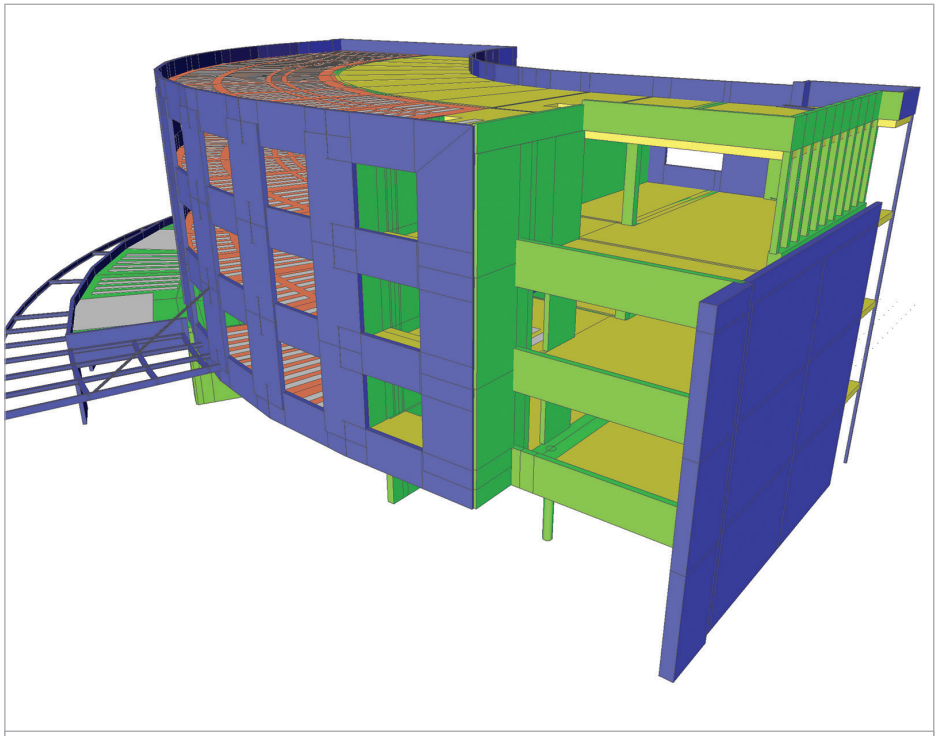
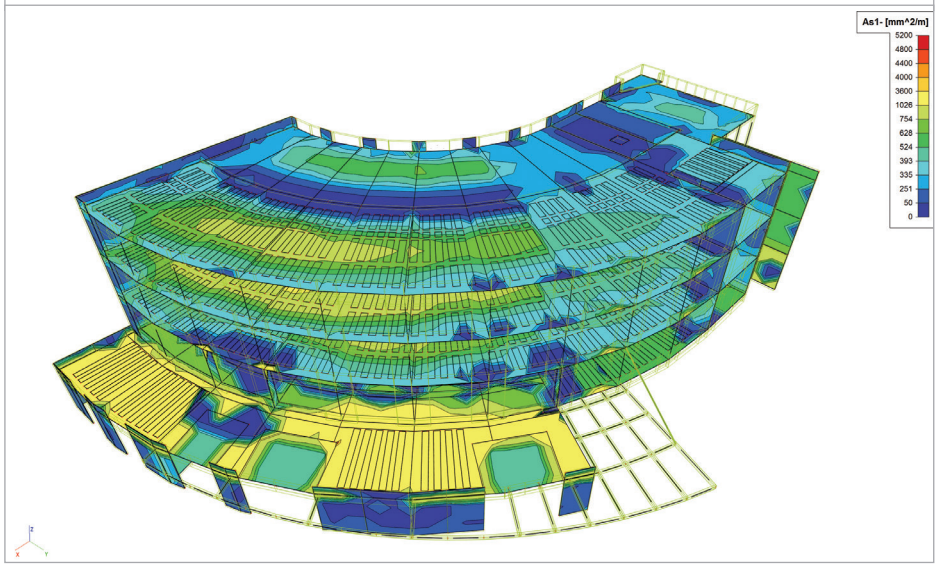
Sacred Heart Hospital - Menen, Belgium





Software: Scia Engineer

Project description

In 2001, the S. Heart Hospital of Roeselare and the GH Menen merged into the S. Heart Hospital Roeselare-Menen. The management immediately decided to reassemble the dispersed locations of the GH Menen on one campus. The existing hospital part to be replaced consists of connected buildings with different architectural styles and floor levels. Furthermore, the present infrastructure is outdated and is not adapted to the demands placed on a contemporary hospital.
VK will provide the building complex with an extension, with, among other things, a radiology department, a medical imaging unit, an emergency admissions centre, intensive care facilities, an operating room, nursing units and a day hospital. Moreover, the extension will combine all components in a smooth way. Through internal shifting of services, it was also possible to plan the reconditioning of certain areas. The final hospital will contain 175 hospital beds and 25 day hospital beds. The modernisation and expansion of the hospital will be carried out while the hospital operations continue. A very advanced phasing of the work will be necessary in order to achieve this renewed 14,500 sqm hospital. A number of existing units have already been addressed in preparatory projects. The delivery room, for example, had to make way for an interim emergency admissions unit, and was moved to a new wing. An additional operating room had to accommodate the increased activity. The Kloosterpand, a part of the monastery that centuries ago laid the foundation for the current hospital, will become a new wing with rehabilitation, haemodialysis, and administration departments and a pharmacy.

Architectural challenges

The basic idea for the different floor levels draws on flexibility as the most important requirement; therefore each floor was designed as an open space of 12.6 m with only one row of columns in the middle and load-bearing outer walls. In addition there are two transfer levels in order to create the necessary space for the operational cooperation of the hospital with, for instance, the reception area, the emergency unit and the intensive care unit on the ground floor and operating rooms and medical-technical areas in the basement.

Structural challenges

Due to the arc-shaped ground plan and the limited structural height (40 cm for the slabs; beams included), several traditional precast floor systems were not an option. In addition, specific demands were set in the form of big spans up to 8.2 m as well as the need for future flexibility (change of functions) of the floor system. As a result, the choice was for predalle flooring with weight-saving elements and a cast-in-place compression layer. Thanks to the incorporation of the light-weight elements, the loads on the transfer levels were limited. The load-bearing façade above the ground floor is captured by a concrete slab spanning 7.75 m; for this slab a higher concrete quality for the compression layer was applied (C40/50). The façade spans the reception area over 13 m and simultaneously cantilevers of 2 m to 3.75 m. Therefore the façade was designed as a concrete arc-shaped 'vierendeel' beam. The cantilever stiffener walls were taken into account in the model to take up the restraining and torsional loads. Some of the stability walls are not centrically positioned onto the supporting columns for the sake of the integration of building services and architectural aims. In this case there are no equilibrium beams, but punching reinforcement was applied.

Modelling and calculation challenges

The 3D model was schematically prepared by the engineer with the intention to create a model as flexible as possible. This scheme was translated by the cad-operator into an analytical Scia Engineer model. The model is easily adaptable for the simple optimisation of the structure and can be divided into several smaller parts for more detailed calculations. Above this, one can create several load take-down models of the transfer levels, of the foundation and for the evaluation of the prefabrication of structural concrete elements.
Scia Engineer made it possible to analyse the global 3D action of loads as well as to analyse the influence of the deformations of the lower structure onto the deformation of the upper structure. On-site performed measurements of the deflections have confirmed the correctness of the model (2 à 3 mm deflection of the façade after finalising the concrete structure is in accordance with the calculated values).

VK Engineering

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VK offers its services in four market segments: Healthcare, Buildings, Industry and Infrastructure.
Our multi-disciplinary consulting engineers undertake studies in building services and civil & structural engineering, ranging from mechanical engineering, electrical engineering and plumbing, to data communication, security and fire engineering, to concrete and structural studies.
VK keeps track of advanced technologies and studies in architecture and construction management and puts together the best team for the client's project.
Having a proven track record with many renowned architects, VK proudly looks back on the building of a portfolio that features many challenging and large-scale projects, including new constructions, as well as renovations of (classified) monuments, expert assessments and management. The new NATO-headquarters, the Antwerp law courts, the Astana National Library, and the VinMedicare Hospital in Hanoi are but a few examples.

Project information

Owner	Sacred Heart Hospital Roeselare-Menen
Architect	VK
General Contractor	Artes Depret
Engineering Office	VK Engineering
Location	Menen, Belgium
Construction Period	2002 to 2015

Short description | **Sacred Heart Hospital**

The renewed S. Heart Hospital Menen will contain 200 hospital beds. The last phase is a new arc-shaped wing which will bring the ground floor up to its final 14,500 sqm and will be finished in 2015. The façade spans the reception area over 13 m and simultaneously cantilevers of 2 m to 3.75 m. Therefore the façade was designed as a concrete arc-shaped 'Vierendeel' beam. Scia Engineer made it possible to analyse the global 3D action of loads as well as to analyse the influence of the deformations of the lower structure onto the deformation of the upper structure.