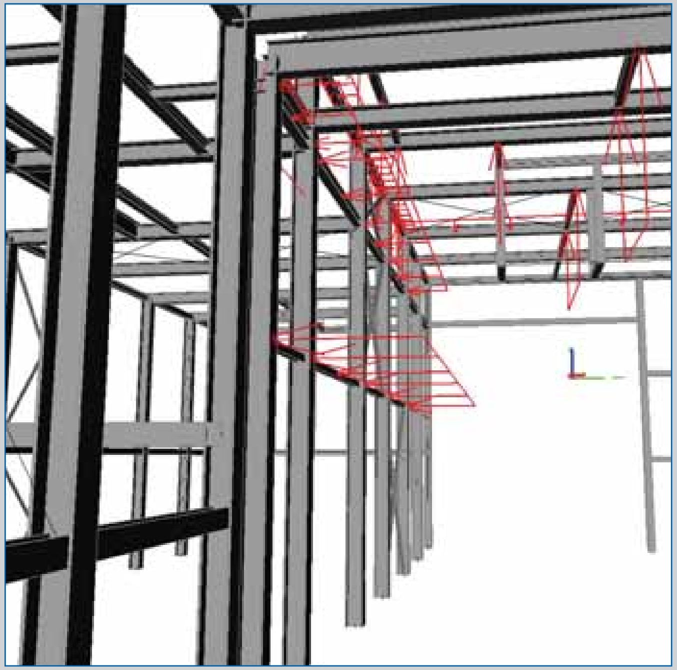
Program description:
Software used for the calculation: ESA-Prima Win 3.60

Advantages of software:
During the design phases several calculations were made to find an optimised solution. With ESA-Prima Win it was easy to perform the different checks.

The load cases can be easily generated with the graphic load generator

The stress calculations and design of frame corners was executed with ESA-Prima Win as well.

Special requirements:
The calculation considers the local seismic and wind loads (Australian Standard)

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Een vraag
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le Centre Information Acier
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journée construction acier ● concours construction acier ● journée professeurs ● journée acier étudiants ● prix acier étudiants ● visites de projets ● cours et formations ● éditions techniques ● bibliothèque ● magazine ● site web ● helpdesk gratuit ● sécurité incendie des bâtiments en acier ● ...
vele voordelen voor onze leden ● de nombreux avantages pour nos membres

Category 5

CAE Special projects (ESA)

5

Stageco Belgium NV

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Fax +32 016 60.10.61
Contact Mr Tom Frederickx
Email tom.frederickx@stageco.com
Website www.stageco.com

Category 5 Winner Special projects

STAGECO® STAGING GROUP

WINNER WINNER WINNER WINNER WINNER WINNER

Stageco, based in Tildonk (B), is an internationally organized staging company, which originated in 1984 from the renowned Rock Werchter Festival in Belgium.

In spite of its long and rich tradition, Stageco remains a pioneer 'pur sang' and a trendsetter in a market at which creativity and technical know-how inextricably go together. That is the reason why our customers prefer the original to a copy.

Stageco took important steps during recent years to provide the expertise it has built in the international touring market (with customers like the Rolling Stones, U2, Bon Jovi, Bruce Springsteen and numerous other artists) to the corporate world. Consequently Stageco has already produced an astonishing list of successful projects in this new market segment.

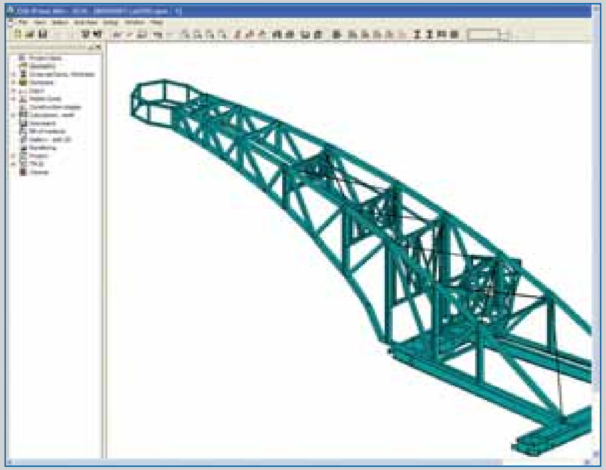
Be it product launches, presentations, sponsored events, ... in close co-operation with the customer Stageco always succeeds in translating its entertainment experience towards the corporate world. Stageco creates an environment in which people can witness an event in a unique atmosphere.

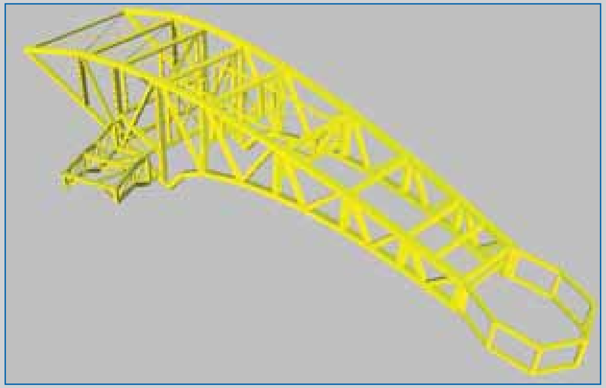
For more information you can visit our website www.stageco.com or email to info@stageco.com .

References 2005 and 2006:
- U2 'Vertigo' 2005
- Rolling Stones 2005 – 2006 'Bigger Bang'
- Olympic Wintergames, Torino 2006
- Robbie Williams 'Close Encounters' 2006
- Bon Jovi 'Have a nice day' 2006
- Football Worldchampionships, Germany
- ...

Quote of the jury:
"An excellent example of a Design-to-Operate project, where not only the original design of the structure, but also the erection and dismantling phases needed to be simulated using CAE software."

Robbie Williams Close Encounters 2006





Used software • ESA-Prima Win

Project data

Height: ± 22 m
Overhang: ± 13 m
Loadcapacity overhang: ± 9 tons
Global capacity complete stage: ± 65 tons and ± 24 tons use load on work platforms
Mass: ± 300 tons (14 trailers) / set (2 complete sets are built)
Name of project: Robbie Williams 'Close Encounters' 2006
Production manager: Wob Roberts
Architect: Mark Fisher (Stufish)
Technical coordinator: Jeremy Lloyd
Project manager: Dirk Dedecker (Stageco)
Engineering steel structure: Tom Frederickx (Stageco)
Designing steel structure: Koen Peeters (Stageco)
Set production: Brilliant Stages (GB)
LED video system: XL video (B)
Location: mobile structure; trucked, shipped and flown around the world.
Building sequence: 2 days building up, production day, show day, 12 hours take down and loading, 1 or 2 travel days, ...

Description

The clients' brief was to design, fabricate and operate a portable structure to host one of the most popular artists of the moment: Robbie Williams. The planning for this 'World Tour' started early 2005. The choice of Stageco as the main contractor for the structural elements was based on previous working experiences the Robbie Williams production had with Stageco. The first sketches were made in December 2005 and the delivery date for both identical structures was beginning of May 2006. Very early in the design process, a calculation model was created to assess the influence of the overhang, use loads and wind loads on the overall stability and to determine which profiles would have to be used.

Specific constraints to the structure were that it should be possible to build it within 24 working hours and to dismantle it and load it on its 14 trucks in 12 hours. This very tight schedule was needed to assure a good flow of all the different concerts. Basically, while one of the stages is in use, its twin brother will be either on the road or being built or dismantled. To allow a swift installation of decoration, lights and videoscreens the two structures are absolutely identical and always built identically.

Structural calculations, together with the first cad drawings, allowed the project team to present a budget. Shortly after - we are speaking mid January 2006 - followed by the client's final approval.
During the upcoming period the final design had to be done. As usual, numerous extras and modifications had to be taken into account.
E.g. an outrigger for the main pa cluster had to be integrated in the scorpio, but it speaks for itself that it had to fit into the overall look of the main structure. We also had to find a way to get Robbie Williams up on the scorpio, so a 1-person elevator and complementary staircase and catwalk were designed and integrated, ...
The scorpio structure was designed to carry a rigging load of 9tons and to withstand a windspeed of 72 km/h in use and 130 km/h out of use.

The complete package of calculations and drawings was sent to the German TÜV for final approval.

Beginning of May 2006 a complete testbuild was done at a secret building site to assure all fabricated parts fitted well together. Only then all structures were shipped out. The tour started June 2006 and travelled to 19 different cities in Europe where Robbie performed 40 shows for a total audience of 2.000.000 people.

Mid September all the equipment, that had been designed to fit 40ft sea containers, was shipped to Australia, where the tour came to an end with another 9 shows in 5 cities.

Use of ESA-Prima Win

The structure was modelled with ESA-Prima Win 3.60.420. The scorpio itself was drawn in AUTOCAD 2007 and imported in ESA-Prima Win as a dxf-file.

The difficulties by calculating the scorpio were the huge eccentricities. Firstly because the bottom part of the scorpio needed to be open to hide production items (cables, motors, ...). Secondly because the scorpio had to be designed in several smaller parts to make building and transportation easier. Of course the structure had to be light but rigid, while it was going to be on the road for quite some time and would be built a lot of times. As in all our projects, transportation cost was a major issue.

The standard Stageco Elements weren't modelled in detail while, with this number of elements, the file size would increase significantly. That's why these standard frameworks (towers and trusses) were modelled as one line with the characteristics of these typical elements. To check these elements the inner forces were used and checked in a specific spreadsheet.

To show the difference between the simplified ESA-Prima Win model and the CAD-drawings, screenshots of both programs are given.

Used modules:

- English language
- 3D-FRAME
- Non-linearity (tension only)
- Steel Code Check EC3

Robbie Williams Close Encounters 2006

The clients' brief was to design, fabricate and operate a portable structure to host one of the most popular artists of the moment: Robbie Williams. It had to be ready for his World Tour. The choice of Stageco as the main contractor for the structural elements was based on previous working experiences that the Robbie Williams production had with Stageco. The first sketches were made in December 2005 and the delivery date for both identical structures was beginning of May 2006. The tour started June 2006 and travelled to 19 different cities in Europe where Robbie performed 40 shows for a total audience of 2.000.000 people, followed by an Australian part of the tour.
Specific constraints to the structure were that it should be possible to build it within 24 working hours and to dismantle it and load it on its 14 trucks in 12 hrs.

Ing. Adolf Godík

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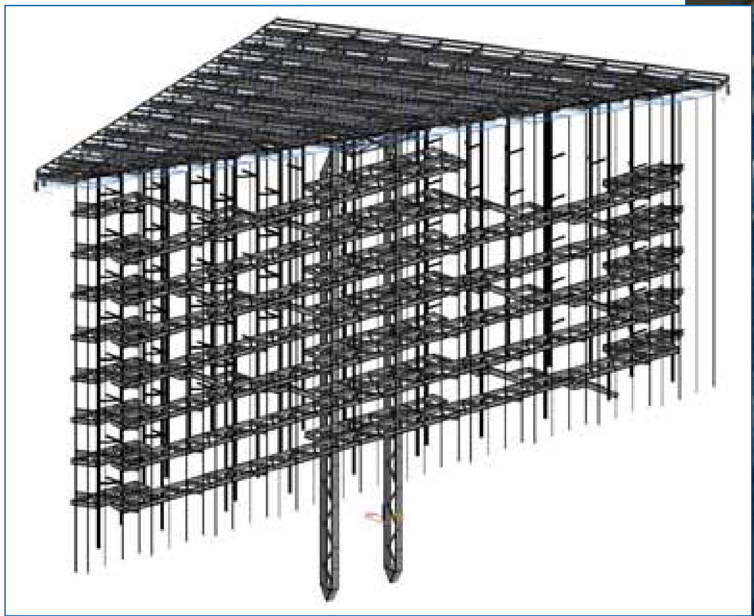
NOMINATION NOMINATION NOMINATION

One man engineering office specialized in steel and concrete structure design. The company has more then 15 years of experience in static analysis and design drawings. The mission is to contribute to efficient and well designed structures, which are not only practical but also nice.

Key activities:

- Steel buildings
- Concrete buildings
- Prefab buildings

Equipment: ESA-Prima Win, SCIA • ESA PT, AutoCAD



River City Prague

Used software • SCIA • ESA PT

Analysis of the Atrium Steel Structure

General Designer: STRABAG a.s.
Author of Design: RFR Paris, Jean Lelay
Structural engineer: PARS Building s.r.o. ing. Jaromír Tomek
Workshop documentation: PARS building s.r.o. ing. Jaromír Tomek
Reviewer: Ing. Adolf Godík (BUREAU VERITAS)

According to the orders of the general designer, this document contains a comparison of the authors´ design of the Atrium steel structure with realisation of the documentation by the structural engineer.

Basic data

The following data and documents were used for the comparative stress analysis:

- Stress analysis - PARS Building
- Workshop documentation - PARS Building
- Design documentation - RFR Paris – Fragments without static calculation

Used resources

FEM stress analysis software: ESA Prima Win 3.40.04
Spreadsheet program: Microsoft Excel

Used codes

DIN 18 800 Design of steel structure
DIN 1055 Loads

The elastic check was made according to T1 article 750. The limit for the torsional check was 0,1. All sectional characteristics of all general sections were calculated with FEM analysis.

Structure description

The steel structure consists of truss lift columns as a grand load bearing structure, which is dominant for all vertical members. The roof is made with a system of rods, tube columns and T-beams, which form the bearing structure of the roof and facade glazing. Steel structures compose the southern atrium of the building. All possible temperature changes are taken into account. The anchorage of the system is especially designed to reduce the forces coming from this changes.

Structural stress analysis

This calculation was done as a 3D analysis with loads fully based on DIN 1055. The software calculates all possible combinations and adds together the appropriate maximums with the appropriate combination factors. Only an exemplar part of the structure was printed for this review as a representative extract.

Analysis tasks

The first task is to model and evaluate two different designs, the second task is to compare the results, advantages and handicaps.

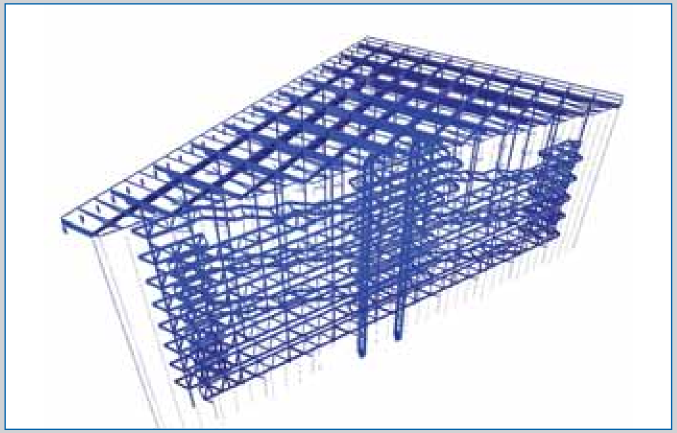
Evaluation

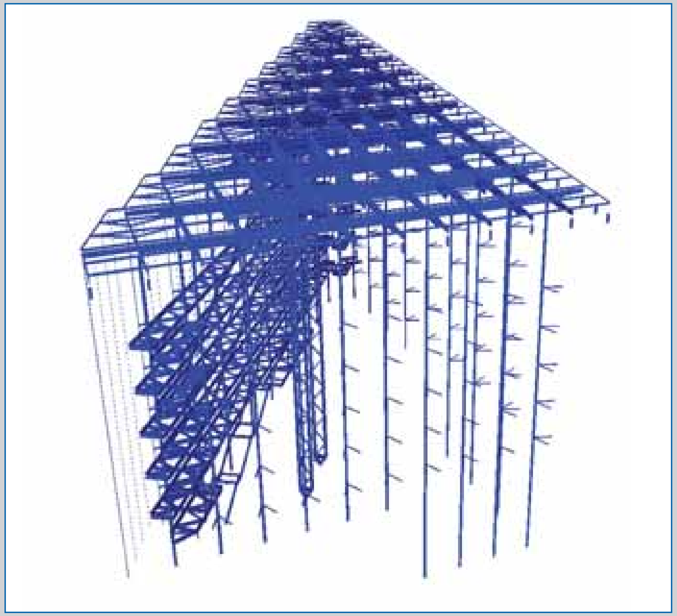
1. RFR - Paris Structure - T-beams with one brace
   According to our analysis this structure is insufficient. See the members with red area of sections efficiency.
   The first basic handicap of the structure is sections insufficiency between ca 1,2 to ca 3,7.
   The second handicap – T- beams with only one brace is the static system with tendency of infinity growing deformations in case of insufficient torsion rigidity of the supporting beam (in this case a triangle beam with insolvable torsion)
   The third handicap – torsion of the triangle beams – there is an absence of theory, we have no possibility to make correct physical or engineering calculations to solve this problem and make the structure infallible.
   The fourth handicap – buckling of the lower strips of the triangle beams is an unsolvable problem.
   This structure cannot be realised without additional comments.

2. PARS - Building Structure - T-beams with two braces
   According to our second analysis the structure is in limit or slightly over. Additional second braces eliminate the torsions' problem and assure the stability of the T- beam cantilever. Buckling of the lower strips of triangle beams remains only on the primary beams.
   According to this calculation, the infallibility of this system is sufficient. Reserves in critical parts of beams are still very small and the stress in some parts of beams is in area of material plasticity. It could cause growing deformations. Such structures could be too sensitive to many different small accidents as a fire and dynamic accidents etc.
   All analysis details and more/all information are in electronic form and it is possible to make complementary documents.

Conclusion

Such an important structure with great impact on a public area with high traffic has to be systematically constructed with more attention to safety, taking financial demands into account.





River City Prague

The project concerns an atrium in the city of Prague. The steel structure consists of truss lift columns as a grand load bearing structure, which is dominant for all vertical members. The roof is made with a system of rods, tube columns and T-beams, which form the bearing structure of the roof and facade glazing. Steel structures compose the southern atrium of the building. All possible temperature changes are taken into account. The anchorage of the system is especially designed to reduce the forces coming from these changes.

Vessel for dangerous liquid waste treatment calculation

Ing. Daniel Bukov OK TEAM

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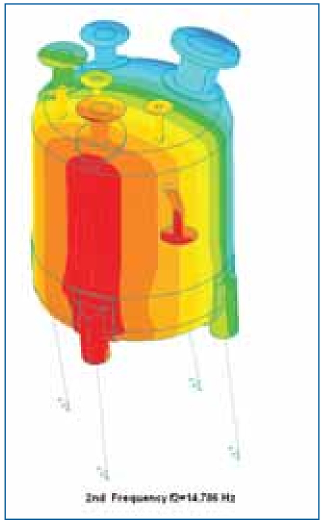
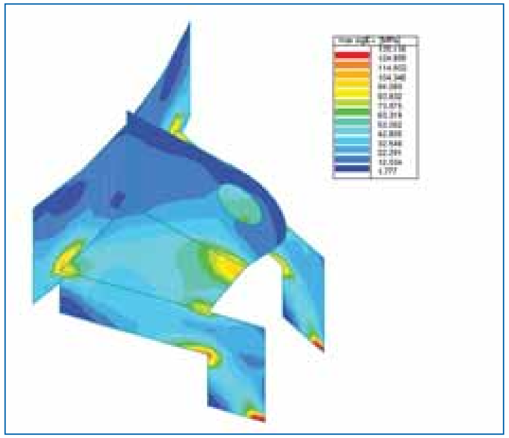
The small private company of Ing. Daniel Bukov OK TEAM is specialised in the structural analysis of buildings as well as technological objects as pipes, vessels, bearing parts of machines, ...

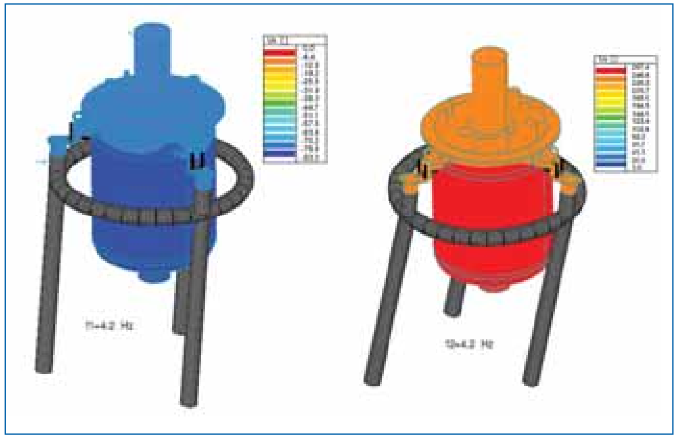
I started my own small firm, as one of the many structural engineers in Slovakia in 1991. At that time I worked as a structural designer in one of the biggest Slovak designing companies.

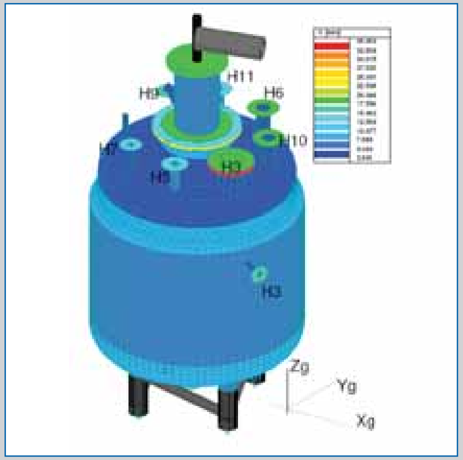
From the year 2001 on, I worked as a private structural designer, mostly for conceptual structural designers and for making calculations.

During this time a lot of things changed in my professional life: increased efficiency of computers, of operating systems and of course of computers program. In the beginning, I worked with the computer program NE-XX, SAPIV running under DOS, later on with FEMDESIGNER, STRAP, STAAD, SAP2000 and of course with ESA-Prima Win.









Used software • SCIA • ESA PT, ESA-Prima Win

The presented project is about the realisation of special small vessels for very dangerous nuclear waste treatment. This project includes more than twenty different apparatus which were produced by the Slovak company TECHNOS Ltd. The main task for our firm was to perform the structural calculation of the vessel shells, nozzles and anchoring of the vessels. The input for the calculations was taken from data sheets and from the shop drawings of the vessels. All designed tanks were also checked for seismic resistance. The main aim of the calculations was to calculate the internal force stresses: in test condition, in normal operation and extraordinary operation, including also seismic effects.

Structural calculation

The design of the vessel is always connected with the use of relevant codes like ASME, AD-Merkblat and Eurocodes. Relevant codes usually calculate the mechanical resistance of the parts of the vessel with some influence of the connected parts. The advantage of such an approach is a relatively simply calculation based on formulas. The accuracy of such an approach depends on the shape and on the character of the loads.
For the calculation of the vessels with different shapes and different loads as mentioned in the code, we can use a similar vessel. For the calculation of such "uncommon " vessels we can use the finite elements method.

Computational model

Vessel shells are modelled by shell elements and legs and other supporting parts are modelled by beam elements. The modelling of the main parts is clear. An important task is how to model the connection of the parts as reinforcing plates, rings and collars by welds. The reinforcing part is connected with the shell, which is reinforced only in the part of the welds.
The connection of the parts could be modelled as part of the shell, which is perpendicular to main shape. In this case we can use intersections of the shells very effectively. Intersection of the shells in the ESA-Prima Win and SCIA • ESA PT is a very effective tool for the modelling of the vessel. Without these tools it is unimaginable to create a computational model of the vessel where nozzles connections supports reinforcing parts.

Method of calculation

Calculations of the seismic response of the vessel with liquid inside can be performed by two approaches, firstly a time history response on the accelerogram. The liquid in this case is modelled by fluids elements. Secondly we can use the linear response spectra method for the calculation of the forces in the supporting parts and quasi-static method for calculation vessel shells. Important for this approach is to use appropriate modelling of the liquid. Part of the liquid inside of the vessel has to move unisons with the vessel (impulsive mass) and a smaller part of the mass moves independently on the vessel (convective mass). The first portion of the liquid mass can be modelled as a mass connected with the shell. The second part can be modelled as elastically connected with the shell by the springs. The system of the springs has to have the same frequency as calculated by the code. From the analysis of the system by linear response spectra we received internal forces and stresses in the shell. It is important where the anchoring points of the vessel are located. Modal shapes and own frequency of vibration are important for the bending mode approximation. On the basis of the frequency of the bending mode of vibration, we are able to approximate seismic acceleration.

Method of checking

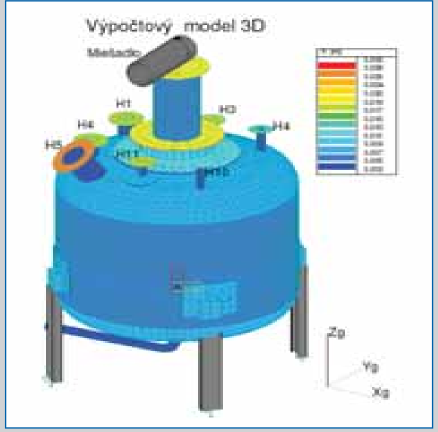
Stresses in the shell are compared with stresses allowed by codes. As is known in the location of singularities the stresses are very high. For singularity problems solution we used formulas mentioned in codes and check the stresses accordance with the codes. Very important is origin of the stresses. Different values are allowed for stresses from bending moments a different from membrane forces.

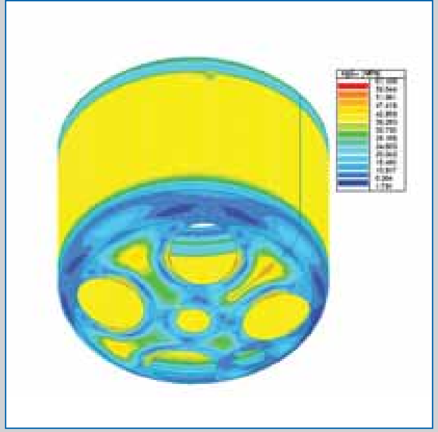
Software use

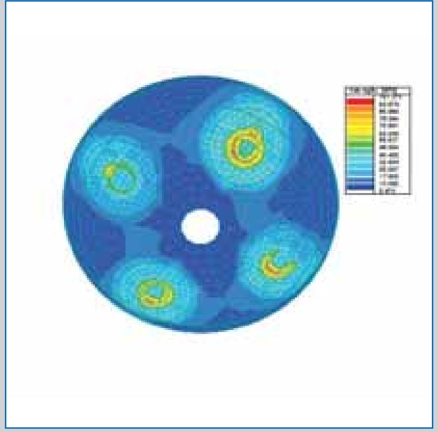
Calculation was performed by ESA-Prima Win. MathCad 2001 Professional was used to perform additional calculation.

Obtained result & conclusions

Internal forces stress deformation and also modal parameters of the vessel were obtained from calculation. Without usage of the complex model of the vessel the results would not be so precise. Based on this calculation, the vessel was checked according to the code.







Vessel for dangerous liquid waste treatment calculation

The presented project regards the design of special small vessels for very dangerous nuclear waste treatment. It includes more than twenty different apparatus which were produced by the Slovak company TECHNOS Ltd
The structural analysis of the vessels is performed by a combination of the FEM method and the analytical method. For the shell, the modelling intersection modulus of ESA-Prima Win is used. The seismic response is solved by the linear response spectra. Stresses in the shells are checked according to the codes.

VK ENGINEERING

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VK Engineering is the new identity of Ingenieurs- en Architectenbureau Van Kerckhove (Roeselare, est. 1952), Studium (Bruges, est. 1963), Bureau d'Etudes Coget (Brussels, est. 1974) and Ingénieurs Associés (Brussels, est. 1977).

Ingenieurs- en Architectenbureau Van Kerckhove, established by Hubert Van Kerckhove and managed by Peter Van Kerckhove since 1982, took over Studium in the same year and Coget in 2000. The expansion of the Van Kerckhove-group urged a more streamlined organization under the joint VK-label, regrouping the engineering services in 2002 in VK Engineering Building Services and Civil & Structural. Ingénieurs Associés reinforced VK in 2004.

With its steady expansion, VK enlarges its action radius, with regard to expertise and knowhow, as well as geographically. With offices in Brussels, Merelbeke, Bruges and Roeselare, employing about 150 people, VK is one the largest engineering firms of Belgium.

VK Engineering offers its knowhow and knowledge especially to the private market, more specifically offices, industrial, hospitality & leisure and the residential market. Through the years, it has put challenging and large-scale projects to its name. The new NATO-headquarters, the Mondrian business center, the Marriott-hotel (Ghent), the GlaxoSmithKline-complex (Waver), the new Antwerp Law Courts, the Charlemagne building (Brussels) and the Bruges Concert Building are but a few examples.

VK Engineering consists of a team of multidisciplinary consulting engineers. The firm is subdivided into cells, each one guided by an expert project director, and undertakes studies in building services and civil & structural engineering of prominent projects. It engages into various missions, from the study of new buildings, to renovations of (protected) monuments, assessments and management developments.

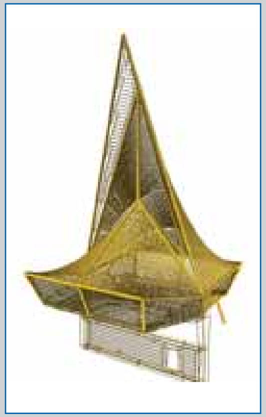
VK Engineering supports the architectural and industrial concept by its creative approach within a rational structure. In maintaining a smooth and coordinated cooperation in the various construction phases, the project is realized according to the concept of the designer and to the satisfaction of the client. As a well-established engineering firm, VK ENGINEERING evidentally also closely follows the newest and future developments, such as CDF simulations, night cooling, natural ventilation, activation of the concrete nucleus, geothermal studies, co- and trigeneration, solar collectors, ...

As such, VK Engineering is capable of offering its clients an integrated study and performing end product.

VK Engineering is equipped with an extended library, containing the most recent standards and technical data, and disposes of advanced soft- and hardware.

Used software • ESA-Prima Win

Roofs Courthouse Antwerp



Roofs Courthouse Antwerp

This project regards the new law courts in the south of Antwerp; it fits in with the large revitalization activities in this part of the city.
The law courts are designed as an open house. Large glass surfaces connect the judicial services with the citizens of Antwerp and offer marvellous sights on the city.
The pointed, cone shaped, roofs are without doubt the most striking characteristic of the buildings, they peak at 41 metres above ground. The roof structure is a grid of linear and spatial metal bars, connected through hinging joints. It rests only on 14 points of support, not on the facades
Footbridges without intermediate support and as wide as the central hall hang underneath the roof construction. They connect the office wings on both sides of the hall.

Introduction

The various judicial services of Antwerp urgently needed new law courts, as they were suffering from an acute lack of space and being scattered all over the city. At the request of VK, Richard Rogers and Arup signed up for the public competition for new law courts on the Bolivar place, organized by the Buildings Agency.

The project of the temporary association RRP - VK - Arup is a gateway for Antwerp, entering or leaving the city from the south. It stands on a prominent place, at the end of the “leien” (main streets of Antwerp), on a location where Antwerp always has had a focal point, that is ‘The Spanish Citadel (from 1571 until 1894) and the South Station (“the cathedral of the South”) until 1966.

Furthermore, the law courts project was seen as part of a revitalization process of the south of Antwerp.

Description

The new law courts are designed as an open house. Large glass surfaces connect the judicial services with the citizens of Antwerp and offer marvellous sights on the city. This not only enhances the transparency, literally and figuratively, but it also insures a good system of finding one’s way.
Sustainability was another key word. The Buildings Agency stipulated that they wanted a building that didn’t need mechanical cooling in the offices. As such, the law courts make an architectural as well as an environmental statement
The construction counts 6 office wings, placed around a central public space, the ‘Salle des Pas Perdus’ (Hall of Lost Paces).

From the Bolivar place, a monumental staircase mounts up to this imposing but light reception space, which acts as an extension of the public square. From the hall, 6 office wings stretch out (3 on the left and 3 on the right hand side) and are connected on the 2nd floor through walking galleries. The more public functions are situated directly near the hall; the parts that are more inaccessible for the public are situated further down the wings.
In between the office wings, inner yards were laid out, offering a green sight for the office workers and cooling down the warm air that flows between the office wings.
With 1 level underground (cells and parking) and 5 levels above ground, the building measures not higher than 15,75 metres.
The complex circulation-system of law courts, in order to protect privacy and for security reasons, demands that private and public circulation are clearly separated. Therefore, the project team decided to put the actual courts (26 smaller courts and 6 larger courts) on top of the building, above the offices of judges, administration, ...

In this configuration, the courts almost float above the building and are crowned with striking cone-shaped roofs. The roofs on the large courts peak at 41 metres above ground.

Technical data

Public tender organization: Buildings Agency
End user: Federal government service of Justice
Architecture: Richard Rogers Partnership - VK STUDIO - Arup
Duration of the works: April 2001 to October 2005
Surface terrain: 3,7 ha
Gross surface: 78.000 m²
Facade height: 18 metres
Facade width front: 300 metres
Facade width back: 240 metres

Roofs on courts
Start placement roofs: July 2003
End placement roofs: mid 2004
Height large roof: 25 metres (41 metres above ground)
Height small roof: 7 metres (18 metres above ground)
Weight large roof 24 tons
Weight small roof: 18 tons
Gauge inox coating: 0,4 mm
Surface inox coating: 16.000 m²

Roof structure public hall
Start placement steel structure: March 2004
End placement steel structure: June 2004
Measurements: 60 metres x 70 metres
Weight steel construction: 240 tons
Painted surface steel structure: 2.400 m²

Importance, approach and results

Roofs of the law courts
The pointed roofs are without a doubt the most striking characteristic of the law courts. The applied structural concept, material and construction method resulted from a thorough analysis, considering all pros and cons of the various options. Through wind tunnel tests, the most unfavourable wind charges were determined and wind disturbance on the surroundings analysed.
The results of the tests, combined with other forces (influenced by temperature, snow and finishing materials), gave the necessary data to be able to calculate all structures three-dimensionally.
Also, the calculated distortions of the structures had to be checked with the compliance of the finishing materials.

At the end, the project team opted for a hyperbolic paraboloid or hyparscale. This figure has a great advantage: it can be constructed from linear elements, allowing for a simple method of covering and coating it.
One roof is composed from 4 connected quadrants (2 high and 2 low quadrants), each a hyparscale in a square base.
The linear elements, as a filling-in of the quadrants, are executed in a “woven” wood-structure, using planks screwed on top of one another and fixing them on a centring. This allows for the coating to follow the curved form perfectly.

The wood-structure is left visible on the inside, for the public to view the forces within the structure.
During the conception phase, all possible finishing materials were considered. The hyperbolic paraboloid form of the roofs, specific connecting details, maintenance demands and sustainability and the transition from horizontal to slanting planes decided in favour of inox. Folded stainless strip steel was welded together by means of a continuous weld.
The quadrant-construction-method made it possible for the roofs to be constructed completely off-site. After their transport on the river Scheldt, the segments were connected and mounted in a minimum of time and without scaffolds.
The pointed roofs act as membranes, all charges are transferred to the underlying structures through normal forces.

Roof of the central public hall
The roof is a complex spatial structure, composed of triangle sections. Several junctions and points of support, situated at several levels in the space, hold the entire roof together.
Eight of these points of support are spatially fixed: they are situated at the ground level of the central hall, in between the office wings. Six other junctions are situated at the concrete platforms of the large courts and are floating. This means the roof structure can’t be used to transfer the gravitational forces of the six high pointed roofs of the large courts.
The roof structure is a grid of linear and spatial metal bars, connected through hinging joints. The pressure of the roof is resting on the top girders, which are connected with vertical rod resistors to subtending cables and bars.
Horizontally, the roof offers support for the façade at the front and the back, but vertically the roof is completely unattached. In other words, the roof rests only on the 14 points of support mentioned above, not on the facades.
Footbridges without intermediate support and as wide as the central hall hang underneath the roof construction. They connect the office wings on both sides of the hall.
As well as the charges of its own weight, the roof is covered with doubled-glazed frames and sandwich boards. The glazing is doubly isolated, in order to prevent condensation.
The most important external charges are snow and wind. In order to withstand these influences, wind tunnel tests were applied.
A CFD simulation tested the roof structure in case of fire. The results showed that the temperature of the steel construction would not rise above 140°C in case of a standard fire, making it unnecessary to provide the structure with a fire resisting paint.

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B.E.L
Bureau d'Etudes Lemaire

Couverture de terrains de sports

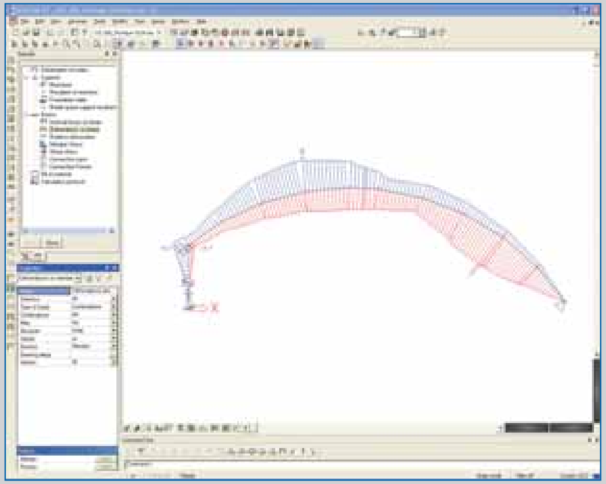
Bureau d'Etudes Lemaire

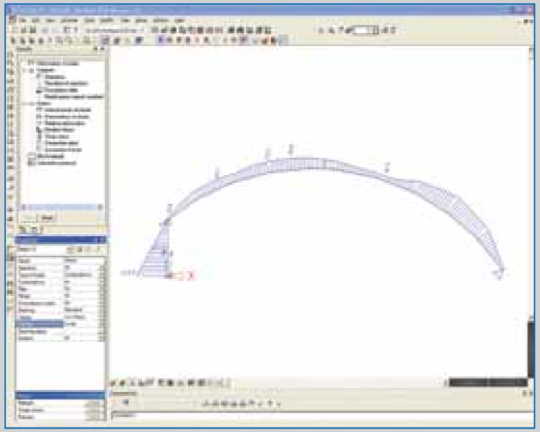
Créé en 2000, le Bureau d'études Lemaire sprl réalise des études techniques dans les domaines de l'industrie, du génie civil, du bâtiment et des infrastructures. Il se distingue par son dynamisme, son savoir-faire et ses compétences.

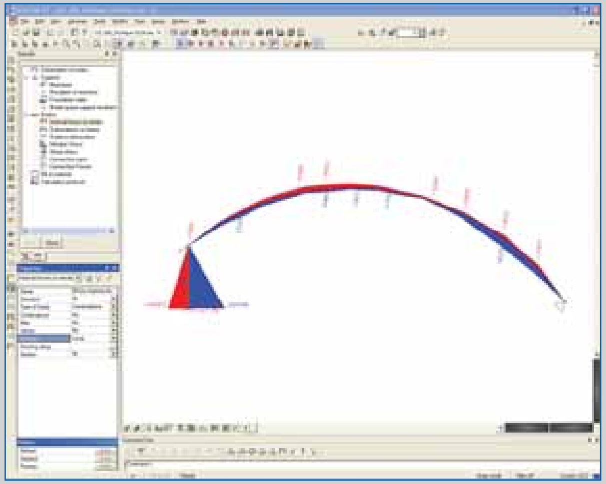
Dès la naissance d'un projet, le Bureau d'Etudes Lemaire sprl s'efforce de dégager des solutions techniques créatives et originales respectant la dimension architecturale souhaitée par son concepteur. Avec des outils informatiques performants et à la pointe de la technologie, le Bureau d'Etudes Lemaire sprl offre un service moderne, innovant et de qualité.

Architecte

Blafart-Ciplet-Dumongh
Rue du Pont
Huy (Belgique)







Used software • SCIA • ESA PT

Conception

Le projet consiste à couvrir un espace multisports existant. La hauteur sous structure est de 5,25 m au point le plus bas et de 7m61au point le plus haut.

La couverture a été conçue de manière la plus légère et la plus simple possible. Le choix s'est naturellement porté sur une structure métallique et une couverture translucide.

Les portiques ont été réalisés à partir de tubes rectangulaires cintrés, terminées par des assemblages de type rotules. Le point bas du portique est repose sur un plot en béton préfabriqué tandis que point haut est fixé sur une colonne métallique circulaire encastrée en son pied. La structure en acier est traitée par métallisation et mise en peinture.

Le dimensionnement de l'ensemble de la structure a été optimisé au moyen du logiciel de calcul SCIA • ESA PT.

La forme cintrée de la couverture permet à la fois :
- De créer un volume intéressant, non seulement pour l'esthétique mais également afin de protéger au mieux l'aire de jeux des vents et des pluies dominantes.
- De résoudre au mieux le problème de l'arrachement au vent, le principe initial étant de couvrir mais pas de fermer l'espace de jeu.

La couverture translucide atténue l'effet de fermeture supérieure et permet de conserver l'idée première d'une aire de jeux en plein air, ceci par l'apport maximal de lumière naturelle. L'édifice est muni d'un éclairage spécifique qui permet la pratique du sport en soirée.

Covering of sports centres of Andenne, Ans, Antheit, Fléron and Hannut

The project consists in covering an existing outdoor sports space, in order to protect it from dominant rains and winds. The easiest and lightest way to do this is to use a steel structure, covered with a translucent roof.
All the gantries are curved rectangular hollow sections with a hinged connection at both ends. Their height varies between 5.25 and 7.61 meters. The lower end is connected to a prefabricated concrete bloc, while the upper end is connected to a circular hollow section column that is fixed on the ground. The curved shape is ideal to resist strong wind effects due to the fact that the playground remains open.
The structure design was optimized by the SCIA • ESA PT software.
Daytime, the natural light goes through the structure, so that the playground doesn't seem to be covered. A specific lightning is also provided to enable the people to play at night.

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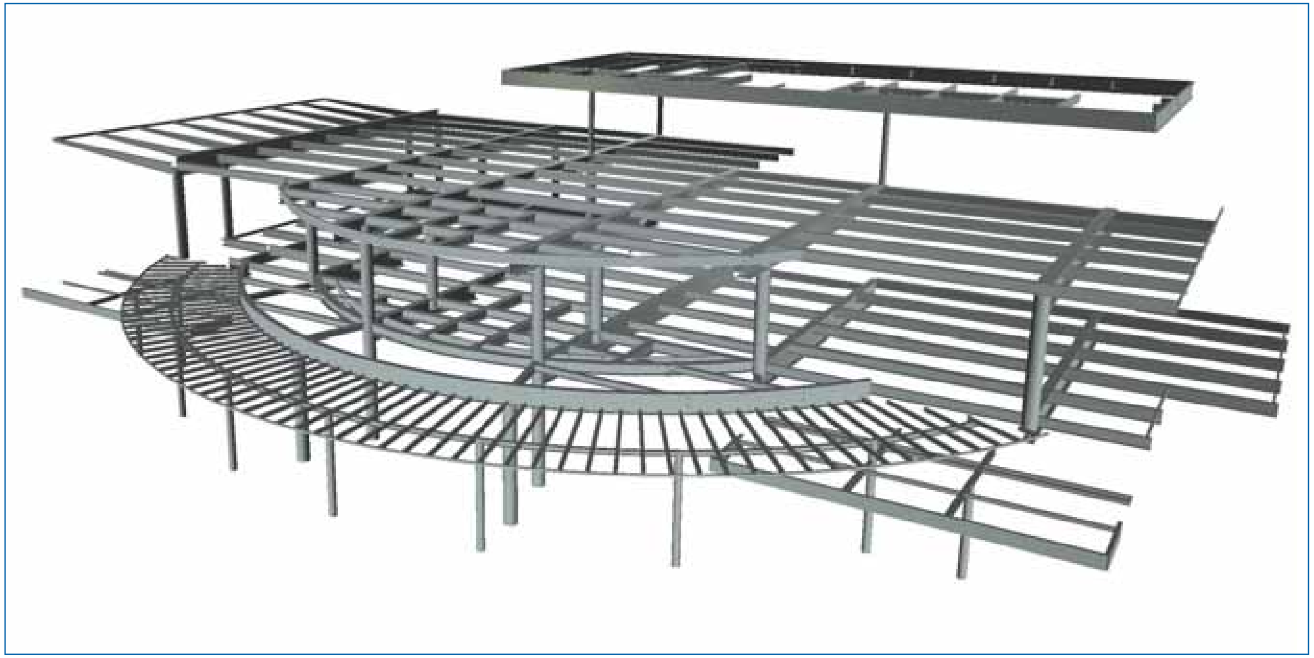
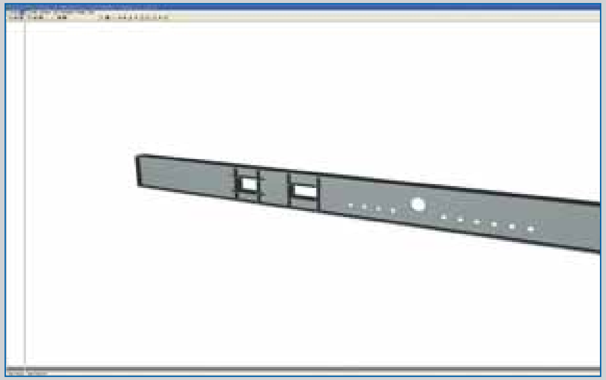
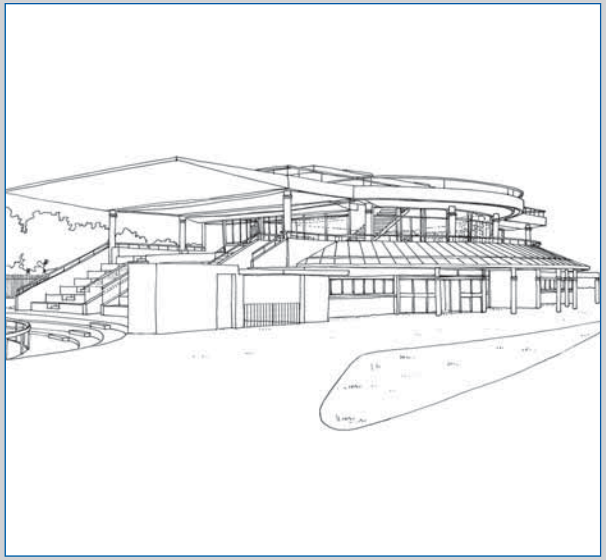
Hippodrome de Chantilly - Batiment des Balances

Depuis sa création en 1969, le Bureau d'Etudes Techniques DUBERSEUIL & Cie met son savoir-faire en charpente métallique au service de l'industrie et du bâtiment.
Son expérience en Bureau d'Etudes dans le domaine de la construction métallique a engendré, depuis plus de 30 ans, satisfaction et bénéfices auprès des donneurs d'ordres.
Une disponibilité selon les besoins, pour une intervention ponctuelle ou permanente, ainsi que les moyens informatiques et techniques contribuent à réduire les coûts d'études.
Etudes de structures (notes de calculs, plans d'exécution et traçage), études de reprise en sous-œuvre ou études de métallerie lourde sont les éléments constitutifs de l'activité.
Vous avez des impératifs en études de charpente ?
Consultez-nous ; nous sommes à votre disposition.

Annual turnover : 420000 euros
Number of employees : 5







Used software • SCIA • ESA PT

En outre, l'ensemble du site est inclus dans le Site Classé du Domaine de Chantilly.

Le futur bâtiment des Balances donnera côté est sur le rond de présentation. Il proposera des vues sur celui-ci, par une succession de gradins depuis le rez-de-chaussée jusqu'au premier étage. En plus de ses gradins, le bâtiment présente un grand nombre d'espaces extérieurs sur ses différents étages. Ces terrasses ouvrent le bâtiment vers les constructions voisines et sur l'ensemble du site. La surface construite de chaque niveau diminue avec la hauteur. Depuis l'entrée d'honneur, des vues sont ainsi préservées sur la Tour du Comité. Depuis les Tribunes, le volume végétal de la forêt reste perceptible grâce aux transparences ménagées à travers le bâtiment (baies vitrées de la façade nord, verre clair agrafé sur structure métallique au niveau de l'escalier en façade sud).

Le choix des matériaux pour le bâtiment des Balances, tient une part importante dans la volonté d'assurer une harmonie entre les bâtiments de l'ensemble du site de l'hippodrome. La pierre sera utilisée en parement sur les façades, le métal pour la structure et le zinc pour la couverture. La pierre utilisée sera la pierre de Saint Maximin, déjà présente sur la Tour du Comité et sur les Tribunes. Le rythme horizontal en quinconce du calpinage des éléments en pierre reprendra également celui de ces deux bâtiments.

Le projet s'inscrit dans une vaste opération de remise en valeur de l'hippodrome de Chantilly dont la première phase s'étendue 1999 à 2004 et a consisté en le réaménagement du pôle d'entretien, du pôle vétérinaire, la construction d'un bâtiment technique en sous-sol, la réhabilitation de la Tour du Comité et la réhabilitation/extension de la Grande Tribune.

Fonctionnement

Les Balances

Le bâtiment des Balances est avant tout le lieu de la pesée des jockeys avant la course. Le projet de nouvelle construction doit permettre la tenue de cette activité dans les meilleures conditions de sérénité et d'éthique possibles. En particulier, il doit être fait attention à la question des flux entre les jockeys, les professionnels (entraîneurs, commissaires...), les invités V.I.P. et le grand public.

La création du nouveau bâtiment des Balances à proximité immédiate des grandes tribunes et axé sur le rond de présentation permet d'avoir une vue optimum sur le rond de présentation. Cet équipement est rationalisé afin d'intégrer tous les besoins modernes nécessaires au fonctionnement hippique et de le rendre polyvalent pour des manifestations évènementielles diverses.

Le rez-de-chaussée accueille toute la partie sportive et organise les différents flux entre les professionnels, les invités et le grand public. Les vestiaires sont situés à l'ouest avec les différents équipements attenants : sauna, douches, salle de massage, sellerie, salon de repos et local enquête. A l'est, on trouve l'ensemble des bureaux administratifs, des commissaires et des accrédités. Dans le hall central est placée la balance des jockeys et l'espace accessible au grand public. L'accès aux gradins pour les spectateurs se fait depuis un portail ouvrant face au bâtiment des Tribunes.

Le R+1 est occupé par le salon V.I.P., un bar et l'office. Ce salon est bordé par des terrasses extérieures accessibles.

Le R+2 est un espace extérieur, couvert partiellement, qui dispose d'un bar.

Matériaux et aspect extérieur

Les Balances

L'architecture du bâtiment et la configuration intérieure des nombreuses fonctions ont été organisées de façon à s'intégrer à l'environnement extérieur et au patrimoine bâti existant. Les volumes sont bas (R+1 et partiellement R+2) et les façades sont sobres avec de larges ouvertures aux niveaux supérieurs, qui éclairent les salons. Les menuiseries sont en aluminium laqué et verre clair.

Les matériaux utilisés en façade sont identiques à ceux de la grande Tribune : pierre de Saint Maximin, métal peint, verre et zinc pour la toiture. Le calpinage de la pierre rappellera celui du bâtiment des Tribunes.

La structure est métallique, les poteaux cylindriques sont remplis de béton afin de diminuer leur section et de conférer une certaine impression de légèreté à l'ensemble.

Calculs

Les points importants du calcul de cette ossature sont d'une part, en raison de la salle de gala, le respect d'une fréquence propre des poutres porteuses supérieure ou égale à 5 hertz sur les deux planchers. D'autre part les épaisseurs très faibles des planchers et de la couverture nécessitent des ouvertures dans les âmes des profils, afin de permettre les passages des gaines techniques.

Les poutres principales les plus sollicitées sont calculées avec les options "coques" et "dynamique" du logiciel. Les calculs des fréquences déterminent la mise en place de connecteurs sur les poutres principales et les poteaux en tube rond ont été prévus pour recevoir un remplissage en béton pour la protection au feu.

Caracteristique principal du batiment

Poids de charpente métallique : 150T
Longueur du bâtiment : 42.3 m
Largeur du bâtiment : 26 m
Hauteur : 10.6 m
Cabinet d'architecture : D.L.2.A
Maîtrise d'œuvre : SOGEA

Hippodrome of Chantilly

The project concerns the 'Building of the Balances' of the famous hippodrome of CHANTILLY.
It is before all the place where the jockeys are weighed before the race.
The project falls under a vast operation of upgrading the hippodrome of Chantilly. The first phase ran from 1999 to 2004 and consisted of the refitting of the maintenance area, of the veterinary area, the construction of a technical building in the basement, the rehabilitation of the Tower of the Committee and the rehabilitation of the Large Platform.
The structure is made out of steel, the cylindrical posts are filled with concrete in order to decrease their section and to confer a certain impression of lightness on the unit.

EIV sprl

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EIV sprl is an industrial engineering company founded in 1993.

In the beginning, we were working mainly for the siderurgy sector. Our biggest project in this field was Eko-Stahl (then called RDA) at the end of the 90's. From 2000 on, we are developping our activities in other fields.

Our mission is to help our customers to develop and optimise their equipments in order to become more competitive.

We count 17 employees, among them engineers, project leaders and draughtsmen, mainly active in the field of mechanics, piping, steel structure and civil works.

We work in the field of 'turnkey' projects, including studies, manufacturing, assembly, tests and start-up.

We ensure technical assistance, define procurement specifications, do the manufacturing, and do projects in relation with air and fluegas treatment.

To develop our projects, we use CAD tools, e.g. Autocad, Mechanical Desktop, Inventor,

Catia, Parabuild for steel structure and SCIA • ESA PT for calculation (we use steel and concrete modules).

Our customers are

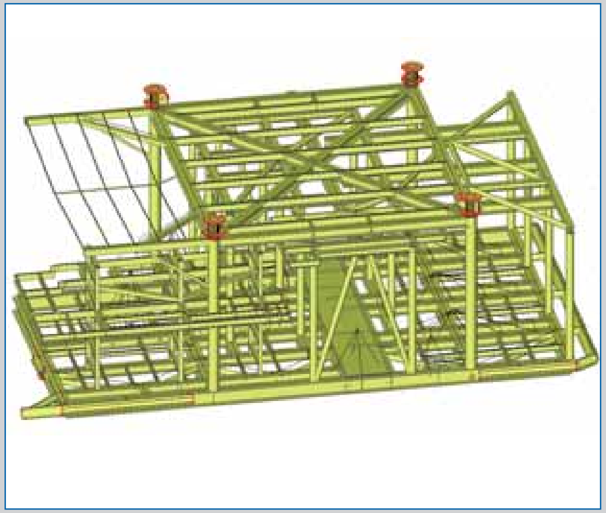
- Industrial companies in the field of siderurgy, energy, water treatement, petroleum;
- Big engineering companies (for consulting);
- Workshops with no engineering department.

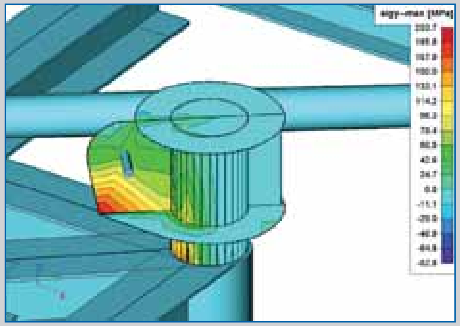
We are now developping our activities abroad, e.g. in Morocco and Congo.

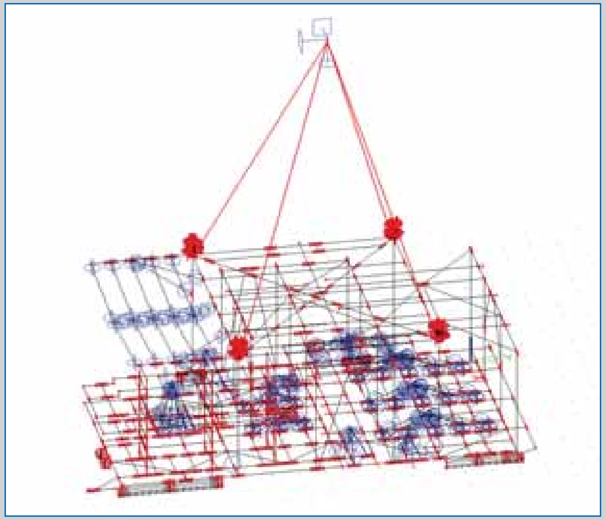
Total Rosa - modul 5

Module 5 is a desalination seawater skid, ordered by Total for the offshore field of Rosa, at 200 km from the Angolan coast. The total weight of this module is 120 tonne, including 30 tonnes for the steel structure.
The dimensions: 14m x 8m x 6m (L x W x H).
EIV sprl designs and calculates the steel structure of this module for Suez-Ondeo.
Due to its destination on the FPSO (Floating Production Storage Offloading), the calculation includes multiple configurations, e.g. installation, transportation, lifting with one and two cranes and load-out. SCIA • ESA PT helps our company to take into account all these requirements.

Total Rosa – Girassol – Module 5







Used software • SCIA • ESA PT

Introduction

This project is included in the development of the second phase of the offshore field of Rosa, located at 200 km from the Angolan coast, in the block 17 * operated by Total E&P Angola.

To produce oil and gas, Total had to install a subsea production system in this depth of water, connect hundreds of pieces of equipment and set up flow lines and risers to bring effluent up to the FPSO.

The Girassol FPSO (Floating Production Storage Offloading) is a production and storage ship that has the advantage of being fully autonomous. The wellheads are installed on the seabed and connected to the surface facilities by rigid flow lines on the seabed and riser systems that bring the effluent up to the surface. These systems are designed to handle extreme ocean states and weather conditions. The FPSO comprises a seawater disulphating unit, an oil treatment and stabilisation plant as well as pumps, generators and of course oil storage tanks. The combined plant can process up to 200,000 barrels per day of crude oil, can disulphate and re-inject 400,000 b/d of seawater and store 2 million barrels of processed crude. The oil is then piped to the offloading buoy moored 2 km from the FPSO.

Module 5

For the Rosa development, Total ordered to Suez-Ondeo the supply of a desalinisation skid to produce treated seawater (module 5). Ondeo takes in charge the general design of this skid with HP pumps, osmosis tubes, tanks, valves, instrumentation, etc. This skid had to be 'key on door'. Also some Belgian companies were active in this project: CTI (Seilles) for the manufacturing of the steel structure and piping, Ensival (Verviers) for the pumps, ATI (Thimister) for electricity and instrumentation and EIV for the design and calculation of the steel structure.

Data of the equipment:

- Length: 14 m
- Width: 8 m
- Height (with lifting frame): 6 m
- Total weight: 138 To (lifting configuration)
- Weight of steel structure: 64 To

The module is composed of different parts:

- Structure of the main frame;
- Structure to support monorails for maintenance of pumps (3 HP pumps with weight of 10 To each);
- Structure to support osmosis tubes, with walkways;
- Structure to support biocide tanks (at 4.5 m height) with walkways;
- Lifting frame for a one hook lifting (this one will be cut off after installation).

The specificities of this project, like these of all the other modules on the FPSO, are that they have to be calculated for different configurations:

- In Place: equipment in place on the FPSO, with operating conditions and taking into account roll and pitch, wind;
- Transportation: equipment on the barge for the travel to the FPSO (from Rotterdam to Girassol), taking into account more severe conditions of roll and pitch, in relation with the size of the barge;
- Lifting with one crane: equipment to be lifted on the FPSO with one floating crane, taking into account the centre of gravity, the calculation and the design of the shackles and the pad eyes;
- Installation: this part includes the calculation of the bumpers and shocks with the installation guides;
- Lifting with two cranes: equipment to be lifted on the manufacturing workshop yard;
- Load-out: equipment to be transported with a trailer between the workshop and the yard.

As these configurations required a lot of information, the calculation files were very big to work with. For this reason, we used different files for these different configurations. For this description, we only join the calculation file for the lifting configuration. For the other files, the calculation model is quite the same, except lifting frame and bumpers.

For the calculation, some other difficulties came from the habits of the petroleum sector: they are working with US standards, as API-AISC, and they use usually a specific calculation software (they didn't know anything about SCIA). For the first problem, although a specific module of SCIA•ESA PT exists for US-code, we discussed with the customer to use Euro code with some adaptations. For the second problem, they mentioned the advantage of SCIA with its graphic interface, more friendly and easy to use.

The calculation required a long preparation to envisage all the combinations for the different configurations.
For example, for the in-place configuration, we have to combine:

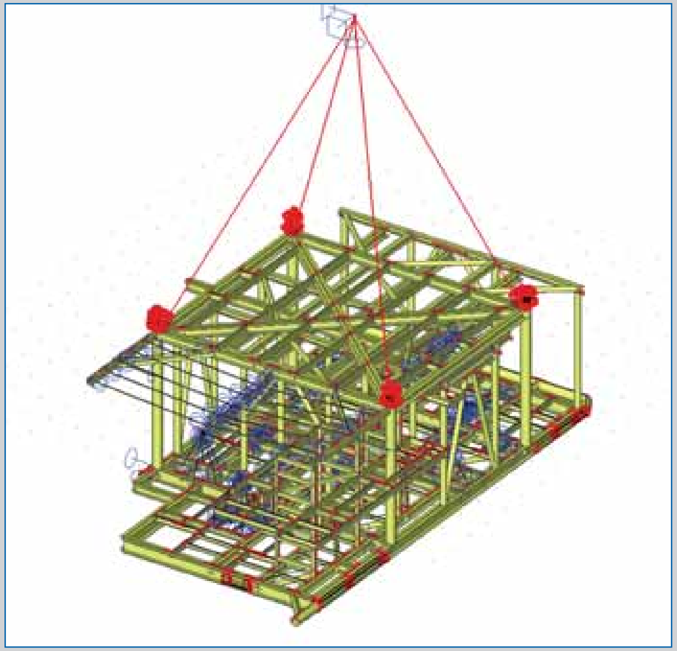
- Dead weight of the structure;
- Weight of the equipments (pumps, piping, tanks,...);
- Contents of the equipments;
- Overload for the walkways;
- Wind in the different directions;
- Roll and pitch due to the sea.

For the calculation report, due to particular requirements of our customer, we used the classical word format file, including tables and graphics from SCIA•ESA PT. This method didn't cause any problem.

In conclusion, this type of project was a little bit new for our company, especially with all the specifications in relation with the fact that this equipment had to operate on a floating structure, but we learned many things about the working methods of this sector.

SCIA•ESA PT helped us to meet the multiple requirements of our customer.

* Sociedade Nacional de Combustiveis de Angola (Sonangol) is the Block 17 Concessionaire. Total E&P Angola is the Operator in the Block. Total's coventurers are Esso Exploration Angola (Block 17) Ltd., BP Exploration (Angola) Ltd., Statoil Angola Block 17 AS and Norsk Hydro Dezassete AS.



Forsttechnischer Dienst für Wildbach & Lawinenverbauung

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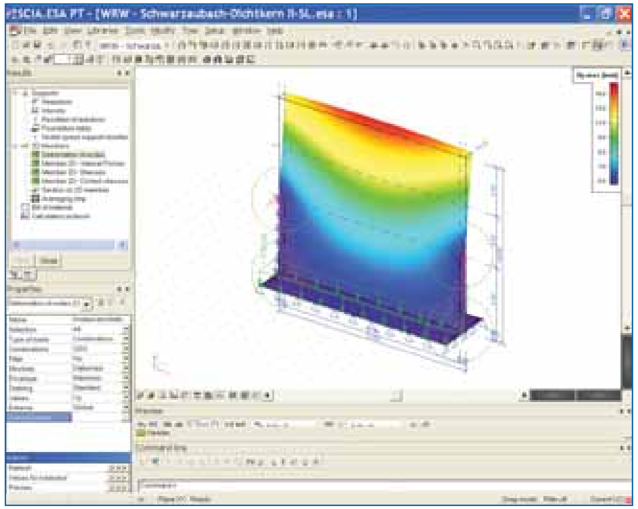
und lawinenverbauung

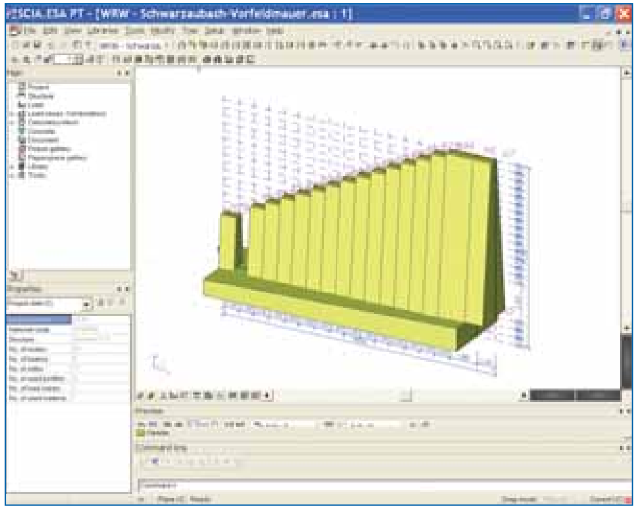
Forsttechnischer Dienst für Wildbach- und Lawinenverbauung
Ein Dienstzweig des Bundesministeriums für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft.
Organisiert in 7 Sektionen (Wien-NÖ-Bgld, OÖ, Sbg, Stmk, Ktn, Tirol und Vorarlberg) und 27 Gebietsbauleitungen, die als lokale Kompetenzzentren zum Schutz der Bevölkerung vor Naturgefahren (Wildbäche, Lawinen, Erosion, etc.) tätig sind.

Wir sichern durch Vorsorge und Schutzmaßnahmen nachhaltig den Lebensraum für die Menschen in Österreich.
Unsere Kernleistungsfelder:

- Gefahrenzonenplanung: Österreichweite Erstellung von flächenhaften Gutachten für ein Gemeindegebiet, das die Intensität und Häufigkeit der Gefährdungen durch Wildbäche und Lawinen darstellt. Fertigstellung 2010, dzt. Erfüllungsgrad ca. 75%
- Sachverständigentätigkeit: fachliche Unterstützung der Behörden in Fragen der Gefährdung durch Wildbäche, Lawinen und Erosion
- Maßnahmenplanung: Ausarbeitung von Schutzmaßnahmen im Bereich Wildbach, Lawine, Steinschlag und Rutschung
- Maßnahmensetzung: die von uns ausgearbeiteten Schutzprojekte werden mit dem eigenen Baubetrieb umgesetzt
- Förderungsabwicklung: Verwaltung der für die Umsetzung der Schutzmaßnahmen erforderlichen finanziellen Mittel des Bundes, der Länder und der Interessenten.

Das vorliegende Projekt Schwarzaubach wurde in der Gebietsbauleitung Flach- und Tennengau in der Sektion Salzburg geplant und umgesetzt.





Wasserdosierwerk Schwarzaubach

Water distribution plant

Protective measures in the catchment area Schwarzaubach in the community of Ebenau in the federal state of Salzburg in Austria were designed because of severe damages caused by floods in 2002, 2003 and 2004.
The aim of the project is to reduce the oncoming flood peak from 44,4 m³/s to 23,7 m³/s. Therefore two flood-dosing dams have to be carried out.
The main flood-dosing dam with a storing capacity of 160.000 m³ has been finished in November 2006 after only 9 months of intense work. The dam is 14 m high and has a span-length of 134 m. 4.250 m³ of concrete and 137 tons of reinforcing steel were used to finish the dam.
At the moment works on a second dam with a height of 12m, a span-length of 70m and a storing capacity of 45.000 m³ are in progress.

Used software • SCIA • ESA PT

Der Schwarzaubach ist ein Teileinzugsgebiet des Hinterseer Almbaches im Bezirk Salzburg- Umgebung des Bundeslandes Salzburg und hat eine Fläche von 25,2 km². Im Oberlauf verläuft der Schwarzaubach von Osten nach Westen und dreht sich im Unterlauf Richtung Nord-Süd. Der Höhenunterschied beträgt 681 m (von 1.237 m auf 556 m SH) und das Pauschalgefälle beträgt 9 %.

Mehrere Hochwässer aus den Quellgräben Katzbach, Ellmaubach, Siederbach und des eigentlichen Schwarzaubaches in den letzten Jahren, speziell die Hochwässer vom 12.8.2002 und 25.3.2003 sowie der Juli 2004, veranlassten die Gemeinde Ebenau und die Wassergenossenschaft Schwarzaubach, bei der Gebietsbauleitung um die Herstellung geordneter Abflussverhältnisse im Einzugsgebiet des Schwarzaubaches vorstellig zu werden. Mit den Projektsarbeiten wurde im Oktober 2004 begonnen und im März 2005 abgeschlossen.
Wie die bisherigen Hochwasserereignisse zeigten, kann die bestehende Regulierung im Ort von hm 36,0 – 46,0 die anfallende Hochwassermenge HQ = 44,4 m³/s im Ereignisfall nicht schadlos abführen.

Der Schwerpunkt der Sicherungsmaßnahmen liegt deshalb in der Aufweitung der Ortsregulierung auf ein HQ von 25 m³/s sein und gleichzeitig die Drosselung der Hochwasserspitze von HQ100=44,4 m³/s auf ein HQ von 23,7 m³/s mit Hilfe zweier Wasserdosierwerke.

Der Schwerpunkt der Sicherungsmaßnahmen liegt daher in der Errichtung von zwei Wasserdosierwerken (Ellmaubach bei hm 21,6, Fassungsvermögen von 45.000 m³ und einem Abfluss von 4,0 m³/s und Schwarzaubach bei hm 55,12, Fassungsvermögen von 150.000 m³ und einem Abfluss von 5,0 m³/s).

Die bestehende Ortsregulierung von hm 36,0 bis hm 42,20 wird saniert und in diesem Zuge auf eine Förderkapazität von 25 m³/s bzw. 22 m³/s ausgebaut.

Wasserdosierwerk Schwarzaubach, hm 55,12

Technische Daten:
Bauzeit: Beginn März 2006 bis November 2006
Staurauminhalt: max. 160.000 m³
Spannweite: 134 m
Betonkubatur: 4.241 m³
Armierung: 137,07 to

Funktion und Begründung des Standortes

Verringerung und Rückhalt der ankommenden Hochwasserwelle aus dem Einzugsgebiet des Schwarzaubaches, die über eine Menge von 5 m³/s hinausgeht. Die Retention der Hochwassermenge dient hauptsächlich der Entlastung des Unterlaufes (Ortsregulierung). Die für die Berechnung zugrunde liegende Hochwasserspitze beträgt in diesem Bereich 19,5 m³/s. Unter der bestmöglichen Ausnutzung der Stauraumkapazität (Volleinstau) wird die Hochwasserspitze von 19,5 m³/s auf 5 m³/s gedrosselt. Der ausgewählte Standort ist die letzte Möglichkeit zur Schaffung eines Rückhalteraumes vor dem bachabwärts liegenden Siedlungsgebiet von Ebenau. Durch das bereits von Natur aus weitläufige Gelände, welches bei größeren Überflutungen als Fließretentionsraum gewirkt hat, eignet sich dieser Standort optimal zur Schaffung eines Hochwasserrückhaltebeckens.

Bautype

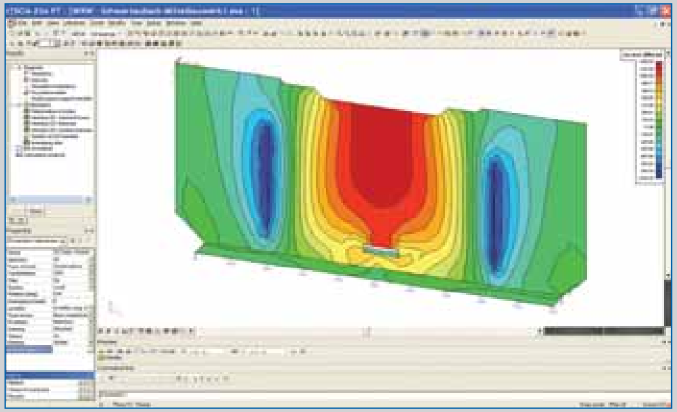
Das Dammbauwerk besteht im Mittelteil aus einer Stahlbetonkonstruktion mit Vorfeldwangen. Diese dienen der Absicherung vor Auskolkung und sind zur Abstützung der Hauptsperre gegen die einwirkenden Kräfte der Hinterfüllung notwendig. Die Konstruktionsteile stellen in sich einen Verband dar, sodass die Querschnitte auf ein Minimum reduziert werden können. Die beidseitigen Flügel (Dichtkerne des Dammes) sind sowohl luftseitig (komplett) als auch wasserseitig (halbe Werkshöhe) mit einem verdichteten Dammkörper umschlossen.

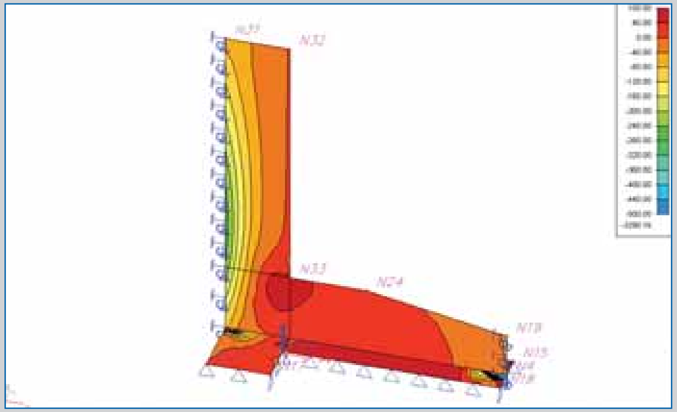
Hydraulisch gesehen funktioniert dieses Werk als Zwischenschluss. Dies bedeutet, dass eine Wassermenge von 3,2 m³/s die Grunddole mit einer Abmessung von 260/60 cm ungebremst durchläuft. Durch den danach folgenden Einstau wird durch die Auslösung eines Klappenmechanismus bis auf Höhe der nächsten Dolenreihe die Durchflussbreite der Grunddolen um 1,0 m reduziert. Gleiches trifft bei einem weiteren Einstau bis zur nächsten Dolenreihe nochmalig ein. Der maximale Dolenausfluss beträgt bei Vollstau 5,0 m³/s.

Die Dolen- und Klappenkonstruktion ist wasserseitig durch einen Stahlrost mit einem Trägerabstand von 25 cm abgedeckt. Die Stabilität der Träger ist durch Querträger mit einem Auflager auf den angefügten Rostwangen gegeben. Die doppelt geknickte Ausführung sollte im unteren Abflussbereich ein Verlegen der Trägerkonstruktion verhindern, indem das angeschwemmte Treibholz auf den horizontalen Teil aufgeleitet und nach Absinken des Wasserspiegels auf diesem zu liegen kommt. In diesem Fall kommt es durch das abgelagerte Treibholz zu keinem Wassereinstau außerhalb eines Hochwasserabflusses. Gleichfalls ist die Räumung des angelandeten Holzes nach Absinken des Wasserspiegels im Trockenen möglich.

Aufgrund der geotechnischen Beurteilung des Baugrundes für die Fundamente wurde kurzfristig eine Modifizierung der Fundamente durchgeführt, um den berechneten Setzungen im Mittelteil, wo die Stahlbetonmauer eine Höhe von FUK bis Abflusssektion OK Mittelteil von 18,2 m erreicht, entgegenzuwirken (sh. Fotos).

Gleichzeitig wurde das gesamte Bauwerk in 5 eigenständige, in sich bewegliche Teile aufgeteilt, welche durch eine Gleitfuge aus Stahlblech miteinander verbunden sind. Zur Verbesserung der Standsicherheit werden die einzelnen Elemente noch zusätzlich luft- und wasserseitig in sogen. Gleitscheiben geführt (sh. Fotos).





Ingenieurbüro OHR Büro für Hochbau GmbH

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Fax	+49-911-969 773
Contact	Herr Peter Ohr
Email	info@ib-ohr.de
Website	www.ib-ohr.de

Treppengeländer für Hardenberg Gymnasium

Das Ingenieurbüro OHR wurde im Januar 1998 vom Geschäftsführer Peter Ohr gegründet.

Zum jetzigen Zeitpunkt beschäftigt das Unternehmen vier Ingenieure und einen Hochbaukonstrukteur. Dem Büro stehen außerdem zwei freiberuflich tätige Mitarbeiter mit langjähriger Berufserfahrung sowie ein freiberuflich tätiger Architekt zur Seite.

Die jungen Mitarbeiter können bei der Bearbeitung ihrer Aufgaben auf das Wissen der erfahrenen Statiker zurückgreifen. z.B. „Senior" Herr Ernst Ohr (Dipl.-Ing.) der sich in ca. 40jähriger Tätigkeit im Baubereich umfangreiche Erfahrung erworben hat. So fließen in die Abwicklung auszuführender Projekte modernste Berechnungsverfahren und fundiertes Fachwissen ein. Dies eröffnet Möglichkeiten, für den Kunden verschiedenste Lösungsvorschläge zu entwickeln, um am Ende ein kostengünstiges und konstruktiv einwandfreies Produkt zu liefern.

Seit der Gründung des Büros 1998 wurden ca. 1400 Aufträge unterschiedlicher Dimensionen für ein breit gefächertes Kundenspektrum erfolgreich abgeschlossen. Dazu zählen unter anderem Werksinstandhaltungen sowie Um- und Neubauten für die Firmen AEG, GRUNDIG, LEBKUCHEN SCHMIDT, MEDERER SÜSSWAREN-VERTRIEBS GmbH, LEONHARD KURZ, infra GmbH, KLINGELE Papierwerke und BOSCH.

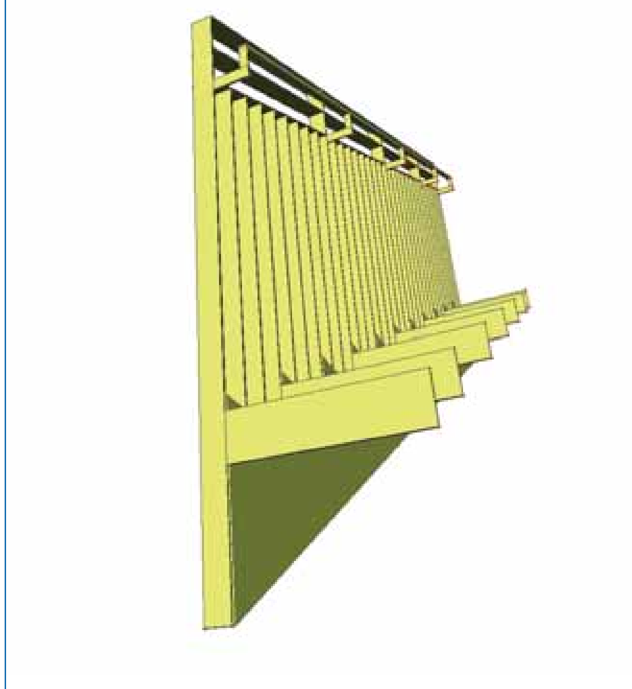
Durch die einzelnen Mitarbeiter werden die Arbeitsfelder Stahlbetonbau, Stahlbau, Mauerwerksbau, Fertigteilbau und Holzbau abgedeckt. Dabei verstehen wir uns als Team, das gemeinsam die gestellten Probleme löst, und so die optimalen Konstruktionsvorschläge erarbeitet. Nur die gleichzeitige Betrachtung aller Aspekte kann zu einem sinnvollen Gesamtkonzept führen.

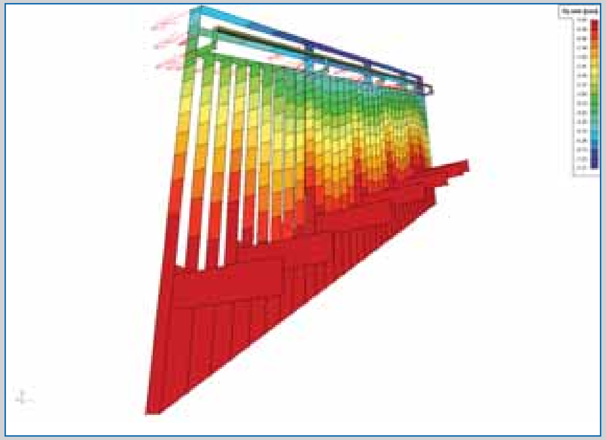
Wir bearbeiten Ihre Aufträge auf CAD mit dem Programm der Firma Nemetschek, Version Allplan 2005.

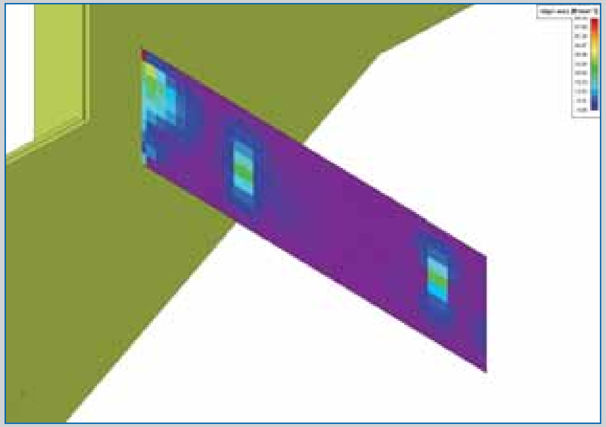
Im Statikbereich arbeiten wir mit Programmen der Firmen SCIA, PCAE, Friedrich und Lochner, Frauendorfer, DEHA, HILTI, Fischer, WEKA, Dlubal sowie eigenen Excel- und Bautextprogrammen.

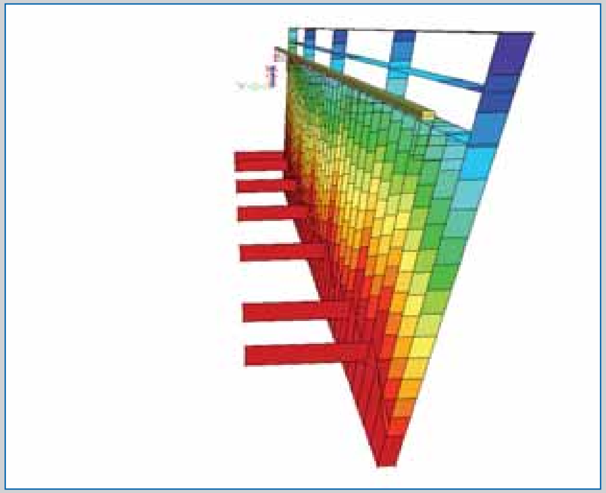
Die Energieeinsparverordnung bearbeiten wir mit dem Programm Dämmwerk.

Im Archivierungsbereich arbeiten wir mit dem Programm Docuware.









Used software • SCIA • ESA PT

Projektbeschreibung

Für den Neubau des Hardenberg Gymnasiums wurde vom Architekten eigens ein Treppengeländer entworfen. Diese Konstruktion galt es nachzuweisen, und, aufgrund der beengten Platzverhältnisse, die Anschlusspunkte zu optimieren. Die architektonische Gestaltung des Gesamtkonzepts ließ nicht viel Spielraum, um die Struktur zu verändern.

Berechnungsvorgang:

Nach anfänglicher „ebener" Überschlagsberechnung konnte mit den vorgeschlagenen Querschnitten des Entwurfs keine ausreichende Tragfähigkeit nachgewiesen werden. Außerdem war die Befestigung des Geländers am Treppenlauf nicht in wirtschaftlichem Maße realisierbar. Deshalb wurde beschlossen das Stahlgeländer mit Finiten Elementen räumlich zu berechnen, und so verschiedene Varianten der Anschlusspunkte mit geringem Zeitaufwand zu vergleichen. Es ergab sich so die Möglichkeit, bei maximaler Ausnutzung der Profile die minimale Anzahl an Anschlussplatten zu ermitteln. Wegen der ungleichmäßigen Befestigung des Geländers musste besonderes Augenmerk auf die Steifigkeit des Geländers im Allgemeinen und des Wangenblechs im Besonderen gelegt werden. Dabei wurden 3 Varianten der Treppengeländer untersucht:

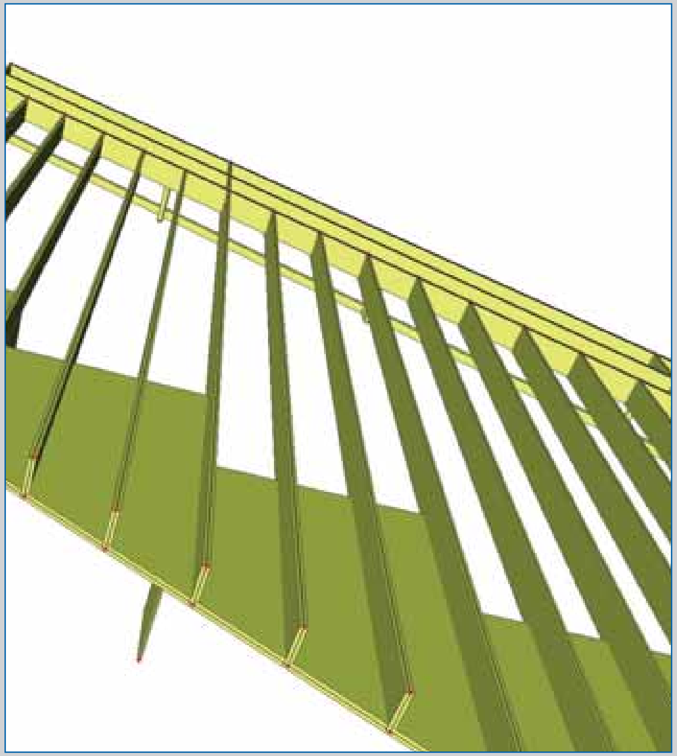
- Befestigung am Treppenlauf und den beiden Treppenpodesten oben und unten
- Treppenlauf und Podest nur unten
- Und das Treppengeländer am Treppenauge nur am Lauf befestigt.

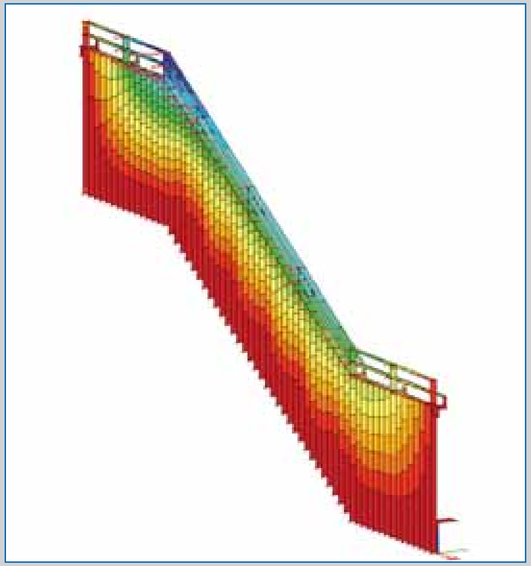
Ergebnisse

Die räumliche Berechnung der Varianten führte zu dem Schluss, eine Befestigung des Geländers mit vertikal stehenden Anschlussplatten an den Setzstufen des Treppenlaufs und eine zusätzliche Befestigung auf den Podesten mit horizontalen Anschlussplatten auszuführen. Die direkte Befestigung des Geländers an der Wange des Treppenlaufs konnte nicht realisiert werden. Die Anzahl der Anschlussplatten wurde räumlich verteilt auf das notwendige Minimum reduziert. Durch die räumliche Beanspruchung und das Zusammenwirken aller Konstruktionselemente konnten die vom Architekten vorgegebenen Querschnitte minimiert werden, was zu einer Stahlersparnis von 25% führte!!

Technische Daten

Treppenlauf: Horizontale Länge: 3,08 m; Höhe 1,75 m (Geschosshöhe 3,50 m)
Treppenpodestlänge: 1,36 m
Anschlussplatten je Lauf: 7 (bei 11 Steigungen)
Anschlussplatten je Podest: 2
Belastung: 1kN/m in Handlaufhöhe
Minimale Blechdicke: 5 mm
Stahlgewicht eines Geländers (am Treppenauge): 295 kg
Es kommen insgesamt 20 Geländer zur Ausführung.
Anzahl der Finiten Elemente (Kantenlänge 1 cm): 37 800





Handrail for stairway of Hardenberg Gymnasium

For the Hardenberg Gymnasium, the architect designed a handrail for a stairway . There was very few space to connect the railing to the stairs, so an economical solution had to be found. The problem was to minimize the number of connection-points. After considering a few different variants, we could reduce the necessary steel material by 25%. This was only possible by considering the whole construction in the 3D-load demolition.

Jaroslav Pražan – plastic structures

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Jaroslav Prazan
plastic constructions

Anchored Polypropylene Swimming Pool

Firma Jaroslav Pražan působí již 16 let v oboru projektování a výpočtů konstrukcí z plastů. Firma byla založena v roce 1991.

Jakožto specialista v oboru mám za svoji misi "Jen bezpečné konstrukce z plastů".

Moje vize je rozvoj projektování termoplastických konstrukcí prostřednictvím počítačové analýzy za použití komplexního modelování konstrukcí metodou konečných prvků, které přispěje k bezpečnému chování těchto konstrukcí v průběhu celého životního cyklu. Takto komplexní analýza je v současnosti při navrhování nádrží, zásobníků, čistíren, jímek, bazénů a ostatních konstrukcí z termoplastů používána jen velmi zřídka.

Organizační struktura je velmi jednoduchá, jsem samostatně podnikající osoba.

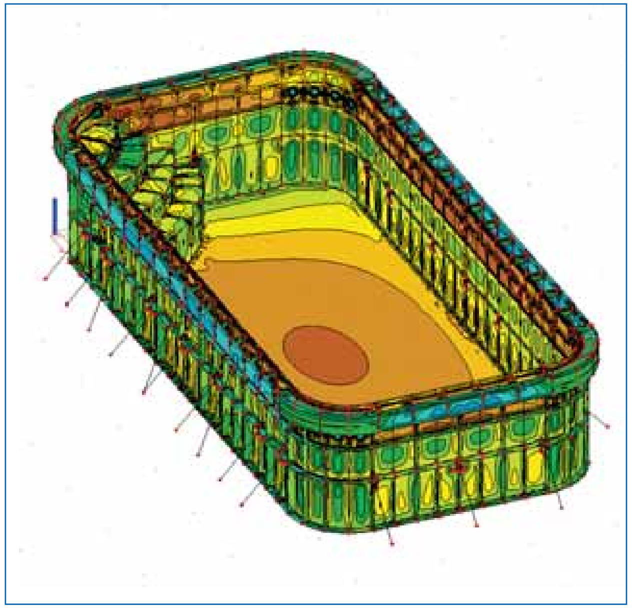
Hlavní obory činnosti:
- Zařízení na úpravy vody
- Zařízení na čištění vody
- Odlučovače oleje a lapáky tuku
- Flotační jednotky
- Protipovodňové bariéry
- Septiky, šachty a jímky
- Nádrže a zásobníky všech typů
- Bazény
- Potrubí z plastů

Vybavení

- hardware – 2 PC počítače
- software - SCIA • ESA PT, ESA-Prima Win, Autocad

Reference

- 100 m³ polypropylenová nádrž na kyselinu sírovou - Procter & Gamble, závod na výrobu pracích prostředků
- 5 - 20 m³ polypropylenové nádrže pro odpadní vody – ASIO s.r.o.
- 10 - 50m³ dvouplášťové polypropylénové nádrže čistíren sloužící jako ztracené bednění pro – ASIO s.r.o.
- Lapače tuků a odlučovače oleje - ASIO s.r.o.
- Parshall žlab, měření průtoku vod – JMVAK
- Čistička plynů – ASIO s.r.o.
- Bazény – AMM Otáhal s.r.o., PATRIA Kobylí a.s.



Used software • SCIA • ESA PT, ESA-Prima Win

Data

Délka bazénu 7400mm, šířka 3600 mm, výška 1500mm. Hmotnost 650 kg.

Technické řešení se týká vodohospodářských výrobků (nádrží žump, septiků, odlučovačů lehkých kapalin, revizních šachet, kanalizačních šachet, jímek dešťové vody a apod.) a balneotechniky (např. bazénů). Statické zajištění podzemních nádrží z termoplastů a kompozitů umístěných pod úrovní terénu je v současnosti prováděno obetonováním.

Podstata technického řešení

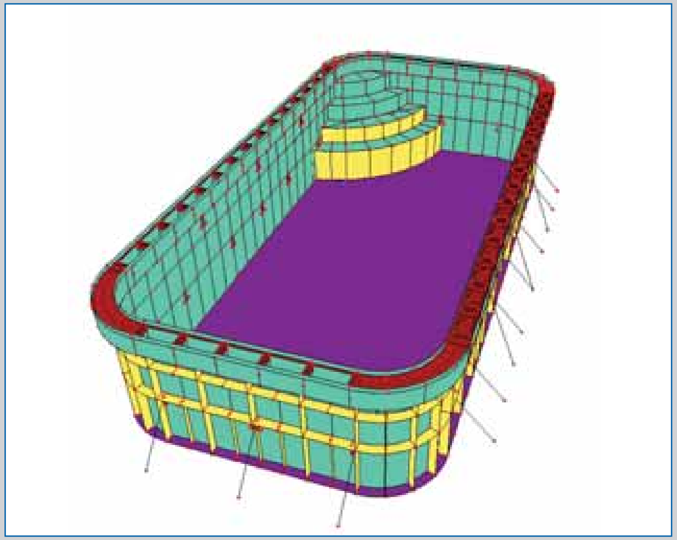
Nádrž je uložena do výkopu a po obvodu je ukotvena do stávajícího terénu, nebo do železobetonové desky dvoudílnými táhly. Přitom je prostor mezi terénem a bazénem vyplněn definovanou zeminou. Na horní straně táhla je připojení ke stěně nádrže provedeno pomocí čepu a závěsných ok, které tvoří se stěnou jeden celek. Na spodní straně je táhlo připojeno k železobetonové desce pomocí ok, které jsou součástí nosné armaturu desky. Mezi okem táhla a dvojitým okem nosné armatury je zamontován čep. V případě uložení nádrže pouze na zhutněném podkladu, je táhlo připojeno pomocí oka, které je součástí zemní kotvy, se kterou je propojen pomocí čepu. Dvoudílná táhla jsou z tyčí kruhového profilu. Horní díl táhla je na jednom konci zakončen okem, na druhém pravým závitem. Spodní díl táhla je na jednom konci zakončen okem a na druhém konci levým závitem. Mezi tyto konce, opatřené závitem je vložena matice pro napínače s pravým závitem na jedné straně, levým na straně druhé.Po smontování lze otáčením matice napínače měnit celkovou délku táhla a tím zaručit požadovanou polohu stěny nádrže. Po docílení tohoto stavu se provede zajištění polohy dotažením pojistné matice. Táhla zaručují jak statickou únosnost stěn nádrže, tak jejich požadovanou geometrii.

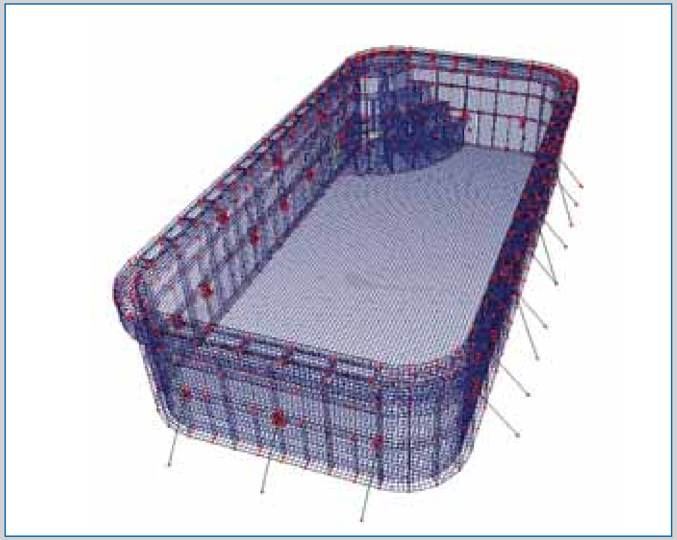
Na delší straně bazénu je provedeno kotvení ve dvou výškových úrovních. Ve spodní části je počet táhel 7, v horní části jsou 2 táhla. Na kratší straně je kotvení provedeno v jedné výškové úrovni se 3 táhly. Počet, umístění a dimenze táhel je provedeno na základě statického výpočtu.

Dno výkopu může být opatřeno železobetonovou deskou nebo může spodní dosedací plochu tvořit zhutněná vrstva štěrkového lože. Do provedeného výkopu se osadí bazén. Horní díl táhla a spodní díl táhla se spojí v jeden celek pomocí matice napínače. Horní díl táhla se vloží do dvojitého závěsného oka a pomocí čepu se spojí se stěnou nádrže. Spodní díl táhla se vloží mezi dvojité oko železobetonové desky a pomocí čepu se spolu spojí v jeden celek nebo v případě štěrkového lože se spodní díl táhla navleče do oka zemní kotvy a tím se spojí v jeden celek.

Přesné ustavení polohy nádrže se provede otáčením matice napínáku. Zajištění požadované polohy se provede pomocí pojišťovací matice. Postupně se provádí obsyp zeminou definovaných vlastností a to postupně po celém obvodu bazénu. Po dokončení obsypu se provedou stavební úpravy horního povrchu terénu podle projektu, např. zádlažbou a provede se napuštění bazénu vodou.

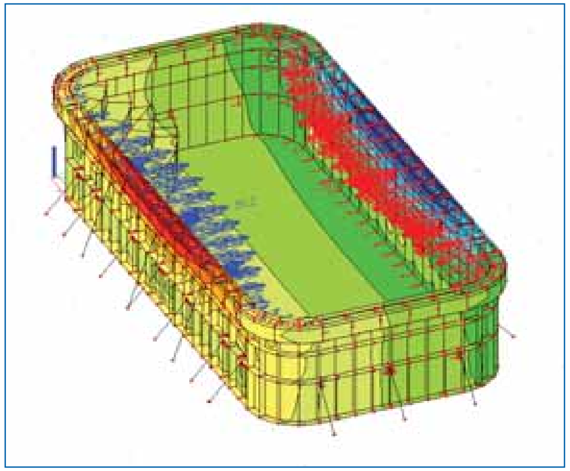
Statické zajištění podzemních nádrží podle technického řešení je využitelné ve stavebnictví, ve vodním hospodářství a v balneotechnice.





Anchored Polypropylene Swimming Pool

The project solves the stability problem of the external underground open tanks and reservoirs in the winter season using anchorage. The temperature differencies between time of the assembly and winter time causes the temperature loading strengthen by the impact of the minimal tank filling during winter season. When the walls are not correctly stabilized then the buckling problems arise during the winter and the walls can be damaged by cracks. The contemporary technology used to ensure the stability of the tank walls is concreting. The provided solution uses the anchorage to the concrete base slab or the soil anchorage in case of compacted gravel base.



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PRECI est un Bureau d'études de 13 techniciens, spécialisée dans la conception et la réalisation de structures métalliques. Le bureau d'étude a été crée en 1999 par trois associés.

Depuis PRECI est devenue le spécialiste de la conception et de l'installation de carrière d'exploitation de minerais, cabinet spécialisé dans l'étude des structures métalliques et chaudronnées pour l'industrie.

Organisation de l'entreprise

3 Co-gérants (Bruno Ginestoux, Laurent Piermay, Serge Crespy), un ingénieur et neuf dessinateurs

Nos domaines de competences

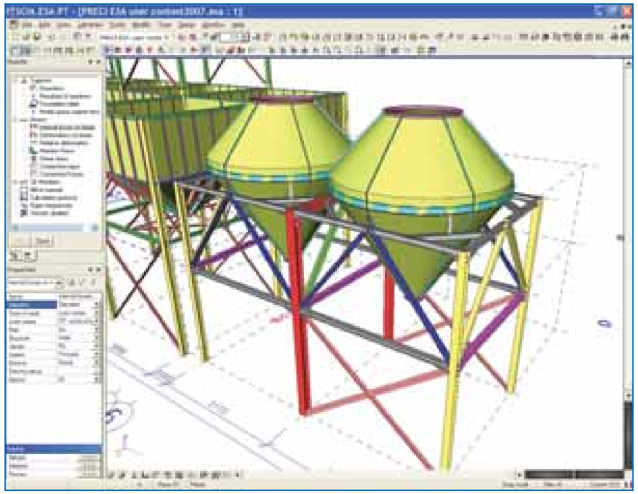
- Note de calcul
- Installations de carrières, Transporteurs, Groupe mobile etc ...
- Installations industrielles
- Charpente métallique
- Chaudronnerie
- Déplacement France et étranger

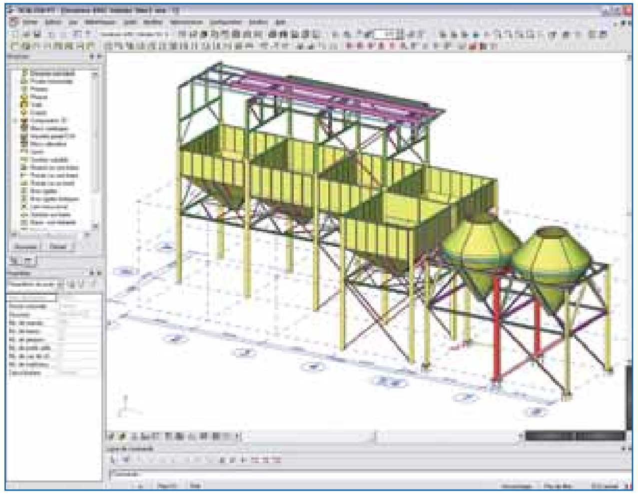
Equipement

13 Postes informatique équipés de logiciel de CAO 2D "Autocad Light" 2 postes informatiques équipés de logiciel de dessin 3D et de préparation "XSTEEL" et "Solid Works" et un poste informatique équipé d'un logiciel de calcul 3D "SCIA • ESA PT"

Nos principales references clients

Morillon Corvol, Sandvik, Krupp Hazemag, Eurovia, Lafarge, Calcia, Colas, Someca, Rhône-Poulenc, Axens, Rhodia, Eurocopter, Pechiney Electrometallurgie...





Poste de chargement pour la carrière ABOS

Used software • SCIA • ESA PT

Ce projet date du début de l'année 2005, l'étude fut réalisée en septembre 2005 pour une fin de construction en mars 2006. Ce projet est un poste de chargement et déchargement de granulat dans une carrière d'exploitation de minerais,

Cette structure métallique a la particularité d'allier le calcul de coques avec celui des barres, en effet celle-ci mesure 31.2m de longueur, 10.23m de largeur et une hauteur de 13.2m pour un poids total de 53.2 Tonnes. Cette structure comporte 4 trémies coniques à base carrée de 45m³ chacune, et 2 silos coniques à base ronde de capacités 50m³ chacune. Ces trémies servent à stocker des différentes tailles de cailloux..

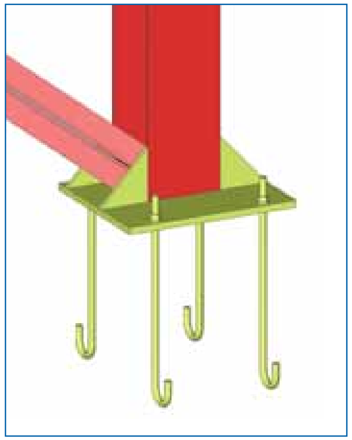
Sur les trémies on a des barres de renfort soudées aux tôles. La structure comporte 511 barres, 594 nœuds, 45 plaques.

Cette structure est caractérisée par la complexité du calcul. En effet, nous avons calculé cette structure en statique et en dynamique avec les effets d'un séisme, et d'un crible vibrant sur la partie supérieure de la structure.

Le plus compliqué a été de calculer les modes propres de la structure avec le séisme plus les vibrations. Mais le logiciel les a calculés rapidement.

Loading and filling construction

This project is about a loading and an aggregate filling shift in a quarry of mining and stones exploitations.
The metal structure comprises 4 conical hoppers on a square base of 45 cubic meters each and 2 conic silos on a round base, with a capacity of 50 cubic meters each. These hoppers have to store different sizes of stones.
The structure was also calculated to resist seismic activity.
This project dates from the beginning of the year 2005, the study was realized in September 2005 and it was finished in March 2006.



Saltwater Engineering B.V.

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Website www.saltwater.nl

Naval architecture and engineering

Saltwater Engineering BV is an engineering partner for companies working in the shipbuilding and maritime sectors.

The shipbuilding and maritime sectors, like most other sectors, are being put more and more under pressure to shorten delivery times of the end product. Saltwater Engineering offers fast and flexible engineering solutions in all fields of naval architecture, which can help to speed up the engineering process and subsequently shorten delivery times.

Saltwater Engineering offers solutions from initial design all the way through the building process and final delivery of a vessel or marine product.

Key activities

- Vessel design from initial design to delivery
- Offshore structures
- Design and engineering for both new and refits of luxury yachts
- Determination of scantlings for vessels and floating objects that fall under the major international classification societies
- Global strength calculations of vessels and steel structures
- Local strength calculations of steel structures
- Hydrostatics and hydrodynamics of vessels and floating objects
- Drafting of both general construction and workshop drawings
- Technical advise and "second opinions"
- Project management

Organizational structure

The company is a partnership between four highly experienced and motivated naval architects. Together the four partners have more than 40 years of experience in the field of naval architecture. A majority of these years has been comprised in the areas of project management and/or co-ordination with both experience in engineering and design offices as well as on shipyards.

Target groups

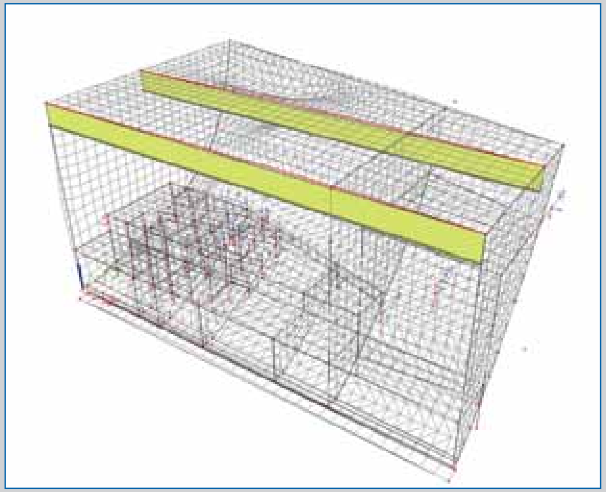
Our target groups include all shipyards and engineering firms working in the general field of the shipbuilding industry. Due to the current market situation the majority of or works is centred on the yacht building and offshore industry.

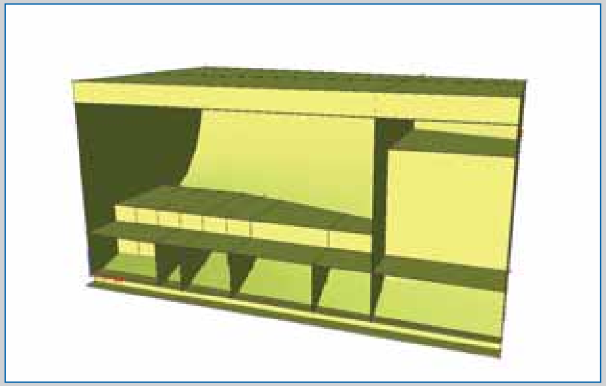
Yacht on transport cradles

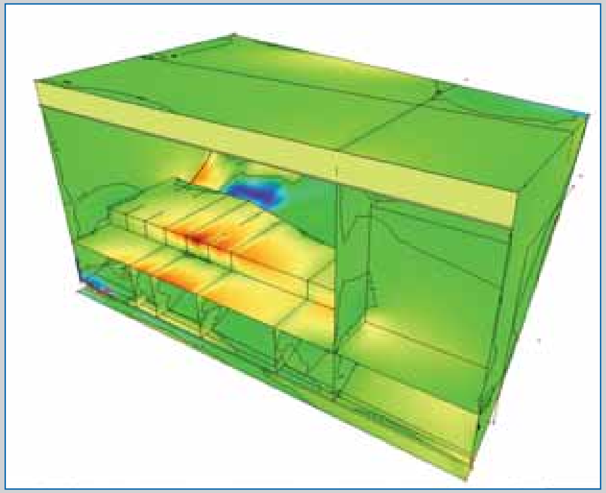
The aim of this project was to prove that the internal structure of a luxury yacht would be strong enough to support the cradle forces exerted on the yacht as it was transported out of the production hall and on to the ship lift.
The main concern in this case was that usually the cradles are placed directly under transverse bulkheads of the vessel; in this case however, the forward cradles would have to be placed between the bulkheads to facilitate access to the ship lift. This resulted in a large force being introduced into the vessel on a very local scale if compared to the normal situation of the vessel being afloat in water.
The calculation covers all stresses occurring in the structure due to the introduced cradle load.

Used software • SCIA • ESA PT

Yacht on transport cradles







Introduction

The aim of this project was to prove that the internal structure of a luxury yacht would be strong enough to support the cradle forces exerted on the yacht as it was transported out of the production hall and onto the ship lift.
The main concern in this case was that usually the cradles are placed directly under the transverse bulkheads of the vessel; in this case however the forward cradles would have to be placed between the bulkheads to facilitate access to the ship lift. This resulted in a large force being introduced into the vessel on a very local scale if compared to the normal situation of the vessel in water.

Method of analysis

This project determined the resulting stresses in the vessel due to the cradle being positioned between the bulkheads 65 and 80.

The calculation covers all stresses occurring in the structure due to the introduced cradle load. The fore part of the ship was built up of mainly plates without additional stiffening. The reason for this was if could be shown that the main plate fields without the additional stiffening could support the introduced load. It can be concluded that the stiffened structure will meet the requirements. This results in the shell being modelled excluding the stiffeners. This approach has been chosen in order to ensure that the stress levels remain within the allowable limits.

SCIA•ESA PT allows the modelling of accurate models of curved plates. They are created in order to determine deformations and internal stresses. This delivers accurate results since the interaction between the various plating and beams is taken into consideration.

The modelled section of the vessel, from frames 65 to 80, was supported by fixed line supports along the entire edge of the bulkheads. Thus basically the section was pinned between the bulkheads and then forced to bend under the introduced load. This is a very conservative approach since the section is not actually fixed between the bulkheads. However this approach was taken to ensure that the calculated stresses would also be on the conservative side.

Only one side, namely the starboard side, of the forward section was modelled. Since the vessel is symmetrical, it was sufficient to model only one side.

Rules and Regulations

The following rules and regulations were used to complete the check of the internal structures of the vessel:

- Lloyd's Register Rules and Regulations
- Rules and Regulations for the Classification of Special Service Craft, July 2003, incorporating Notices No. 1 and 2
- Part 6 Hull Construction in Steel

Loads

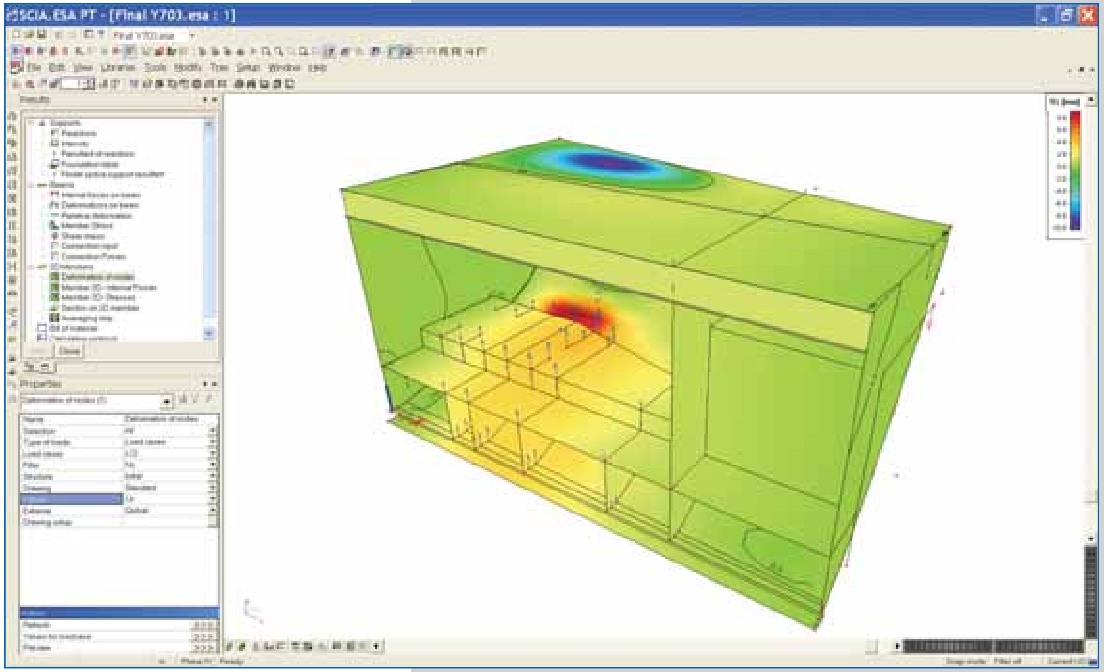
The load exerted onto the vessel was determined by using the maximum capacity of the Mammoet load liners used to transport the vessel. These load liners would be lifting the large cradles on which the entire weight of the vessel would be resting.

Basically the entire vessel would be supported on 4 cradles, with 2 supports points each, one on the port side and one on the starboard side. Between the steel of the cradle and the steel hull, a layer of wood was used to attempt to reduce the "hard point" of the load.

A load of 176 tons had to be introduced into the vessel between frames 65 and 80. The support area was 3,0m by 1,8m, resulting in a surface area of roughly 290kN/m^2.

Results

The results proved that the vessel would be able to support the introduced cradle loads between the bulkheads without any modifications to the vessel. The conservative approach ensured that the actual deflections and stresses that occurred during the transport did not have any adverse effect on the yacht.



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Launching of arched bridge LN36 Schaarbeek

A steel and concrete engineering company

The engineering firm Stendess was founded by an experienced team specialising in the study and design of steel constructions. From its establishment in 2002, Stendess has made high quality and full service provision its top priority. Thanks to this integral service, where the design of the metal superstructure and the concrete substructure are calculated and drawn by experts in the same office, the building owner and principal contractor retain 100 % control over the complete structure.

Stendess can follow up on cross-border projects in accordance with most standards and codes: Eurocode, NBN, NEN, DIN, NF, AISC, Britisch Standards and specific national codes.

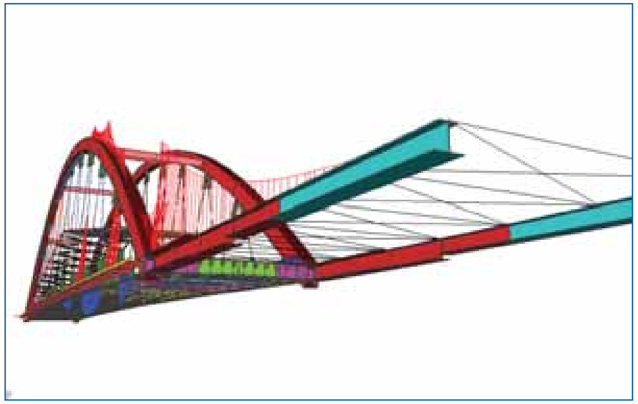
Key activities

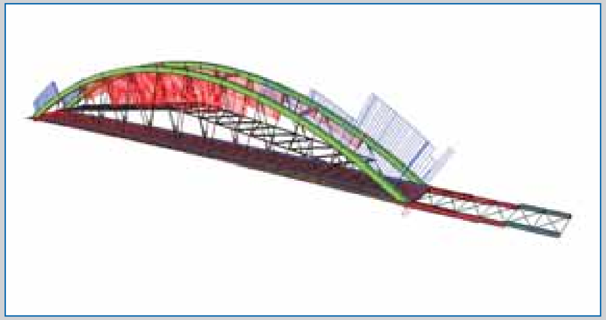
- Industrial buildings: steel factories, power plants, depots, etc,
- Other buildings: service buildings, concert halls, sport facilities, swimming pools, apartment buildings,
- Bridge constructions: arch bridges, cable –stayed bridge, suspension bridges, bascule bridges, swing bridges, orthotropic bridge, mixed steel-concrete bridges,...
- Off-shore projects: lock gates, Roro, oil rigs, ...
- Industrial equipment: silos, cranes, craneways, storage tanks,...
- Erection engineering: longitudinal and transverse repositioning, skidding, lifting, bridge launching...

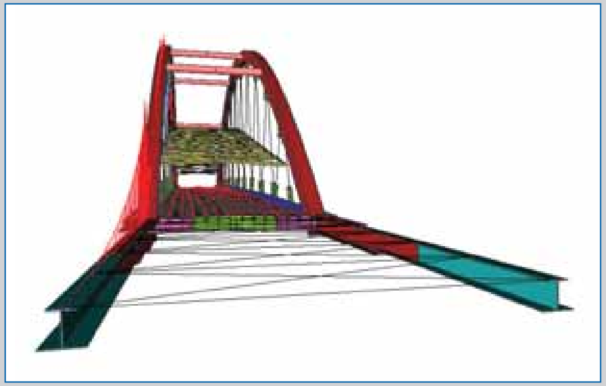
Locations of the constructions: Belgium, the Netherlands, France, Germany, United Kingdom, Spain, Sweden, Saudi Arabia, Greece, Singapore, Chili, Brasil, Cameroun, Russia, Thailand ...

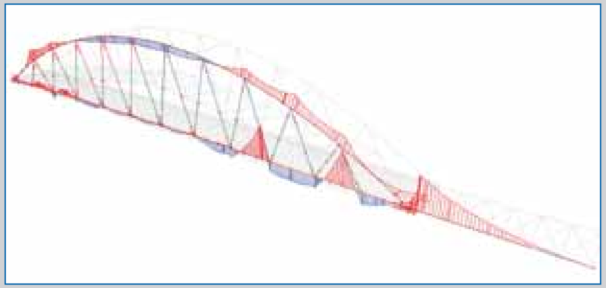
Launching of arched bridge

It concerns the launching of a new bridge for the use of HST (High Speed Train) traffic at Schaarbeek, Brussels. The new bridge is an arched bridge with an orthotropic deck. The arches are built-up box girders. The main beams are built-up I-sections underneath the orthotropic deck.
In order to reduce the disturbance of the train traffic under the bridge, the new arched bridge was erected on a newly build concrete bridge. On this concrete bridge the new arched bridge was built together and prepared for launching.
Between the existing train tracks erection towers with skids were built to support the new bridge during launching. The positions of these erection towers were very non symmetrical because of the high density of tracks below. This caused an extra difficulty in the engineering study of the bridge launching.









Used software • ESA-Prima Win, SCIA • ESA PT

Type: Arched bridge
Location: Schaarbeek, Belgium (L36N between Brussels-North and Diegem)
Owner: Infrabel, Belgium
Architect: Tuc Rail, Belgium
Erection Engineering: Ingenieursbureau STENDESS N.V., Lovendegem, Belgium
Check of the bridge during erection
Contractor: Victor Buyck Steel Construction N.V., Eeklo, Belgium
Total steel weight: ± 1.650 tons
Total length: 136 m
Building period: 2005

Short description of the project

It concerns the launching of a new bridge for the use of HST (High Speed Train) traffic at Schaarbeek, Brussels. The new bridge is an arched bridge with an orthotropic deck. The arches are built-up box girders. The main beams are built-up I-sections underneath the orthotropic deck.

In order to reduce the disturbance of the train traffic under the bridge, the new arched bridge was erected on a newly build concrete bridge. On this concrete bridge the new arched bridge was built together and prepared for launching.
Between the existing train tracks erection towers with skids were built to support the new bridge during launching. The positions of these erection towers were very non symmetrical because of the high density of tracks below. This caused an extra difficulty in the engineering study of the bridge launching.

Ingenieursbureau Stendess N.V. was asked to check the new bridge during launching and to calculate and propose solutions for a safe launching.
Several options were calculated and discussed with Victor Buyck Steel Construction. Challenges like global and local reinforcement of the main beam and launching with a launching nose lengths from 10 to 30 m, were investigated and judged. The solution with a launching nose of 30 m long was chosen. Because of the risk of buckling the buckling length of the bridge, diagonals were reduced by placing a horizontal lattice girder.
During the launching, the reactions and the deformations of the bridge and launching nose were constantly compared with the calculated values in order to secure a safe launching. The launching itself was done smoothly and within 7 hours the bridge was in place.

Use of ESA-Prima Win and SCIA • ESA PT

Description of technical questions to be solved with ESA-Prima Win
The complete 3D-model was formed with bars, the orthotropic deck plate was put together as 2D-elements. To realize a realistic behaviour of the bridge it was necessary to calculate and correct the effective width of the upper flange of the main beams along the whole bridge length and this for each launching phase. The effective widths were calculated according EC3 and based upon the M-lines in the main beam obtained by ESA-Prima Win. The corrections of the effective width could be easily done by the "rib" module in ESA-Prima Win.

To avoid overload of the concrete bridge on which the launching started and on the erection towers it was necessary to perform constantly corrections with regard to altitude, real precision work. The input in EPW and obtaining the results of these altitude corrections out of ESA-Prima Win went smoothly.

The check of the local impact of the reactions into bridge was done based on EC3 with the use of the results given by ESA-Prima Win.

The altitude corrections, the reactions on the erection towers and the deformation of the launching nose were calculated for each launching phase. The results obtained from ESA-Prima Win could easily be put in table and graphics in order to obtain a document in which theory and praxis during the launching could be compared and a safe launching was possible.

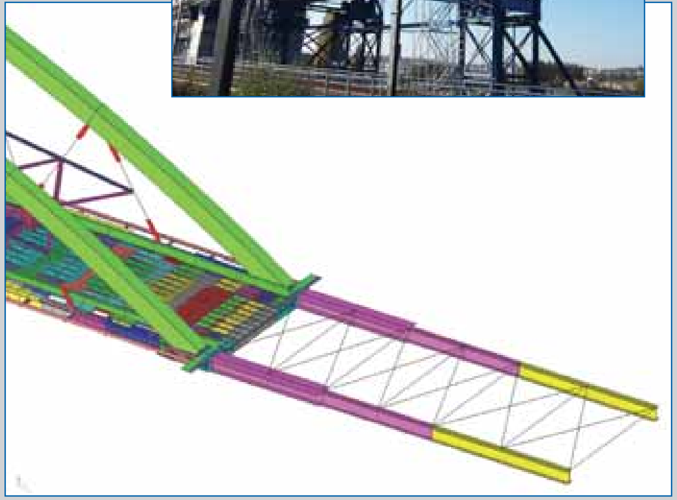
Description of our experience with Esa-Prima Win when realizing the project

- Checking the structure as a combined model with 1D-2D-3D elements and with a high hyperstatic degree according EC 3.
- The possibility of building up a flexible model to simulate the different altitude correction on the erection towers.
- The possibility of changing the effective width of the orthotropic deck along the bridge length.
- The short calculation time for the model pro launching phase and the easy and fast way to do a global check according EC 3. This was very important because of the high number of launching phases to be considered.

Used modules

- Base
- 3D frame
- 3D shell
- Steel code check (EC3)






Travhydro nv - sa

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Contact	Dhr. Anthelme Claeys
Email	antwerpen@travhydro.com
Website	www.travhydro.com

Oosterweelbrug - Antwerpen

Activiteiten

- Montage en demontage van steigers, schoringen en ondersteuningen in de bouw en de industrie.
- Montage, demontage en verhuur van bekistingsystemen voor speciale constructies – systeem Meccano (Alpi).
- Verkoop en verhuur van steigermateriaal.
- Verkoop en verhuur van beschoeiingmateriaal voor sleuven.
- Verkoop, verhuur en montage van rekken en industriële magazijn - inrichtingen.

Steigersystemen

Travhydro produceert eigen steigermateriaal (CRAB, CS, stapelrekken) in haar productievestiging te Nijvel – België en heeft vestigingen in de gehele Benelux.

Klanten

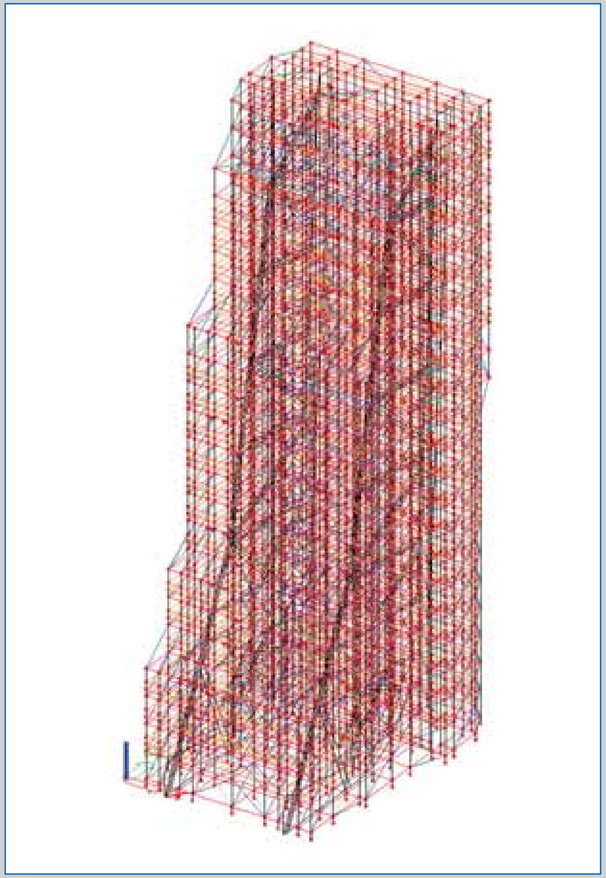
Industrie en bouwsector.

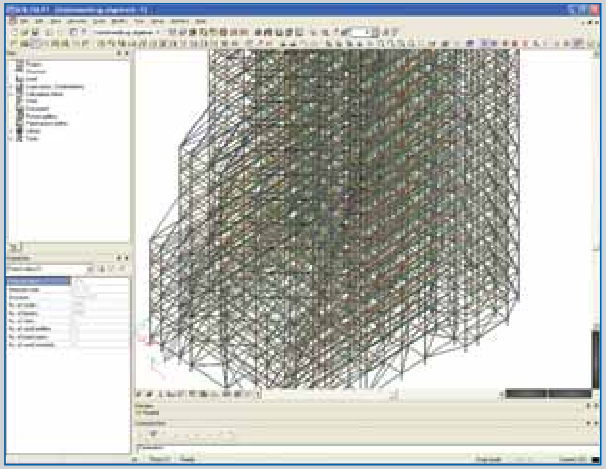
Bedrijfsvisie en filosofie

Op een creatieve wijze en op een voor ons bedrijf rendabele manier, de gebruiker in staat stellen veilig en efficiënt werken op hoogte te laten uitvoeren.

Organisatie

Datum oprichting: 12 september 1928
B.T.W.: BE 432.259.516
Reg. aannemer: 432.259.516-08/23/1/3
RSZ-nr.: 00 / 1.122.297 / 75





Used software • SCIA • ESA PT

De brug werd voor het eerst in dienst genomen in 1928.
Eind 1989 tot 1992 werd de brug, ten gevolge van een aanvaring, uit dienst genomen voor het gewone wegverkeer en enkel opengesteld voor treinverkeer.
Van 1992 tot 1994 werd de brug geherconditioneerd; een nieuwe bedieningskamer en nieuwe machines werden geplaatst.
Locatie: Antwerpen – België
Opdrachtgever: THV Aelterman - AIS

Beschrijving

Concept

De structuur betreft een werksteiger aan en rond de brug ten behoeve van werken aan de staalstructuur van de brug. Deze werken omvatten mechanische werken, straal- en schilderwerken.
In een eerste fase, waarbij de steiger niet is bekleed, wordt het wegdek verwijderd.
In een tweede fase, waarbij de steiger volledig wordt bekleed met krimpfolie – inclusief het dak - worden de straal - en schilderwerken uitgevoerd. De berekening betreft de tweede fase.
De steiger wordt afgestempeld tegen de staalstructuur in vier richtingen (X, -X, Y, -Y), in principe alle 4,00m in hoogte, zodat de horizontale belasting, hoofdzakelijk afkomstig van de wind - rechtstreeks naar de brug wordt overgedragen.

Rekenmodel

Niet lineaire elementen

- Steunpunten op grondniveau: kunnen in verticale richting enkel starre druk opnemen en zijn in horizontale richting als vast gedefinieerd.
- Stempelsteunpunten kunnen enkel starre druk opnemen volgens de locale x-as van de stempelbuis. Ze worden gekarakteriseerd door een veerconstante van 10^7 daN/m om rekening te houden met de "vervormbaarheid" van de steunpunten, maar vooral om onrealistisch hoge steunpuntreacties te vermijden bij een definitie als volkomen star steunpunt.

Belasting

- Eigen gewicht steigerstructuur
  Om rekening te houden met alle toebehoren op de bepaalde steigeronderdelen, wordt voor staal gerekend met een specifiek soortelijke massa van 90 kN/m³. Voor enkele onderdelen wordt gerekend met 78,5 kN/m³.
  Eigen gewicht van de werkvloeren wordt aangebracht onder de vorm van puntlasten in de staanderknopen op slaghoogte.
- Nuttige overlast op werkvloeren
  Steigerklasse 3 (200 daN/m²) overeenkomstig norm EN 12811-1; 100% op één vloerniveau en 50% op een tweede vloerniveau.
  Deze last wordt aangebracht op de hoogst gelegen vloeren om het 2de orde effect in de meest ongunstigste situatie te laten optreden.
  De nuttige overlast wordt voor 100% toegepast in combinatie met gereduceerde werkwind belasting. Voor 25% in combinatie met normale wind.
- Windbelasting
  Werk windbelasting in overeenstemming met EN12811: 20 daN/m² als basis winddruk, waarop in functie van de oriëntatie van het vlak de bijbehorende drukcoëfficiënt wordt toegepast.
  Maximum windbelasting overeenkomstig NBN B03-002-01:
  - Terreinklasse 2: landelijk gebied met alleenstaande gebouwen.
  - Basiswinddruk, variabel met de hoogte boven het terrein, variërend van 66 tot 119 daN/m².
  - Ter vereenvoudiging wordt er gerekend met een over de volledige hoogte gemiddelde basis windbelasting.

  Drukcoëfficiënt cp: aan de loefzijde: 0,8
  aan de lijzijde: -0,5
  aan de strijkzijde: -0,7
  aan de dakzijde: -0,7

Realisatie

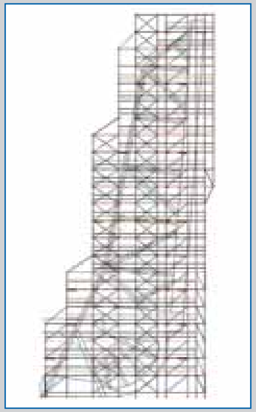
- Aanvang montage: 20.11.2006
- Gebruikstijd: + 4 maand.

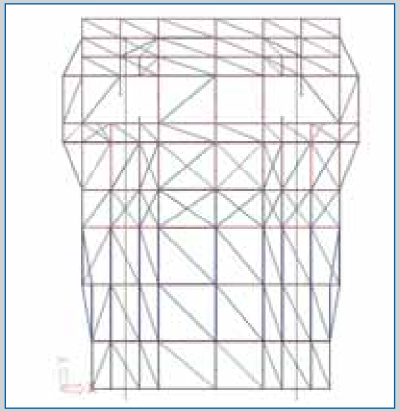
Enkele cijfers

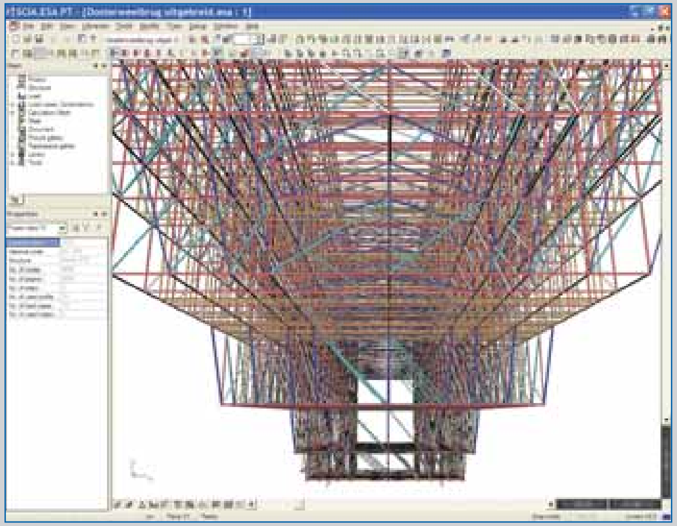
- Eigen gewicht steiger: + 1262 kN.
- Globaal nuttige overlast aan 100%: + 582 kN.
- Totale windlast normale wind volgens X- richting: ± 608 kN.
- Totale windlast normale wind volgens Y- richting: ± 413 kN.
- Totale windlast normale wind volgens Z- richting: ± 128 kN.

Oosterweel' bridge

This project regards the renovation of the Oosterweelbrug of Antwerp, the bridge was first used in 1928. It concerns a work scaffold at and around the bridge for allowing works at the steel structure of the bridge. These works consists of mechanical works, jet stream works and paintwork.
The surface of the road, where the scaffold wasn't covered, was stripped in a first phase.
The jet stream works and the paintwork were executed in a second phase in the course of which the scaffold was fully covered.
The scaffold is horizontally supported against the steel structure in four directions (X, -X, Y, -Y), principally every 4,00 m in height by which the horizontal load, mainly coming from the wind, is directly transferred to the bridge.
The erection of the scaffold started in November 2006 and will last for approximately 4 months







How to participate in the next SCIA International User Contest

Dear customer,

SCIA would like to thank and congratulate all participants of the SCIA User Contest 2007.
Those who did not have the chance to subscribe to this contest, we gladly invite to participate in our next edition. As you will have noticed when reading this contest book, taking part in the contest is not only about winning prices; it is above all a unique opportunity to show your projects to an international public.

The next SCIA User Contest will once again offer you a unique opportunity to come forward with your company and to get international attention. Participating will become easier, as we will already open the project submission website at the end of 2007. The advantage for you as a customer is that you can submit your project information at your own pace: once a project has been finished, it can be published immediately when it is still fresh in your mind. In other words, you don't have to start gathering information two years after the project has been realized.

For all practical information regarding the next User Contest – release 2009, please visit our website at http://www.scia-online.com/contest.
SCIA engages itself to make the next edition even more valuable for your company: all your submitted projects accompanied with your company profile, will be published in our next SCIA User Contest Book. We anticipate distributing more than 5000 hardcopies and of all winning companies, a comprehensive case study will be made and presented to the international press and media.

Taking part in this contest is easy, free and accessible for all customers with an officially registered version of SCIA and Nemetschek software. This contest is meant for projects which either have been realised already, which still are in progress or that will be carried out soon. If you have elaborated your project before, the biggest job is already done and you only have to submit your projects to us.

We wish you a lot of success with your participation.

The SCIA Marketing Team
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SCIA scientific software

Member of the Nemetschek Group

www.scia-online.com

User Contest 2007

All projects represented in this book
have been designed with
software from SCIA and Nemetschek.

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