

Movares

Contact Hans van Lint
Address Postbus 2855
3500 GW Utrecht, The Netherlands
Phone +31 30 2655298
Email hans.van.lint@movares.nl
Website www.movares.nl



From concept to completion

Movares is an engineering consultancy providing solutions in the fields of mobility, infrastructure, building and spatial planning. Usability, future value and sustainability play a major role in the designs we produce and the advice we give. We contribute to accessibility through our unique combination of expertise. With some 1.400 members in their professional staff, Movares operates throughout Europe and has offices in the Netherlands, Germany and Poland.

Giving shape to mobility

Infrastructure is the backbone of development, both for the society and for economy. From the initial studies and the earliest planning phases to the design and execution of projects and on through to management and maintenance. Movares plays an active role throughout the entire consulting and engineering process. Our combination of knowledge, expertise and innovativity is summed up in our motto: 'Giving shape to mobility'.



Software: Scia Engineer

Platform Roofs and Footbridge in Central Station - Arnhem, The Netherlands

The station area in Arnhem will go through a drastic metamorphosis in the coming years. A new railway station will be built and also the track layout will be radically renewed.

To increase the capacity and reliability, the station will be extended; an extra platform and dive-under will be constructed.

The new situation will be advantageous for the trains from the directions Utrecht and Nijmegen which are simultaneously entering the Arnhem station. Beside these radical changes in the station area there is also foreseen a complete renewal of the platform covering as well as a skywalk across the railway tracks. The current platform covering structure dates from the 50's and no longer meets the present requirements.

UNStudio

The internationally operating architects of UNStudio designed a futuristic structure supported by an inclined column structure.

The platform covering and footbridge shape a fluid intermingling entity.

Oval skylights in the roof made of Freeformglass® are designed to maximize daylight on the platform; the remaining part of the roof is lined with aluminium composite panels.

Movares developed, in close collaboration with the architect, the challenging design into an economical and reliable structure without compromising the core values of the architectural design.

Platform covering

The most notable construction elements of the platform covering structure are the inclined columns. These columns join at platform level in such way that they can be used as a seat.

As the columns are box sections, composed of welded cut sheet, an installation shaft to keep the drainage pipes and lines out of sight could easily be provided.

The platform covering is carried by two main girders with a span of twenty meters.

These beams are concealed in the lining of the hood and are made of standard rolled sections.

The large span is possible because the beam is supported against lateral torsional buckling by a link to the roof girders.

These roof girders consist of straight IPE sections and curved box girders, where the latter, relatively expensive, are required only at the skylight locations.

The location of the skylight is chosen to increase transparency in the covering; the girders implemented alternating high and low tube sections (180 x 80 and 80 x 80, respectively). The weak low section is then determined by means of a constructive channel supported by a high section.

Skywalk

The inclined columns are the most remarkable elements in the structural design of the skywalk. The columns are clamped at roof level in heavy HEA sections (HEA500 and above).

In this way rigid table-shaped portals are established, strengthening the structure and providing adequate stability.

The heavy gantry beams are arranged at roof level, resulting into a slender floor structure.

Using Scia Engineer

The design of the steel structure with its inclined columns and curved beams is geometrically complex. A 3D analysis was necessary to get a clear picture of the structural behaviour of the buildings.

The architect supplied the building layout and its dimensions. Consequently this design was digitally scanned straight into Scia Engineer.

The structure is divided into more or less independent parts. Of these components, several computational models were created. Models ranging from designs made only for the main structure to detailed models which were also used for designing secondary steelwork.

The models of the main support structure are used to get insight into the overall load transfer and deformations, the more elaborate models are used as input for the detailed engineering.

(Copyright visuals: UNStudio)

Platform Roofs and Footbridge in Central Station Arnhem, The Netherlands

Project information

Owner ProRail
Architect UNStudio
General Contractor BAM/DURA and Buiting Staalbouw
Engineering Office Movares Nederland B.V.
Construction Period From July 2010 to September 2011
Location Arnhem, The Netherlands



Short project description

The station area in the city of Arnhem will be transformed dramatically during the next few years. As passenger numbers will continue to grow, the railway infrastructure is being substantially revitalized. On the train station a new 4th platform will be added and all current platform roofs and the footbridge will be replaced. UNStudio made a futuristic design for new platform roofs and a fully integrated footbridge. In cooperation with UNStudio, Movares elaborated the design into an economic and solid steel structure.

