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

Aircraft carrier as Pon head office

The office building of this project has the appeal of an aircraft carrier. To give shape to this idea, the building rises steeply from a water element. The ‘bridge deck construction’, lifted above the ground, consists of two building layers. The prestigious design has two elevations.
The building is supported by cantilevered pylons. In order to prevent deformation, prestressing was implemented in the in situ placed pylons and floors. To approach the occurring deformation in the best manner possible, IMd Raadgevende Ingenieurs have made an extensive analysis with the use of a three-dimensional computational model, processed with Scia Engineer. The constructive design aims at controlling the subsidence during the building phase as much as possible.

Project Information

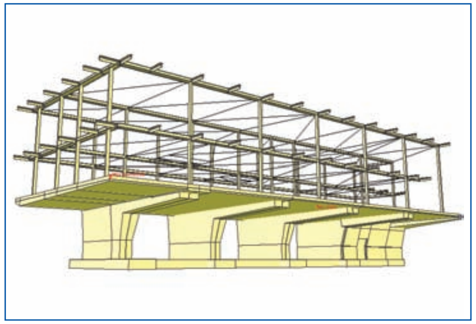
Owner: PON Onroerend goed, Nijkerk
Architect: QUA Architecten, Amsterdam i.s.m. Inbo Adviseurs Bouw Amersfoort, Amersfoort
Engineering Office: IMd Raadgevende Ingenieurs
General Contractor: Heijmerink Bouw, Bunnik
Construction Start: 19/06/08
Construction End: 30/06/09
Location: Almere, Netherlands

Introduction

Designed by architectural firm Qua, the new Almere head office of Pon – automobile- and equipment importer –was to become a building with the appeal of an aircraft carrier. To give shape to this idea, the building rises steeply from a water element. The ‘bridge deck construction’, lifted above the ground, consists of two building layers. The prestigious design has two elevations. The most remarkable one consists of the cantilevers, placed above the water. The opposite side serves as the building’s backbone, and it reminds the viewer – because of its massive and dense appearance – of an aircraft carrier’s engine. Through a slope, which gradually transforms into a platform, visitors are directed to the entrance. Apart from the building’s allure, the client was also concerned with the aspect of durability, and the construction was designed accordingly.

Design

The main supporting structure was designed by IMd Raadgevende Ingenieurs. The in situ ‘bridge deck’ is supported by cantilevered pylons. Right on top of the floor, a whole different type of construction is created: a light steel construction with hollow core slabs and prefab concrete shaft walls. By using a crafty construction, including prestressing in the pylons located at the side ends, two-directional cantilevers of approximately nine metres have been created. The prestressing reduces possible deformations, in order to ensure the façade’s impermeability. The pylons and the bridge deck’s lower side have been constructed using aesthetical concrete. Partly because of the slender floor design, and the subsequent limited space for prestressing cables, it was decided that prestressing was only applied partially. This means that during everyday use, crack formation may



Used software: Scia Engineer

occur. Apart from prestressing, reinforced steel was implemented as well.
The design was composed and calculated three-dimensionally, using Scia Engineer. The 3D-computational model was principally used to analyse occurring deformations during the construction and post-construction phase. By including different levels of concrete rigidity, as well as different load sequences, the possible deformations were determined. The different levels of rigidity were determined with Scia Engineer-concrete section, using M-N-Kappa diagrams that included the variable degrees of creep deformation. Because of the eccentricity of the resulting load on the foundation, the building is likely to 'tilt'. This eccentric load is intercepted by the foundation. The foundation poles are implemented with a specific spring rigidity, in order to cope with the cantilever's deformation. Because of the large cantilevers, the calculated deformations are relatively large. That is why the building is 'curved' upward, using an arch, which ensures the subsidence to reach standard level after the construction phase.
The prestressing was executed as a load case, and the position as straight eccentric cable offset.

Execution

During the execution, it is of great importance to control the subsidence. The form work construction, which has to be assessed higher because of the subsidence, has been determined by using a special arch plan. The temporary creep support will only remain on the cantilevered heads. They are regularly loosened, to jolt the building, and are twisted shut after that. That way, the building can experience controlled subsidence. To see whether the subsidence levels reach prior calculations, they are to be monitored in pre-determined building phases. The largest subsidence is to be expected during the construction phase. The steel framework of the superstructure is linked, during the concluding phase, to the hollow core slabs, which are constructed in the form of a disc. The superstructure deformations, due to the cantilever subsidence, are to be kept at a minimum during the execution. Bolt connections are therefore left loose wherever possible, and the hollow core slab joints and -clefts are filled at the latest possible moment, to increase rotation capacity. The columns, too, are initially placed with a slight deviation, to make sure they end up standing straight.

During the eccentric prestressing, there is a considerable risk of unwanted crack formation in the visible part of the profiled concrete. To prevent this, stainless steel slabs are placed, serving as crack initiators. The massive pylons have a large concrete volume; crack-restraining reinforcement is to prevent the formation of too large shrinkage cracks.