A NEW SUBURB RISES IN AARHUS

- PEIKKO'S PUNCHING REINFORCEMENT USED FOR THE FIRST TIME IN DENMARK

Text: Reeta Paakkinen
Photos: A. Enggaard A/S

In the summer of 2015 a new, ultramodern suburb will be completed in the heart of Denmark's second largest city, Aarhus. The project is the first time punching shear reinforcement has been used in Denmark.

Ceres City is a new suburb built on the land of Royal Unibrew's former brewery in the heart of Aarhus, western Denmark. Once completed, it will become an important part of Aarhus' city center.

HOMES AND A CAMPUS FOR 6,000 PEOPLE

The suburb will consist of premises for businesses (30,000 m^2), education (42,000 m^2), shops (3,000 m^2) as well as residential areas for students and families (65,000 m^2). Approximately 600 ultra-modern flats will provide housing for 1,000 people, whilst the VIA University College dormitory will accommodate 5,000 students.

The first part of the city to be built is the university campus, where students will be housed in a building of six floors, which has a parking lot in its basement. The contractor of the project, funded by the Danish state, is A. Enggaard A/S. The engineering firm is Niras and architect Arkitema. Construction of the campus started in June 2012, and it is expected to be completed in the summer of 2015.

FIRST TIME FOR PUNCHING SHEAR REINFORCEMENT IN DENMARK

Peikko is supplying punching shear reinforcement for the campus building. There exists two ways of applying PSB; as punching or as shear reinforcement. In this project both applications have been used. For the first stage of the construction work, A. Enggaard ordered several thousands of standard Ø10 - Ø25 PSB studrails and more than 2,000 1-2 meters high Ø32 single studs.

Enggaard A/S also has a MODIX Pressing machine on site so that around 1,000 Ø32x14000 rebars can be connected by MODIX standard A+B couplers and PM position coupler instead of using traditional overlap, which is not geometrically possible to install in the casting mold.

Peikko's PSB is headed stud reinforcement system used as punching and shear reinforcement in all kind of cast-in-situ and precast structural elements like flat slabs, ground slabs and footings, beams and walls. Such reinforcement has been used in Central Europe already for decades, and it has become a commodity product whenever cast-in-situ structures are built. PSB provides higher resistance, faster and simpler installation and supervision optimizing construction height, construction and running costs in comparison to other conventional reinforcement solutions like stirrups. Most often it is used as punching reinforcement.

A very important benefit of PSB that has been used in Ceres City project is anchorage of transversal reinforcement provided by use of forged heads with diameter of tree times rebar diameter.

"When we speak about big spans and heavy loaded concrete elements, the use of forged heads as anchorage of reinforcement can be the best technically feasible and cost efficient solution," **Gatis Pocs**, product manager of punching reinforcement at Peikko Group, said.

To fulfill needs of various kinds of projects Peikko provides PSB with diameter from 10 till 32 mm in length up to 6 m.

PSB SOLVES PROBLEM OF HEAVY LOAD UPSTAIRS

According to **Jan Würtz Knudsen**, project leader at contractor A. Enggaard, due to high shear loads according to design Ø32 stirrups were required in the foundation slabs and in some of the in-situ beams of the building above the parking lot basement. However technically it was not possible to use conventional Ø32 stirrups in the construction of Ceres City campus building because of problems with too big bending radius and anchorage length required for Ø32 rebars. "Our sales team realised normal reinforcement would not solve the problem of heavy load above the basement parking lot. We needed new ideas to carry on," he said. "Using PSB in the top level of the parking basement solved the problem of heavy load upstairs. There simply was not enough space to use traditional reinforcement. Using PSB was the right solution because compared to traditional stirrups, it also speeded up the construction process. We would definitely use it again," Würtz Knudsen added.

Henrik Harder, Sales Consultant at Peikko Denmark, noted the walls in the parking space were not following the walls above the building, which meant that a lot of load had to be transferred along the beams in the walls of the parking space. "Our product manager has supported engineers actively on this project, as it is their first time designing a project by using PSB," he noted.

The running designing during the project has resulted in imitate ordering of the PSB after the final revision of the drawings from the engineers have been finalized. This has created a demand for fast deliveries to avoid expensive waiting time on site.

"So far we have stayed right on schedule and deliveries to the site have been on time," Harder said.

DEMAND FOR THE SOLUTION ON THE MARKET

"We see a great potential in the Danish market for PSB, not only in traditional slabs to avoid punching failure, but also in other applications to transfer shear loads like in wind turbine foundations, bridges and precast elements," states Henrik Harder.

In Denmark the benefit of using PSB is very obvious due to the high salary level. Solutions that enable faster building up of reinforcement structures are warmly welcome. It is fair to say that we expect to see many new PSB projects in the years to come where contractors and engineers can gain from the benefits the system offers. ■