WINNER

Ney & Partners

Contact Jeroen Vander Beken
Address Terhulpsesteenweg 181
1170 Brussel, Belgium

Phone +32 2 643 21 80
Email jeroen.vanderbeken@ney.be
Website www.ney.be

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Ney & Partners is a structural engineering consultancy, established in Brussels. Since its foundation in 1997, the office has worked with an active view on the art of engineering through the integration of the different civil works disciplines.

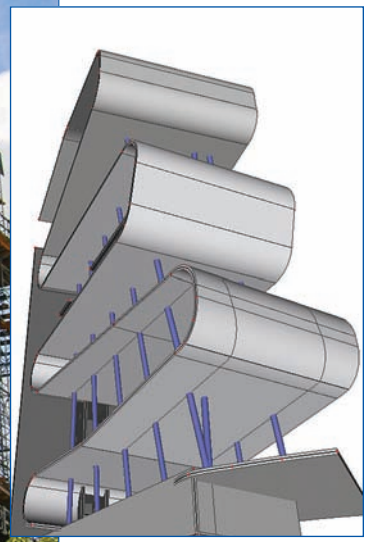
This integration and optimization of structural elements aims to overcome the classic hierarchic assembly of constructive solutions. Innovative bridges, roof structures and works of art developed by our office, express most clearly this vision.

The construction project quality lies in the synthesis of specific design constraints. The structural aspect is of primary importance to this synthesis.

From the very beginning of the design process, Ney & Partners conducts a constant research for advanced engineering integration. In doing so, our position as Engineering Consultancy overcomes the standardized dimensioning of predefined technical solutions.

An intense collaboration with the design team from an early stage on allows the development of innovative solutions, adapted to the context of the project.

Ney & Partners currently employs more than 40 civil engineers, architects, draughtsman, etc…



Short Description

Office Building 'Facelift Umicore', Hoboken

A reinforced concrete shell that slowly 'climbs' to the roof of an existing building forms this spectacular office building. The three spaces that are enclosed by the shell, which has a thickness of only 30cm, are not aligned but slightly rotate one above another. The nine-storied building, with a footprint of only 15 m by 30 m, is structurally independent from the existing building and gets its stiffness from the co-operation of the shell, 11 inclined columns and an eccentrically placed core. The foundation of the building is made from 36 screw piles with an average length of 11 m which reach to a lower stiff clay layer but which also get their strength from the friction along the shaft of the piles.

Project Information

Owner: Umicore nv
Architect: Conix Architects cvba
General Contractor: Strabag nv
Engineering Office: Ney & Partners nv

Construction Start: 01/12/2007
Construction End: 31/11/2008
Location: Hoboken, Belgium

Quote of the Jury

"The originality and prestige of this project combined with the high technical complexity and the use of the software to the limit, attractively presented, made the jury decide to have this project as number one. Especially the complex material and structural model using a mix of curved shells, inclined columns and long term analysis of creep and deflection made it a very interesting project. On site measurement proved the accuracy of the calculation."

Introduction to the project

In 2006 Umicore, one of world's largest materials technology groups, decides to modernize their 'Precious Metals Plant' in Hoboken. The project 'Facelift' includes the renovation of different buildings, the realisation of tree awnings and the construction of an eye-catching office building, which combines a spectacular reception, an auditorium, an exposition hall and several offices. The building is unrestrained in design in contrast to the monotonous and randomly selected surroundings. The design draws one's attention and counters the existing rational background. The powerful, high-tech look and feel creates an innovative image, thus modernizing the company.

Description of the project

A reinforced concrete shell that slowly 'climbs' to the roof of an existing building forms the office building. The three spaces that are enclosed by the shell, which has a thickness of only 30cm, are not aligned but slightly rotate one above another. The nine-storied building, with a footprint of only 15 m by 30 m, is structurally independent from the existing building and gets its stiffness from the co-operation of the shell, 11 inclined columns and an eccentrically placed core. The foundation of the building is made from 36 screw piles with an average length of 11 m which reach to a lower stiff clay layer but also get their strength from the friction along the shaft of the piles.

Approach

One of the larger challenges dealt with while designing the structure of this building was formed by the geometry and especially the large eccentricity introduced by the position of the 3 boxes in combination with the inclined columns. The combination of these 2 elements introduces large horizontal forces in the shell, which result in relatively large horizontal deformations under the (vertical) self-weigh.

Several solutions were modelled and analysed not only to reduce the initial deformations but also to estimate the expected final deformations caused by creep and cracking of the concrete. It was very important to determine an upper boundary for the postponed

Used software: Scia Engineer

Office Building ‘Facelift Umicore’, Hoboken

deformations for the manufacturing of the frames of the glazed facades. In the final solution the horizontal stiffness is granted by a large ‘framework’ which is formed by 3 columns at the street side of the building and the core at the other side.
Due to the large horizontal displacements, it was necessary to introduce several construction stages where the supports of the formwork where removed in order to let the building move under its self-weigh. In this way, the large horizontal displacements at the end of the construction were limited and the displacements were introduced in a more controlled way. Several models were made to analyse the internal forces between different construction stages. The evaluation of displacements measured on site and the values from the models were satisfying.
The reinforcement of the shells was optimised to an economic minimum and was transformed in prefabricated cages which were easy to place and shortened the construction time. In order to avoid beams, the reinforcement of the slabs was carefully analysed and optimised. Supplementary reinforcement was necessary to prevent punching around the mixed columns.

The use of Scia Engineer for this project

The program Scia Engineer made it possible to easily and quickly model and analyse several solutions. Because of this, it was possible to, in early designing phases, make essential decisions in consideration with the architect, which resulted in an esthetical, structural and economical justified solution.
The program Scia Engineer made it possible to easily and quickly visualise the internal forces in the shells and thereby the interpretation of the results was simplified. Also the modelling of the shells themselves was very easy and intuitive.

The program Scia Engineer made it possible to analyse the initial and final deformations in function of the real geometry, age of the concrete and theoretical necessary reinforcement. This was of great importance for the frames of the glazed facades.