IMd

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Organisation

IMd Raadgevende Ingenieurs is an organisation with a great core of highly qualified employees, who have been applying their experience, know-how and expertise for many years with regard to advising about, designing and working out main structures for buildings. At present the firm consists of 40 highly educated employees. IMd is completely independent and does not have any business links with manufacturers, suppliers, contractors, developers and other interested parties who could influence our impartial and independent consultancy.

IMd is a member of the Dutch association of consulting engineers (ONRI) and possesses the “quality management system” certificate according to NEN-AND-ISO 9001.
It is a firm where the internal communication proceeds smoothly and all employees are kept informed about the most recent developments.

In the almost 50 years that our firm has existed the quality of our service has always been a key issue. The most important characteristics of this service for us are:

- A good product that fits the budget of the client
- Aproduct that fits the concept of the architect
- Creativity and ingenuity
- A flexible and service-oriented attitude

Projects

They vary greatly: from prestigious office complexes to pedestrian bridges, from houses to complex shopping centres, from alterations to new-housing and from simple and small to complex and large. Each project has its own charm and is a constructive challenge. The projects are carried out at the request of property developers, government organisations, foundations, architects, contractors and private parties. This diversity in clients is made possible because of the independence of the firm of consulting engineers.

View IMd Raadgevende Ingenieurs

The view of IMd is that the success of a project largely depends on the first stage of the design process. The cooperation between architect, client, mechanical engineer and structural engineer is decisive in order to have a fine design in complex projects. In the preliminary design various alternatives are presented for the structure of a building. The advantages and disadvantages of every constructive alternative will then be discussed in the design team. Wishes of the client and architect, requirements in the field of building physics, possibilities regarding the technical installations: they all affect the choice of an optimal structural design.
In addition to the constructive design, IMd regards its role as a coordinating engineer as very important. In its existence IMd has built up a perfect reputation. In addition to the inspection of the basic principles of the drawings and calculations of suppliers of prefabricated concrete and steel constructions, the content of these elements is also assessed with great care. We ask the client to make it possible for us to carry out the consultancy work in a constructive way. In the end this will create the best result for the client.

Short Description

Sculpturally shaped lecture hall

*The new construction measures close to 10.000 m² of educational capacity and includes also 110 parking places. Rietveld Architects LLP, stationed in New York, has designed a building which consists of three construction parts, each of a different height, that are contracted through angular distortion.
Without a doubt, the most striking feature of Hogeschool INHolland Delft’s new lecture hall is its steel construction. The lecture hall’s sculpturally shaped steel construction has been designed, drawn, and exchanged by all parties involved through fully three-dimensional models. Scia’s ESA-Prima Win software was used to achieve all this. During the execution, it was decided to affix an experimental façade, with a high additional tensile load, to the complex-shaped steel construction.*

Project Information

Owner: Hogeschool INHolland, Haarlem
Architect: Rietveld architects LPP, New York
General Contractor: Sprangers bouwbedrijf, Breda
Engineering Office: IMd Raadgevende Ingenieurs

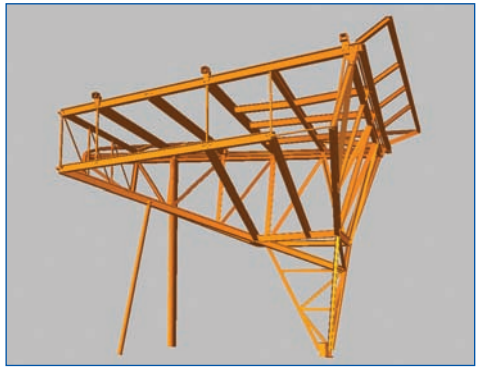
Construction Start: 01/10/2008
Construction End: 31/07/2009
Location: Delft, Netherlands

Introduction

At a former University site, located on the Rotterdamseweg, the new construction works of INHolland Delft are concluded. Eye-catching feature of the new building, which is largely made of concrete, is the steel construction of the lecture hall. This sculpturally shaped construction feature was designed, drawn, and shared by all parties involved with the use of fully three-dimensional models, created with ESA-Prima Win computational software. The new construction measures close to 10.000 m² of educational capacity, as well as 110 parking places. Rietveld Architects LLP, stationed in New York, have designed a building which consists of three construction parts, each of a different height, that are contracted through angular distortion. Also, the building contains a number of floating plateaus, as well as sloping columns, measuring over 17 meters. The large atrium, at the north-side of the building, boasts the presence of the lecture hall, which holds 174 chairs.

Design

The initial architectural drawings, within the boundaries of which IMd was to design its construction, consisted of a 3D model of the inner- and outer shell, with a total thickness of 500 mm. After subtracting 2x100 mm, accounting for the slabs and the required tolerance, 300 mm was left for the construction. Bearing in mind both the complex shape as well as the large span, a steel construction proved to be the most economical option. The floor



Used software: ESA-Prima Win

is constructed by using hollow core slabs with an in situ layer, while metal decking is used in the roof floor. Both floors serve as a panel, which is crucial to the construction's stability.

First, a three-dimensional wire-frame model was drawn, within the architectural boundary conditions, according to our well-developed engineering instinct. Then, this model was transferred to the 3D computational model of ESA-Prima Win, after which the various steel sections were determined. This was all done within the architect's set conditions; because of the cohesion of the different slopes, this was an imperative requirement. Wherever possible, trusses were implemented in order to reduce the weight. However, this could not be achieved in all places, which required the appliance of heavy steel sections; for instance, an HD-section was used for the diagonal floor beams.
After adjusting the 3D-drawings to the final ESA-Prima Win profile measures, the architect implemented these to her drawings, and adjusted them wherever necessary.

Development and execution

During the execution phase, steel sub-contractor Moeskops used IMd's 3D-drawing model to design the details. After thorough consultation, IMd adjusted a few elements, with regard to the production- and assembling time. Transport by water enabled the steel construction to be divided into large units. We were therefore able to get the largest truss, measuring 22 meters in length and 7 meters in height, to be delivered as a prefab unit. In only one week's time, the complex-shaped steel construction could be assembled.

Prestressed façade

While execution on site took an advance with placing the foundation piles, it was decided to enclose the atrium surrounding the lecture hall with an experimental façade. The design goal of this 12-metre high cladding is to administer it without visible reinforcements, and create a super-slender appearance. The lecture hall design was again analysed with the use of Scia's ESA-Prima Win, allowing for the substantial vertical tensile force which is supported by the upper edge of the lecture hall's two large trusses. This resulted, among other things, in applying heavier steel sections, and a single extra column. Despite the inconvenient time of the adjustment, it was nonetheless executed properly by all parties in design and execution. Therefore, the planned delivery date of July 2009 is still within reach.