

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
- A product 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

Theatre with cantilevered steel construction

One of the historic purification industrial halls of the Amsterdam Westergasfabriek is the home of theatre MC. Together with architectural firm MOKO*OMAHA, IMd Raadgevende Ingenieurs have designed the main supporting structure for two large, unique constructions, to be placed in this monumental industrial hall. During the design phase, Scia Engineer was already used to rapidly determine the construction's ideal shape, as well as to gain insight into aesthetically desirable alterations. In this manner, form and function are linked efficiently. During a later phase, the construction was tested, again with the use of Scia Engineer.

Project Information

Owner: Theatergroep MC, Amsterdam
Architect: MOKO*OMAHA Architecten, Amsterdam
General Contractor: Witkamp Bouw, Almere
Engineering Office: IMd Raadgevende Ingenieurs

Construction Start: 15/03/2009
Construction End: 01/09/2009
Location: Amsterdam, Netherlands



Introduction

In 2009, the Amsterdam Westergasfabriek site is where, in one of its monumental halls, a number of exclusive constructions are realised. Constructively speaking, "The Grid" is the most interesting: a steel construction with a 12-metre cantilever protruding from it. This cantilever may be used to present various props and items, such as cars and other heavy stage properties, needed for the groundbreaking theatre productions of the MC theater society. Lamps will be hanging from the construction as well. Therefore, it is of vital importance that the construction shows a high level of rigidity, together with the lowest possible level of deformation. All this must be achieved while retaining a slender appeal, since the architect aims at creating a box, which floats in mid-air.

This construction was analysed using a Scia Engineer 2D- and 3D-model, respectively.

The hall's second large construction is the so-called "Achterhuis" ("Rear House"). This is an entire building within the large hall, including dressing rooms, conference rooms, installation depots and ground-floor storage rooms. Since the storage rooms have to stock large stage items, the front was to be as large as possible, without the construction of columns. This was achieved by placing the staircases on the building's side wings; the columns were situated there as well.

The columns, which under normal circumstances were to be placed below the remaining 12 metres, can be omitted here, because of the large girders that hold the floors in place.

This girder frame forms the Westergasfabriek's roof construction and fits in perfectly with the rest of the building. During the design phase, Scia Engineer was already used to create a 3D-image of the forms that were to be implemented, as well as the accompanying steel moulding.

What made this project relatively complex was the already existing construction. Not only are the construction works to take place within a building that already exists, this particular building is also branded historically monumental. This means that, basically, no part of the building may be altered. For instance, the new constructions are not to be linked with the already existing ones too much, while such an approach would, constructively, be the best one. These stipulations have led to two fully independent constructions.

Another problem that was encountered was the fact that the Westergasfabriek site used to hold chemical plants, which have polluted the soil. Also, Amsterdam constructions always have to be built using pole-foundations, because of the weak topsoil. The poles that are required for the new construction have to be placed in such a way, that they do not enter the

sphere of influence of the already existing poles. This, too, was included in the design, by using Scia Engineer - set to specific boundary conditions - to determine possible reactions.

Design

During the design process, IMd worked closely together with the architect. First, ideas were pitched and shared using drawing sketches. Soon, however, Scia Engineer was employed to determine a clear 3D-model of the construction.

The constructive challenges (a 12-metre cantilever and a 12-metre column-free protruding span) have led to a project, the form of which directly relates to the construction's dimensions. Construction and design were carefully integrated during the design process, in order to achieve not only aesthetic appeal, but also efficiency; both within the set financial boundaries. Scia Engineer proved to be of great value; any alteration in the construction's shape was rapidly processed, and IMd was able to determine which consequences the alterations would have for the steel moulding.

Scia Engineer was also used for both constructions to determine their ideal constructive shapes, within the boundary conditions of the architect, as well as the

already existing building. Changes in the design could be implemented rapidly, after which the various options could be compared. Communicating through 2D-models about these 3D-shapes has proved to be rather problematic. This 3D-package, which produces clear images, was a very good solution to that problem.

All in all, the well-tuned co-operation between the architect and IMd, with the use of Scia Engineer, has led to a constructive design that fits in nicely with the already existing building. It has met with all the architect's demands and wishes, as well as those of the eventual employer; on top of that, the design proved to be financially feasible.

Development and execution

During the design process, IMd optimised the steel construction as much as possible, which means that during the subsequent phase, this only needs to be completed. The 3D computational model was then used to create the 3D construction drawings. These drawings, together with the completed Scia Engineer computations, were sent to the steel sub-contractor, who will finish the detailed construction.

2009 will see the outset the construction works, which are to be completed before the start of the 2009-2010 theatre season.

