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Customer Magazine

CONCRETE CONNECTIONS

1/2014

PEIKKO LAUNCHES NEW FLOORING PRODUCT RANGE

- THE MOST COMPETITIVE ON MARKET

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PEIKKO'S CONNECTIONS USED IN REPSOL REFINERY COMPLEX

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TECHNICAL ARTICLE: SAFETY OF LIFTING SYSTEMS

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Peikko Group Corporation
Voimakatu 3
FI-15101 LAHTI, FINLAND
peikko@peikko.com

EDITOR-IN-CHIEF
Molli Nyman
molli.nyman@peikko.com

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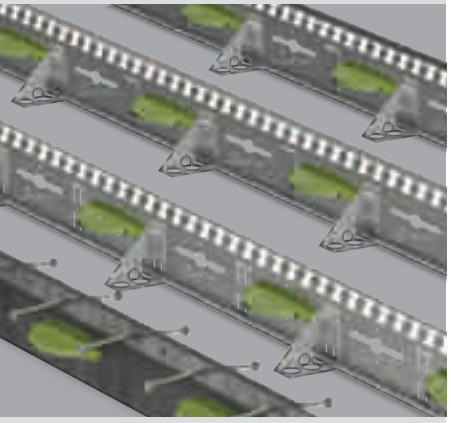

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ON THE COVER:
Peikko's Flooring Product range offers the largest available selection of innovative products for use in ground bearing and pile supported ground level concrete floor construction.

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WOULD YOU LIKE TO TREAT YOURSELF WITH FAKE MEDICINE?

It may sound harmless and fun to buy a fake T-shirt or a luxury bag, but there are more serious issues related to product piracy. There are many examples: People have been killed by deadly accidents caused by counterfeit brake parts sold under a car manufacturer´s brand, or by medicine sold under a brand over the internet containing fake, lethal ingredients.

In the construction industry counterfeit products are also unfortunately part of daily life. For example, last year Peikko came across a building site, where fake DELTABEAMs had been used and where it was claimed no fire protection was necessary. There was no evidence that the fire resistance of the site had been calculated by any method: its fire safety rating was based on some "hocus pocus". The beams at the site were look-a-likes of DELTABEAMs, and that is why they also must have had a fire safety rating. So, somebody there had made a hefty sum by ignoring safety.

Is safety really something that can be risked? We at Peikko do not think so. That is why we, for example, plan to conduct during 2014 at least five series of tests at different university laboratories on various products of ours. We have to and want to know all the workings and details of a product, and not just think that it works.

And naturally, if we see fake Peikko products around, we will expose them; contact the companies behind the scam and alert local building and fire authorities. Not because we are after money, but because we would never want to see a building collapse because fake Peikko products were used in it. Risking human lives is just not worth it.

At your service,

Topi Paananen
CEO, Peikko Group Corp.
topi.paananen@peikko.com

Rendering produced by Lundgaard & Tranberg Arkitekter

MALMÖ UNIVERSITY EXPANDED USING PEIKKO'S COMPOSITE FRAME

Text & Photos: Arto Rautio

I have high hopes for Niagara. Both the physical environment and the building's location right in downtown Malmö are important. Consolidating our activities into one location will help us to develop our identity and will boost cooperation within the university. The location provides us with all the perquisites for further improving interaction with other city communities, says Ingrid Dackert, Dean of the Faculty of Culture and Society at Malmö University, of the significance of the new portal building. The buildings, collectively known as Niagara, are supported by Peikko's DELTAEBAMs and Composite Columns – the Peikko Composite Frame.

The university's activities are currently dispersed across several locations in Malmö. In the fall of 2014 they will be brought together into Niagara, a new collection of buildings under construction right next to downtown Malmö. As land has become available right next to downtown Malmö, due in part to a shift in the operations of the dock industry, new areas are being developed with a combination of bold, new work and modernization of old buildings, complementing them with new ones. Niagara, which will provide 25.000 m^2 of floor space close to Malmö Central Station, will make an impressive partner on Malmö's skyline to the Turning Torso, a well-known modern building in Malmö's Västra Hamnen district.

"As a building, Niagara is completely in tune with the university's vision. It shows what Malmö University is new, fresh, and modern, and also Sweden's largest university. The building allows us to stand out impressively and, with its modern facilities, it is a symbol of the university's activities. When we can bring two faculties under the same roof, cooperation between the faculties will improve," believes **Naser Eftekharian**, who previously worked in the Faculty of Technology and Society and is now an advisor to the Vice-Chancellor.

"The building is a composition of three entities with five, seven and eleven floors, connected to each other by an undulating horizontal design language combined with strong sculptural imagery.

Between the three parts of the building is the central lobby, which functions as the building's heart. The building stands tall as the focal point of the Universitetsholmen campus zone," say designers Lindgaard & Tranberg Arkitekter of their work's under lying principles.

The name, Niagara, comes from the building's location. The lot has long been known as Niagara and the project's developers did not see any reason to change it.

THE UNIVERSITY IS LOOKING FOR THE BEST

The project to construct a new teaching and research building began on Malmö University's initiative. The aim was to consolidate the activities that were dispersed across the city onto the same campus and construct a clear portal for the university and a landmark in the city. When project planning began, the future users of the building were responsible for steering the project. The university arranged an architecture competition and Lundgaard & Tranberg Arkitekter of Copenhagen won the commission.

"In Sweden, universities cannot own real estate. For this reason, the university put the project out to tender. The university used the tendering process to look for the best possible solution. We won the competition and set about looking for planning and implementation partners," says **Jan Andersson**, Project Manager from Akademiska Hus, the real-estate owner.

Akademiska Hus is a state-owned real-estate investment company that focuses on university real-estate. This specialization and the consequent strong position on the debt markets explains why their offer was the most attractive to the university, according to Andersson.

"The university has spaces for research, education, and administration in the new building. The building has wings of five, seven and eleven floors and a large, well-lit atrium between them. The teaching areas are on the lower floors and the upper floors house office-type working areas. A new aspect here is that even professors do not have their own offices: all of the offices are open-plan. Of course, there are also areas where professors can speak to students in private," Andersson says of the project.

"Although the facilities are being made for the university on a long-term lease, the building has been designed to allow for other uses too," says Andersson.

GREEN ROOF EXTENDS THE ATRIUM TO THE OUTSIDE

The architects have also brought a modern look to the building's external surfaces. The façades are metal and glass, and the roof of the lowest wing complements the atrium, serving as a lounge and meeting space for Niagara's users.

"The rounded corners created extra work on the metal structures during the construction phase. The design and the architect's strong vision, combined with the functional requirements of the structure, have led to demands that seldom arise. I would say that the architects have played an unusually large role in the project, but I consider this a positive thing: it is an operating model that could be used even more. Modeling has naturally been an important part of the planning and it has helped a lot across the various phases. We have also been pleasantly surprised by how much can be done with glass that was impossible only three or four years ago. There are several curved glass surfaces and the glass affects the way in which sound is carried from place to place. This is one thing that we had to bear in mind during implementation," Andersson says.

The atrium structure opens out onto the street between each wing. The idea was to use three entrances to keep the space open and easy to access from every direction. There are restaurants and large lecture theaters

Christoff Hagelin (left), Jan Andersson and Magnus Claesson.

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on the ground floor. Around the edge are stairwells and elevator towers, as well as a separate staircase leading to the atrium's upper floors. At the center of the atrium, which narrows as it goes up, is a lightwell with a glass roof. The upper floors of each wing house open-place office space. The tallest wing naturally has the most space. "It was only possible to build a green roof on the lowest wing due to the wind conditions," Jan Andersson says.

The atrium is the height of six normal floors, rising as high as the top floor in the lowest wing. Niagara's teaching facilities are on floors 00 and 0M. Office space, meeting rooms, and other similar facilities are on floor 1. The green roof is on level 5, as is the atrium's glass roof.

TOP EXPERTS WERE SOUGHT

Akademiska Hus looked for partners by inviting expert designers and construction companies to enter a tendering competition. For the building phase, it requested tenders from Sweden's largest national companies as well as a significant local operator, Thage Anderssons Byggnads Ab, which won the commission. The work is mainly being done using the client's designs, which were produced by WSP. Peikko has also provided dimensioning and planning data related to its own products.

"Thage Anderssons has been responsible for implementation in collaboration with its subcontractors. We have put the concrete work and steel work out to tender separately. Östra Vrams Smide Ab, who won the commission for the frame, assembled its own package of deliverables and chose Peikko's composite structures," says Niagara's Site Manager, **Magnus Claesson** from Thage Anderssons Bydggnad Ab.

"We will deliver a surface-treated frame that is ready for installation, meaning that the Composite Columns and DELTABEAMs will be lifted from the trucks right onto the building. Furthermore, the precast concrete supplier, Starka Betongelement Ab, has purchased a large number of Fastening Plates, Anchor Bolts, Wall Shoes, and Connection Loops from Peikko. A large proportion of the deliverables are custom-made for the site," adds **Christoff Hagelin**, Peikko's on-site Project Manager for Niagara.

The rounded corners were a distinctive element of the architect's design. There are no right angles in the building. This has naturally posed its own set of interesting challenges for the structural designers. The division of space also required much thought, particularly in the atrium's structures. The planning and placement of the stiffened stairwells and elevator shafts, as well as that of the columns, had to be carefully considered so as to allow sufficient space for students and university staff to circulate, as it was not possible to reduce the amount of concrete used. DELTABEAMs are always made straight from their load-bearing cores. For this reason, the columns of the external wall line are always located on both sides of the rounded corners. The building's forms are managed using customized flange solutions for the beams.

The precast element designer, **Anders Palenryd**, says that interesting and unusual solutions arose frequently. It took a long time even to group the precast concrete elements for the intermediate floors. The most exciting thing for Palenryd was stabilizing the stiffened wall structures using cabling. The wall elements of the stairwells and elevator shafts, which stiffen the entire building, have been fixed to the building's foundations using cables. These wells and shafts transfer all of the horizontal loads, including wind loads, from the hollow-core

Rendering produced by Lundgaard & Tranberg Arkitekter

slab levels to the building's foundations. The composite frame bears the building's vertical loads.

"Steel helped us because it was possible to make beams and precast elements of similar thickness. That also pleases the builders," Palenryd says.

COMPOSITE STRUCTURE CHOSEN AT AN EARLY STAGE

Jan Andersson from Akademiska Hus says that the thought process behind the implementation of the building developed as the project progressed, but the composite structure was in mind from the outset. The architects and the university had already decided on it before Akademiska Hus won the project.

As the building was constructed from scratch on soft coastal land that is difficult to manage in terms of moisture, the foundations and load management have been highly demanding. The foundations do not only have to withstand the weight of the buildings. They must also prevent strong winds from causing the structure to tilt, particularly in the case of the taller parts of the building. Niagara is standing on very long piles with a diameter greater than anywhere else in Sweden. The amount of water was an extra challenge for the foundations: there was much more than initially assumed.

"It would have caused us many a headache along the way if it had not been possible to use a composite structure. Thanks to the composite structure, floor heights are well-managed and it has been easy to install services. Keeping the buildings' overall heights down has had a positive effect on managing wind loads," Jan Andersson says of the chosen solution.

"The building's fire protection is also provided by the composite structure. The structures have been measured to have a 60-minute fire resistance classification," Claesson adds.

The difficult starting conditions have reflected on the entire project, affecting Peikko's original delivery schedules. However, work has been progressing in accordance with the university's requirements. Construction work began in summer 2012 and work on the frame began in June of that year. The building will be ready for the fall semester of 2015. In practice, however, the university can only move to new premises between semesters. The lower parts of the building's façade were sealed in time for Christmas 2013. The facade will be sealed on the taller parts in April 2014.

COOPERATION WITH PEIKKO HAS GONE WELL

Jan Linden from Peikko's Swedish unit has acted as all over Project Manager for this very large project. **Gösta Pehrsson** has been responsible for connection item deliveries to the precaster Starka Betongelementer Ab. Christoff Hagelin has been the Project Manager on-site and he has also provided technical support.

"Cooperation with Peikko, in practice with Christoff, worked well. Thanks to his dependable help we were able to get our questions answered. From time to time, it would have been nice to receive information from Peikko even faster, schedules were in this case very demanding. I was familiar with Peikko's products but I hadn't used them in my work before It's important to be able to find up-to-date technical information, as this makes it easy for the Structural Designer to propose which products should be used. My impression is that the majority of Peikko's products are good," says Anders Palenryd.

> "Thanks to the composite structure, floor heights are well-managed and it has been easy to install services.

When asked whether he has been satisfied with Peikko's deliveries, Magnus Claesson from Thage Anderssons has a clear answer.

"No," says Claesson, letting out a cheerful laugh.

"You are going to write what I said, aren't you?", the Site Manager asks, somewhat tongue-in-cheek, before continuing by praising Peikko for its quality deliveries.

»

"The frame erection schedule has been planned from the perspective of quality and it allows everybody enough time to do their part well rather than focusing on the highest possible speed. The steel, concrete, and facade subcontractors have worked extremely well together on-site and there have been appropriate tolerances in the deliveries, so it can be said that everything has gone very well," Magnus Claesson elaborates.

The frame subcontractor, Östra Vrams Smide, and the precast element supplier, Starka, also assert their satisfaction with Peikko's deliveries and the progress on-site in general.

"We won this contract by competition and we chose Peikko as our supplier of composite columns and beams in the same manner. Peikko was selected on the basis of its prices and experience. Although we didn't have any experience working with Peikko on joint projects with deliveries as big as these, the choice has proven the right one. We have been satisfied with every aspect of Peikko's activities: handling the project, production, and ensuring accurate deliveries," says Department Manager **Mats Andersson** from Östra Vrams Smide AB, who is working as Project Manager for the Niagara project.

Östrä Vrams Smide was founded in 1968 and has production units in Trollarps and Malmö that employ 24 personnel. Since 2004, the company has been an independent part of the Thage Anderssons Byggnads corporation. Its business includes planning, manufacturing, and erecting metal structures. For the Niagara project, ÖVS is erecting the composite frame – Composite Columns and DELTABEAMs that it has acquired from Peikko.

Ola Svensson, Project Manager from Starka, the company that delivered the concrete parts for the frame and the steel connected to the concrete, describes Peikko's products as excellent. Various Peikko products are being delivered in such a way as to ensure compatibility with Starka's products and operating methods.

"We buy a lot of connection parts from Peikko, both for production and for erection. I think the cooperation has been good, on the Niagara project as in our other deliveries," Ola Svensson summarizes.

NUMEROUS LONG BEAMS IN THE STRUCTURE

"912 tons of steel has been used to make the frame. This is one of our biggest deliveries in Sweden. We have had one person from Sweden dedicated to working on measurements, calculations, and similar jobs for this project. In accordance with our operating principles, the production drawings belong to the production unit," Hagelin says of Peikko's main delivery.

The Niagara project's Composite Columns have come from Peikko's factories in Lithuania and the DELTABEAMs have been delivered by Peikko's factory in Slovakia. Both factories have been responsible for their own strength calculations and production drawings related to the products they have delivered.

The columns have been delivered in one-floor units, with the exception of the atrium space. The tallest columns are 13 meters. The longest beams are 15.5 meters, which is unusually long. DELTABEAMs normally have a maximum length of 13.5 meters, so extension pieces have been used. Due to the building's shape, the composite beams do not have a modular division. Instead, each column span is unique, as is the beam solution designed for it. According to Hagelin, the most common column span is 6–7 meters. The columns are parallel in the vertical plane, so it was not necessary to transfer vertical loads laterally.

"For the columns and beams beneath the green roof, we had to take into account the extra load exerted by the roof. Otherwise, I'd describe the columns and beams as quite normal for any type of product destined for use in office-style premises. Of course, the unusual shapes and spans brought their own little challenges along with them," Chistoff Hagelin states.

Sales of composite structures and Peikko's connection products have seen good growth in Sweden, Christoff Hagelin says. Peikko's customers are, as on the Niagara project, construction companies and precasters, whom Peikko worked with on the Niagara project from the quotation phase onwards. The deliveries usually take place according to the customers' plans, as on the Niagara project. ■

LUBRICANT GIANT CONSTRUCTS PRODUCTION PLANT IN SPAIN

PEIKKO'S CONNECTIONS USED IN REPSOL REFINERY COMPLEX

Text: Reeta Paakkinen

One of the world's largest lubricant production plants will be completed in South Spain in late 2014. The SK-Sol project is located in the REPSOL Refinery complex in Cartagena, Murcia, Spain. The company is a joint venture between Korean SK Lubricants, world leader in the industry, and Spanish multinational REPSOL.

More than € 250 M has been invested in constructing the new production plant. Once complete, the facility will produce 20% of the world demand for last generation lubricant, and some 40% of the demand in the European Union.

THE LARGEST INVESTMENT IN CARTAGENA'S HISTORY

SK-Sol, the new plant, completes the largest industrial investment ever made in Cartagena, Spain, estimated at € 3.4 bn. The earlier parts of the investment were made a few years ago when REPSOL's refinery was expanded. Peikko was also involved in the project.

The new plant will cover an area of 90.000 m^2, divided between a process plant, to be built next to the existing REPSOL refinery, and a storage plant to be built in the port of Cartagena, to facilitate the export of the products by the sea. Once complete, it will offer employment to 160 people.

PEIKKO COOPERATES WITH REPSOL SINCE 2009

REPSOL chose Peikko to calculate and supervise the design of all the connections of the new Pipe-Rack project. The decision was made on the basis of the positive experience the two companies had whilst cooperating on the construction of another refinery of REPSOL in Cartagena in 2009.

The engineering company for the new production facility is Ayesa, a Spanish international engineering company, which specializes in industrial projects.

Whilst the design and calculations of the project were being prepared, Peikko and Ayesa were in regular contact with one another.

The precaster company in the project is Spanish firm Prefabricados Aljema, which is located in Caravaca de la Cruz in Murcia. Peikko supported the company actively by supervising the drawings and visiting their production facilities several times during the process.

The customers were happy to use Peikko's products to connect precast columns and beams, noting that they made the construction process faster, safer and more cost-efficient than traditional systems.

Sébastien Lardy, Civil Engineer Manager at REPSOL, praised the technical knowhow and support Peikko Spain offered his firm in the project. "Peikko Spain offered great technical support in the calculation and design stages of the project. Without their input, it would not have been possible to solve all of issues emerging. Peikko did a thorough work of detail engineering of the connections that simplified a lot the work of design and construction," he said.

Lardy also noted he considers Peikko's products to be of very high quality. "Technical documentation and manuals of different Peikko solutions are very detailed and the company has a very experienced technical department. Peikko Designer® software is a powerful and effective calculation tool. The products are of particularly high quality," Lardy said.

PRODUCTION PLANT WITH A PIPE-RACK STRUCTURE

The structural concept of the concrete Pipe-Rack frame in the production plant is based on the rigid connection of concrete precast columns to the foundation and the fully rigid joints between concrete precast beams and columns using Peikko's connections for both.

The project is formed by a main multistory precast concrete Pipe-Rack with length of 150 m and five smaller Sub-Racks from both sides. The cross-section of most of the columns is 800 by 800 mm although some column sections measure 700 by 700 mm and 500 by 500 mm. Columns were connected rigidly to the foundation using standard HPKM Column Shoes.

Typically, in a Pipe-Rack project as in the case of Cartagena plant, precast columns have several concrete corbels in different directions and on different height levels. They are needed to support the precast beams and transfer the shear load to columns.

Beams were completely prefabricated with rectangular sections measuring 400 by 700 mm and 400 by 500 mm. They were rigidly connected to the columns using standard Peikko Columns Shoes, which are perfect to solve the beam-column connections as well. Frame joints are designed to carry both negative and positive bending moments. Peikko Column Shoes are capable of carrying tension or compression as well. A couple of Peikko Column Shoes were installed in the bottom part of the beams and another couple in the top part of the beams. Standard HPKM and PEC Column

Shoes were used, depending on the bending moments existing in each joint and always trying to standardize the solution as much as possible.

After tightening the nuts of the connections, all vertical joints between columns and beams were grouted completely for its structural function, to protect the steel against corrosion and as anti-blocking system. Peikko visited the building site several times during its construction in order to train people and check that the assembly was done correctly.

Jesus Sánchez Ferrer, Managing Director of Prefabricados Aljema, noted the assembly of the different components was speedy. "Peikko's column connection system provided great safety and speed of assembly because once the nuts are tightened, connections are completely rigid," he said. "The quality of Peikko's products is very high and deliveries to the site arrived promptly despite demanding schedule. Peikko Spain team made several visits to the factory and the building site to supervise the different works that were being carried out. We are very satisfied with the cooperation and support Peikko Spain offered us in this project," Sánchez Ferrer said.

LOCATION IN SEISMIC ZONE REQUIRES EARTHQUAKE-PROOF COMPONENTS

Cartagena's location in a seismic area means earthquake risk must be taken into account in the planning and construction of new buildings. "Peikko's products match the needs of engineering and construction companies exactly because of this; our Column Shoes and Anchor Bolts have been tested for their earthquake-resistant qualities in several universities and institutions in different countries, and have gotten very good results in the tests," said **Adrian Liste**, Sales Manager at Peikko Spain. "Continuous investment in R&D in this field makes Peikko the worldwide specialist in connections for precast structures also in projects with seismic requirements," Liste added.

Lardy of REPSOL underlined how important formal approvals are: "European Approvals and Certifications of Peikko's products were very important for our project management and so was the excellent performance shown of Peikko's system in several tests against seismic behaviors," he said.

LARGE PROJECT AND TIGHT SCHEDULE MAKE A CHALLENGING JOB

The Cartagena project is particularly important for Prefabricados Aljema because of its massive size and challenging, tight schedule, Sánchez Ferrer said. Construction of the lubricants plant started in November 2012, the plant is expected to be running in 2014.

"This project has been challenging also because of the strict performance criteria project management required. But we managed to successfully complete confirming the capacity of our company in projects of this size. During the execution of the project cooperation between the technical teams of both companies was just perfect, we were very satisfied with the technical support we received from Peikko," Sánchez Ferrer said.

> "Peikko gave us a complete solution which solved all the connections of the precast concrete structures forming a Pipe-Rack.

Precast concrete structures are nowadays the optimal solution for large industrial projects, like Pipe-Racks, **Enrique Hernández**, Managing Director of Peikko Spain, said. "We are very satisfied with the excellent results of this important project and the good feedback received from our customers. We gave them a lot of support and service to solve easily and in a cost-effective way all the connections of the precast structures forming the Pipe-Rack project. We are proud of the cooperation and excellent results we have had with REPSOL during several years and projects done," Hernández concluded.

Lardy of REPSOL looks forward to using Peikko's products in the company's future projects. "We are very satisfied with the cooperation and support that Peikko offered in this project. Peikko gave us a complete solution which solved all the connections of the precast concrete structures forming a Pipe-Rack. REPSOL has implemented in our building standards that Peikko products will continue to be used in our future projects worldwide," he concluded. ■

CONTINENTAL SHIFT
TERAJOINT MAKES ITS MARK IN MOROCCO

Text: Erkki Jäppinen
Photos: Durocem

A brand new logistics centre in Casablanca, Morocco is expected to serve as a busy hub for consumer goods traffic for years to come. Chosen for the centre's flooring was Peikko's TERAJOINT System, which not only ensures that the floors will withstand bustling traffic at the facility, but also marks the concept's launch in Africa.

Overall, the logistics centre covers 66,000 m^2 of total space, of which 58,000 m^2 is flooring, making it the largest in Casablanca. The flooring constructor, Durocem of Italy, is among the world's premier industrial flooring specialists and well aware of the wear and tear that intensive use places on warehouse floors. With the experience that the company has accumulated over more than 50 years of projects, Durocem has developed a wide range of technologies to make floors that last.

TECHNOLOGY WORTHY OF A FLOORING SPECIALIST

The logistic centre's floor, which was made of steel fiber reinforced concrete, utilized Durocem's special mix for concrete floors and floor system developed in cooperation with concrete supplier Lafarge. The concrete was placed and leveled using laser screed machines. Durocem's dryshake hardener with DUROQUARTZ HP was applied to provide the required high surface endurance requirements.

For the floor joints, which are the most sensitive part of the floor, Durocem used the TERAJOINT prefabricated free movement joint system, customized by Peikko to fit the Durocem brand. The product was TERAJOINT 6-160-3000. The slab thickness was 180 mm.

"The project was a success. Delivery was on time and we once again proved the superiority of laser screed technology and steel fiber reinforced concrete over traditional methods," says **Marco Guidetti**, who was in charge of the project on Durocem's side.

CRACKING THE PROBLEM

The TERAJOINT Free Movement Floor Joint System eliminates an important concern that has been common to warehouse floors, namely the random cracking of concrete that can occur during the curing or shrinkage phases of the concrete. Also eliminated is the damage of slab edges due to degradation or misalignment of floor joints.

"Cracking is a particular concern in large facilities like the one in Casablanca because they rely on smooth ongoing operations throughout the year. Once cracking or breakage occurs never ending repairs might be needed thereby significantly curtailing operations and profitability," explains **Lorenzo Bianco**, Managing Director, Peikko Italy.

ONE CANNOT ARGUE WITH BETTER AND FASTER

Being a free movement leave in place floor joint produced to the tightest tolerances, TERAJOINT also made the Casablanca flooring much faster and accurate to build. In the TERAJOINT System, all process steps from setting up the formwork through to pouring concrete and post-pouring actions have been designed in such a way that they require a minimum of time and manpower while ensuring the highest-quality result.

"During the Casablanca project, as in previous ones, we have been glad to note that floor construction has been made much swifter with TERAJOINT. The product delivers on its promises," notes Guidetti.

TERAJOINT AROUND THE WORLD

The TERAJOINT System is available in a range of sizes as standard, with the possibility to produce customized solutions of the system according to various project requirements.

Customers can also choose among a variety of material starting from plain steel, hot dip galvanizing protection, standard stainless steel or highly alloyed stainless steel for the most extreme environments. An excellent example is a recent delivery for a leather processing plant in the Czech Republic, for which Peikko provided floor joints in acid-proof stainless steel.

"We have big plans for TERAJOINT. Since the product's launch in 2008, we have delivered TERAJOINT through our factories in Finland, Slovakia, UK, Russia and China to most of the European countries, Russia, the Gulf region and APAC. Now, with the Casablanca delivery, the gates have been opened to Africa as well," Bianco envisions.

Customers like Durocem of Italy are important partners in this expansion.

"We have completed several projects using TERAJOINT in Italy and now in Casablanca. The experience has been good and we recommend TERAJOINT to avoid problems of joint deterioration," Guidetti sums up. ■

Peikko launches a complete new Flooring Product range. Read more on page 24!

TERAJOINT IN A NUTSHELL

- Prefabricated Leave-In-Place Free Movement Joint System with a variety of integral load transfer mechanisms to suit all floor loadings
- Heavy-duty performance with 40 mm x 10 mm cold drawn steel for extreme armoring of joint arrises
- Suitable for high flatness category floors and superflat floor construction
- Fast track installation with a selection of fixing methods and accessories
- Materials used in the construction of the product are 100% recyclable

TURKEY'S IZMIR AIRPORT GETS A NEW TERMINAL AND A MULTI-STOREY CAR PARK

Text: Reeta Paakkinen

A new domestic terminal with a new multi-storey car park is replacing the old one at Izmir Adnan Menderes Airport, West coast of Turkey, this spring. The car park and the new terminal are the largest structures where Peikko's Column Shoes have been used in Turkey so far.

The 200.000 m^2 terminal will serve 25 million passengers a year, whilst the car park covers an area of 108.000 m^2. Peikko's Column Shoes were used to connect prefabricated columns to the foundation of the car park.

PEIKKO'S PRODUCTS MEAN CONSIDERABLE SAVINGS

Bora Turan, Vice President at Dere Construction, said the multi-storey car park project at Izmir Adnan Menderes Airport is the first project where Dere Construction used Peikko's products. The Izmir-based company is producing the prefabricated elements of the terminal and the garage. The structural engineering design for the terminal and the car park structure was made by Istanbul-based Statica Engineering, which suggested using Peikko's products to Dere Construction. Izmir is Turkey's third largest city with a population exceeding four million. Its airport is one of the most important for Turkey's tourism sector.

"We heard about Peikko's products from Statica Engineering and decided to use them after making a quality assessment and a cost analysis," Turan said. "Peikko's products reduced the need for excavation by some 25.000 m^3, made erection of elements fast and saved in external socket connection construction. This project has inspired us to use Peikko's products in our other projects as well," Turan said.

COLUMN SHOES SERVE WELL IN A SEISMIC ZONE

The constructor of the terminal and car park is TAV Construction, which is one of the world's largest airport construction companies. Its previous projects include, among others Abu Dhabi Midfield Terminal, Madinah Airport, Jeddah Airport Saudi Airlines hangars and Riyadh Airport. **Ahmet Çıtıpıtıoğlu**, Structural Design Coordinator at TAV Construction, said the company chose to use Peikko's Column Shoes instead of conventional socket foundation, widely used in prefabricated construction in Turkey, because Peikko's products suit seismic conditions, and because they offer considerable savings.

"Peikko's products gave us considerable savings in the foundation and uncalculated savings in the seismic issues," Çıtıpıtıoğlu said. "A traditional socket system for the foundation has to be minimum two to three meters deep and excavation works cost. Using Peikko's solution saved us significant sums of money as it enabled us to have a lower foundation, which meant less soil had to be moved. Deep excavation would also have interfered with the nearby excavation of the terminal building substructure, and would have approached the foundations of the viaducts," Çıtıpıtıoğlu said.

He also noted that Peikko's products serve well in a seismic zone. "Izmir is located in a highly seismic region, which has to be taken into account in all construction here. We keep buildings as low as possible because of the wash down effect – the lower the building is, the safer it is in an earthquake scenario. The fewer the connections used and the less the building weighs the better it tolerates seismic situations. Peikko's products serve well also in seismic zones," Çıtıpıtıoğlu added.

IZMIR AIRPORT BECOMES PEIKKO'S LARGEST PROJECT IN TURKEY

The multi-storey garage is the largest building where Peikko's Column Shoes have been used in Turkey and the largest multi-storey precast building in Izmir. It has four levels and it is located on the entrance side of the new terminal with a 213 m length and 81 m wide footprint. It offers parking spaces for 2.537 vehicles. The structure is made of three 71 m by 81 m blocks. The floors are three meters in height and have eight meters grid spacing in both directions. The total enclosed construction area is approximately 180.000 m^2.

The structure is supported on a mat foundation. The framing is made up of prefabricated beams and columns with prefabricated double-T slab elements. Reinforced concrete infill walls spread about the structure provide lateral stability. The prefabricated columns are connected to the foundation by Peikko's Column Shoes.

The order from Dere Construction to Peikko consisted of 3.616 pieces of Column Shoes and Anchor Bolts. The products were delivered Izmir in three phases over one calendar month.

IZMIR PIONEERS IN GREEN AIRPORT BUILDING

Cem Özer, Managing Director of Peikko Turkey, noted Izmir Airport is important also because it is Peikko Turkey's first project to be acquiring a Leadership in Energy and Environmental Design (LEED) certification from the Green Building Certification Institute (GBCI) in the United States. LEED certification indicates the environmental impact of a building. "The new terminal and car park will be the first and only airport in Turkey to have a Gold LEED certification. The use of precast concrete also played a role in getting this certificate – the procedure is long and detailed, all aspects of the construction materials and process are thoroughly evaluated for their environmental impact. We are proud to be cooperating on a project of this calibre," Özer said.

COLUMN SHOES SPEED UP CONSTRUCTION

Turan of Dere Construction noted all precast production and erection at the Izmir project lasted six months. "After that we spent about three months on the cast-in-situ works in order to build the multi-storey garage. Processes were smooth, there were no delays," he said.

Özer of Peikko Turkey noted that it was particularly the use of column shoes which speeded up the construction process. "The initial connection at the foundation is realized by very tight geometrical tolerances so when the construction of a multi-storey prefabricated building progresses, the construction of the remaining frame elements proceeds much more smoothly in comparison with conventional methods, " he said.

TURKISH CONSTRUCTORS INCREASINGLY PREFER PREFABRICATED STRUCTURES

Dere Construction has adopted Peikko's Column Shoes as one of its preferred products. "Since the Izmir Airport project Dere Construction identified Peikko Column Shoes as its preferred method of construction. Since this project we have been providing column shoes to their other projects," Turan said.

Özer noted the use of prefabricated construction materials is in steep rise in Turkey. "Although the construction market in Turkey may seem quite conservative, companies involved in prefabrication are more open to changes and new technologies. Since our entrance to Turkish market in 2009, we have provided concrete connection products to most of the members of the elite Turkish Prefabricators Association – where most of these customers are returning customers with order stocks growing each week. The future here looks very bright." ■

APARTMENT PROJECT IN QUEBEC CITY HIGHLIGHTS ADVANTAGES OF DELTABEAM SYSTEM

Text: David Johanson

The Luxembourg six story, forty unit apartment building, now under construction in Québec City's Charlesbourg district, is attracting attention in the industry, for the simple, fast and safe materials used in the project.

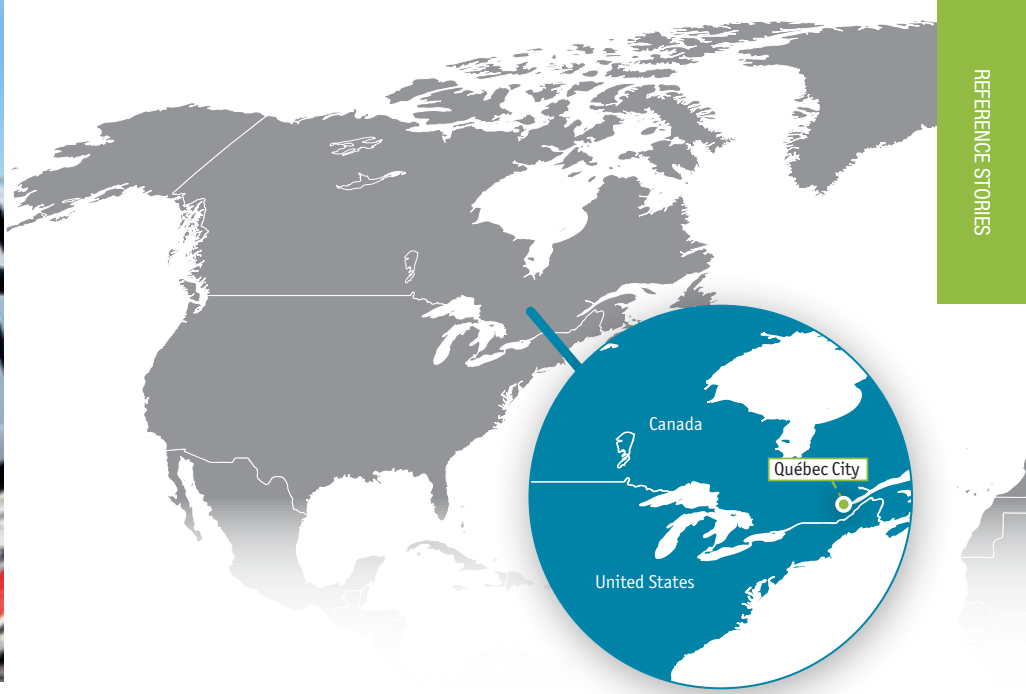
Excavation for underground parking at the Luxenbourg project got underway in September of 2013, with work on the structure beginning at the end of October. As of the first week of January of this year, all six floors were in place, windows installed and workers protected from the forces of nature. The Luxenbourg was erected at the rate of 10.000 square feet (929 m^2) every three days.

"It's amazing how fast a building goes up" states **Luc Lemieux**, President and CEO of Logisbourg Inc., general contractor and developer. "Winter weather is not the hurdle it used to be with more traditional building techniques. Our project will be delivered on time for July occupancy."

What is the key to accelerated construction? "The off-site manufacture of building components," promptly replies Lemieux. "Prefabricated steel beams and concrete slabs are delivered ready to install. The floor by floor assembly requires no expensive and time-consuming forms for poured cement."

MAXIMUM DESIGN FLEXIBILITY

The DELTABEAM itself might best be described as a trapezoidal steel beam with an extending "wing" on each side. The wing serves as support for the hollow-core concrete slabs which form the floor. Only the grout placed between slabs requires on-site preparation. As the steel beam is fully imbedded, the technique is popularly called "slim floor" construction. The result is



30% lighter than a poured concrete floor, reducing the size of supporting foundations and the overall height of the building required to produce the same number of floors.

As the floor assembly can be as thin as 10 inches (200 mm) and span as much as 45 feet (13.5 m) without a downstanding beam, there are few structural impediments to design, a feature particularly appreciated in an indoor parking layout. "The system provides a lot of flexibility to optimize living space, opening the way for architectural creativity and long-term options should a change of vocation be contemplated " he adds.

"Speed and efficiency aren't the only advantages that have our colleagues in the industry peering over the fence," says Lemieux with a touch of humour.

REDUCED CONSTRUCTION WASTE

On-site construction safety has also generated considerable interest at the Luxenbourg. Permanent precast concrete stairwells were installed as the building went up; there was no need for the temporary wooden structures which can often be a safety headache. Precast concrete requiring no forms also translates into far less construction waste, reducing disposal costs and making the project more environmentally friendly. "Our visitors have taken notice of just how clutter-free the site is," points out Lemieux.

The DELTABEAM provides exceptional resistance to fire and can withstand exposure of up to two hours with no additional protection. It is the only steel beam in Canada to offer resistance to fire in the event of direct exposure.

RELIABLE TECHNICAL ASSISTANCE

"Since the various components of Peikko's system come into place with a high degree of precision, there is little time lost in adjusting for margins of error when proceeding to the indoor phases of the project," adds the affable Logisbourg CEO. "Peikko also provides engineering services and step by step technical assistance as construction progresses."

In addition to excellent soundproofing, future residents of the Luxenbourg will enjoy in-floor radiant heating and access to shared roof-top amenities. More than half of the units have already been reserved. ■

BAKERY COMPANY BUILDS A WAREHOUSE

ON PEIKKO'S COLUMN CONNECTIONS IN THE USA

Text: Reeta Paakkinen

A new warehouse for the Belgian-based food manufacturer Puratos, was completed in November 2013 in Pennsauken, New Jersey, the USA. Peikko's Column Shoes, Beam Shoes and Column Corbels were used in the construction of the premises.

Puratos is a Belgian company specializing in producing bakery, patisserie and chocolate ingredients. The company supplies these to a range of bakeries from corner stores to chain super markets and restaurants. The U.S. demand for such sweets has fuelled an expansion to Puratos' Pennsauken location. The precaster of the warehouse project was Oldcastle Precast and the designer De Vita & Associates, which used Tekla software with Peikko's design components in the process.

COST EFFECTIVE SOLUTION AND SMOOTH COOPERATION ARE PRIORITIES

Oldcastle Precast started using Peikko's products in 2011. Projects where the two companies have cooperated over the past three years include apartment complexes, college dormitories, a prison in the state of Massachusetts and industrial food manufacturing facilities.

Oldcastle Precast's order to Peikko USA in the Puratos' project consisted of 228 Column Shoes, 164 Beam Shoes and 160 Column Corbels. **David Wan**, Chief Engineer at Oldcastle Precast, said his company prefers to use Peikko's connections because of their cost-effectiveness and the smooth cooperation Oldcastle Precast has with Peikko USA. "We chose Peikko's products because of the cost savings compared to forming conventional concrete corbels, because we are familiar with Peikko's products from several previous projects and because of the high level service Peikko provides," Wan said.

Puratos
Reliable partners in innovation

TEKLA SOFTWARE MAKES ASSEMBLY EASY

In this project our customer was looking for a fast erection and user friendly installation of columns, beams with a high capacity and meeting the fire protection for type of building, **Rens Hansort**, Managing Director of Peikko USA, said.

"The use of Tekla software in the process made it very easy for the precaster to produce and assemble the concrete construction elements. Everything fit in well and there were no inconvenient surprises. All Peikko design components for the 3D BIM design where downloadable from Peikko's website," Hansort said.

FIELD ERECTION AND STRUCTURE IN SEVEN WEEKS

Wan of Oldcastle Precast noted construction schedule of the warehouse project was particularly demanding. "The construction schedule was very tight due to ongoing complex design coordination with the owner and their industrial equipment supplier. Field erection of the precast structure took seven weeks," he said. "On the other hand, fast track schedules being nowadays the norm in warehouse construction, we look for off the shelf products such as Peikko's for solutions," Wan added.

Hansort noted that because Peikko USA stores most of Peikko's connection types in the USA, it is easy to start projects with a fast-pace delivery. ■

SAFETY OF LIFTING SYSTEMS

Author: Dr. Václav Vimmr

INTRODUCTION

Safety in construction industry [1] is a very important issue. Construction in one of the most dangerous work sectors in Europe. Fatal accident rate is nearly 13 workers per 100.000. The average rate for all sectors is 5 per 100.000. Lifting and handling of precast concrete elements belongs to the most sensitive operations in construction industry.

Lifting of precast concrete products requires the use of special equipment, careful planning and appropriate knowledge. Individual components of the equipment should fit to the whole system to allow safe and effective lifting of precast concrete products. Failure of any single component could lead to an unsuccessful lifting operation with danger of devastating effects to the product, human life or other items in the surroundings.

The best way to verify a lifting system is to make reasonable tests by an experienced laboratory. Testing rigs can be arranged according to CEN Technical report [2] drafted by CEN/TC 229 Precast Concrete Products or particularly in Germany according to the second Part of the Guidelines [3].

Peikko Group conducted a remarkably extensive testing programme of all Peikko Lifting Systems. Tests were executed by the Institut für Massivbau of the Technical University of Darmstadt, Germany. Results of such tests are very important for all stake holders, namely precast concrete producers and designers. They must pay great attention to the correct choice of the lifting systems particularly with regards to safe lifting and handling of precast concrete products.

CE MARKING

Harmonized European standards or European Technical Approvals (ETA) are fundamental documents for CE marking. While harmonized European standards according to Construction Product Regulation exist for some of precast concrete products there are no such European standards for Lifting Systems. Lifting Systems placed on market by specialized manufacturers belong to products that are subject of the European product safety Directive – EU Machinery Directive 2006/42/EC.

CE marked products are ready for free movement throughout the European Market. However, one should recognize the CE mark is not a quality mark but products are accompanied by Declaration of Conformity with relevant product safety Directives. Declaration of Conformity is a

Fig. 1 KK Anchoring System

Fig. 2 RR Anchoring System

Fig. 3 Wire Rope Anchors

Fig. 4 JENKA System

formal declaration by a manufacturer (or his authorised representative) that the product meets all relevant requirements of all related product safety directives.

Declaration of conformity of lifting systems is based on the following international standards

- EN ISO 12100:2010 Safety of machinery – general principles for design – Risk assessment and risk reduction
- EN 13155:2003+A2:2009 Cranes – Safety – Non- fixed load lifting attachments. EN 13155 is currently under CEN/TC 147 amendment process
- German safety regulations that are relevant for German market but highly recommended to other markets as well:
- BGR 106:1992 Safety rules for transport anchors and systems for precast concrete units
- VDI/BV-BS 6205 Parts 1-3 Lifting inserts and lifting insert systems for precast concrete elements

Hence while the producer takes full responsibility for correctness of Declaration of conformity, it is obvious that features and properties of a product or a system that are difficult to prove by calculation must be tested. Peikko lifting systems for precast concrete elements has been CE marked since 2013.

TEST PROGRAMME

Lifting devices are governed by the Machinery Directive which doesn't deal with embedment conditions of transport anchors in concrete. Thus reliability of a lifting system as a whole depends not only on resistance of steel parts but also on the capacity of anchorage in concrete elements. With the aim to clarify this rather complex problem Peikko underwent an extensive testing programme for the complete range of their Lifting Systems. Testing performed by the IfM TU Darmstadt comprised more than 800 individual tests of anchors inbuilt in concrete elements and additional tests of steel parts to obtain steel capacity of anchors. Those tests were done in addition to previous tests with regard to new products and situations that were rarely tested before.

Peikko offers wide range of Lifting Systems starting with so called "Rapid Coupling" including traditional KK (from German Kugelkopf – spherical head) anchors (see Fig 1), anchors for walls and short anchors for other applications or RR (Rapid Release) anchors (see Fig. 2) and WRA (Wire Rope Anchors - see Fig. 3) to Threaded Lifting System "JENKA". Peikko's JENKA System (see Fig. 4) consists mainly of straight rebar anchors (SRA), wavy long (WAL) and short (WAS) anchors, troll foot anchors (TF), bolt socket anchors (BSA), plate socket anchors (PSA) and cross hole socket anchors (CSA+ESA). All above mentioned types of anchors were tested for different applications. Tests were carried out for the following load directions (see Fig. 5):

- axial load (0°), direction of the longitudinal axis of anchors
- diagonal load (45°), inclination from the longitudinal axis
- lateral load (90°), direction perpendicular to the anchor axis

All tests were conducted until the ultimate load was reached. Different modes of failure occurred:

- in concrete parts,
- in steel anchors (shaft, socket),
- no load increase was possible,

Location of anchors for testing respected the following rules:

- minimum edge distances 1.5 h_{ef}
- minimum axial distances of anchors 3.0 h_{ef},

where h_{ef} is anchorage length according to [2] shown on Fig. 6.

a) applies if $a < 0.5\ h_{ef}$ b) if $a \le 0.5$ L than $h_{ef} = L - a$

When testing inclined loads (45°, 90°) appropriate complementary reinforcement was installed. Wall anchors subjected

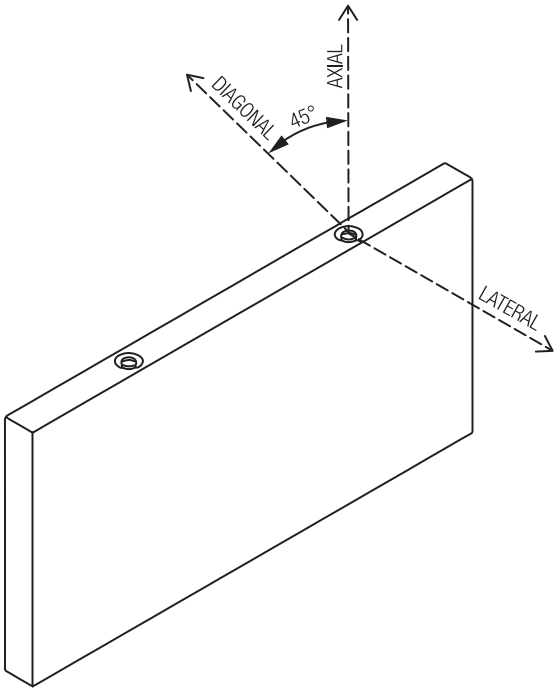


Fig. 5 Tested load directions

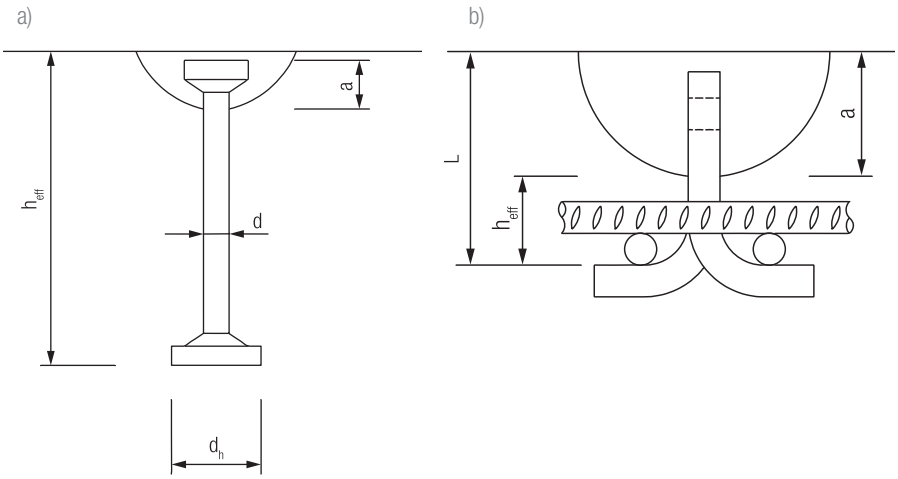


Fig. 6 Examples of anchorage length

to tests were built-in wall elements that contained minimum reinforcement provided by orthogonal meshes Q188 (this means 188 mm^2/1000 mm in both directions). Only one mesh was installed in the middle of wall elements of thickness 60 and 80 mm. All other wall elements included two meshes that were located with minimum concrete cover to surfaces.

All tests were arranged in compliance with requirements according to [2] and [3]. In addition to ordinary test reports special expert's opinion (Gutachten) was provided. It is important for comparison of tests results to create a common platform with regard to concrete strength. Test results were recalculated to concrete cube strength 15 MPa.

COMMENTS TO TEST RESULTS

Peikko Technical Manuals for all Transport Anchor types can be found on Peikko's websites. They include a lot of useful information for designers but there are situations in practice that cannot be fully covered by Manuals. Thanks to so many tests and corresponding experts' opinions there is a rich database that can be used as guidance for those special cases.

To demonstrate the safety levels of Peikko Transport Anchor Systems, comparisons of different JENKA systems were analysed on Tables 1 to 5. The analyses include three JENKA systems of different sizes and load grades. All values are valid for concrete cube strength 15 MPa. Not only average but also minimum failure loads are considered. Global safety factors are calculated for both average values and minimum failure loads as well.

Tab. 1 Comparison of JENKA Anchors, size Rd14

Anchor Type	Anchor length [mm]	Failure load [kN]		Coeff
WAL	170	Average	28.8	3.60
		Minimum	24.7	3.09
SRA	235	Average	25.3	3.16
		Minimum	22.7	2.84
TF	105	Average	32.1	4.01
		Minimum	27.5	3.44

Load grade 8 kN,
Wall thickness 60 mm

Tab. 2 Comparison of JENKA Anchors, size Rd18

Anchor Type	Anchor length [mm]	Failure load [kN]		Coeff
WAL	235	Average	67.0	4.19
		Minimum	64.1	4.01
SRA	305	Average	53.3	3.33
		Minimum	48.3	3.02
TF	150	Average	75.7	4.73
		Minimum	74.2	4.64

Load grade 16 kN,
Wall thickness 100 mm

Fig. 7 Typical mode of failure

Tab. 3 Comparison of JENKA Anchors, size Rd24

Anchor Type	Anchor length [mm]	Failure load [kN]		Coeff
WAL	350	Average	123.6	4.94
		Minimum	118.7	4.75
SRA	400	Average	132.9	5.32
		Minimum	128.9	5.16
TF	275	Average	125.0	5.00
		Minimum	124.0	4.96

Load grade 25 kN,
Wall thickness 100 mm

Tab. 4 Comparison of JENKA Anchors, size Rd36

Anchor Type	Anchor length [mm]	Failure load [kN]		Coeff
WAL	570	Average	279.9	4.44
		Minimum	258.9	4.11
SRA	690	Average	271.0	4.30
		Minimum	247.6	3.93
TF	450	Average	280.0	4.44
		Minimum	264.6	4.20

Load grade 63 kN,
Wall thickness 150 mm

Tab. 5 Comparison of JENKA Anchors, size Rd52

Anchor Type	Anchor length [mm]	Failure load [kN]		Coeff
WAL	880	Average	427.6	3.42
		Minimum	408.9	3.27
SRA	950	Average	413.9	3.31
		Minimum	364.6	2.92
TF	550	Average	421.1	3.37
		Minimum	408.3	3.27

Load grade 125 kN,
Wall thickness 275 mm

Typical mode of failure can be seen on Fig.7.

BASIS OF DESIGN

General approach is based on ultimate limit state (ULS) and serviceability limit state (SLS) employing partial safety factors. For a transient situation such as lifting and handling admissible load design concept is more practical.

It is based on global safety factors requiring that the action E does not exceed the admissible resistance R_{adm}

$$E \le R_{adm} \qquad (1)$$

where E is effect of actions on the anchor

R_{adm} is admissible load declared by transport anchor producer

The admissible resistance of lifting anchor is

$$R_{adm} = R_k/\gamma \qquad (2)$$

where R_k is characteristic value of resistance

γ is global safety factor

TR [2] deals with both methods and explains all partial safety factors.

Global safety factors γ covering uncertainties in action and resistance can be derived from partial safety factors.

$$\gamma = \gamma_{load}\,(\gamma_m \cdot \gamma_{l+h}) \qquad (3)$$

where $\gamma_{load} = 1.35$, partial safety factor for actions

γ_m is partial safety factor related to materials

γ_{l+h} is partial safety factor for lifting and handling effects

Safety is in the competence of National Governments so global safety factors can be different in some countries. In the absence of national requirements recommended values of safety factors can be used.

Partial safety factors for resistance can be taken according to Tab. 6 Review of global safety factors is given in Tab. 7 taken from [2]. PCI means US Institution Precast/Prestressed Concrete Institute.

Tab. 6 Partial Safety factors for resistance

Material	γ_m		γ_{l+h}	$\gamma_m \cdot \gamma_{l+h}$
Structural solid steel	γ_s	1.25	1.8	2.25
Reinforcing steel (smooth bars)	γ_s	1.15	1.8	2.07
Concrete	γ_c	1.5	1.5	2.25
Anchorage of reinforcement	γ_s	1.15	1.5	1.725

Tab. 7 Global safety factors γ used in different National provisions and MD 2006/42/EC

Verification of		Section 4.3.2 [2]	Fascicule 65	VDI/BV-BS 62051) [3]	Conc. Elem. Book, C5 2013 edition	PCI	Machinery Directive 2006/42/EC[1)]
Inserts	Structural steel	3.0[2)]		3[6)]	3.04[2)]		4[3)]
	Reinforcing steel (smooth bars)	2.8[2)]	2.35[2)]		2.80[2)]		
	Prestressing strands	2.8[2)]			2.80[2)]		
	Wire ropes	2.8[2)] 4.3[3) 5)]		4[6)]	2.80[2)] 4.30[3) 5)]	4[3)]	5[3)]
Concrete	Concrete failure	3.0		2.5 or 2.1[4)]		4	
	Anchorage reinforcement	2.3[2)]			2.33[2)]	4[3)]	

1) The Machinery Directive 2006/42/EC includes a dynamic factor. VDI/BV-BS 6205 assumes this factor to be 1.3.

2) Verification for $f_{\gamma k}$, $f_{0.1k}$ or $f_{0.2k}$ (yield strength), $F_{p0.1}$ (force at 0.1 limit)

3) Verification by calculation for f_{tk} (tensile strength), F_{min} (tensile force)

4) $\gamma = 2.1$ might be applied if lifting inserts are installed in precast elements under plant specific and continuous inspection.

5) $2.8 \times k = 2.8 \times 1.54 = 4.3$

6) Verification by calculation for f_{tk} (tensile strength), or verification by testing for R_k (characteristic value of the insert)

CONCLUSION

A brief comparison of tests results and values in Peikko's Technical Manuals of JENKA System proves that designers can rely on Peikko's design tables. Average global safety is well above the threshold for concrete failure (that is 3.0). In many cases it is above 4 or even for some load grades above 5. Furthermore designers have the opportunity to consult unusual design situations with Peikko's Technical Customer Service.

ACKNOWLEDGEMENT

It is a pleasure to express special thanks to the Peikko expert **Sebastian Gonschior** who kindly provided test reports, valuable comments and photos.

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Dr. Václav Vimmr

PEIKKO LAUNCHES THE MOST COMPETITIVE FLOORING PRODUCT RANGE ON THE MARKET

In 2014 Peikko is adding new products for concrete floors to its product range. The acquisition of UK based Metalscreed Ltd. last year expanded the flooring product range, making Peikko number one in the industry in terms of its selection of flooring products. Whilst more new products are to be launched soon, the current range is backed up by full technical support.

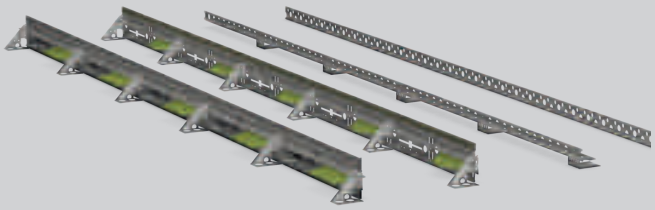
Text: Pat Eve

Peikko has had industrial floor joint products in its range since 1990s, with the biggest launch of its current TERAJOINT product family some years ago. Now with the new Metalscreed products Peikko's Flooring Products offer the largest available selection of innovative products for use in ground bearing and pile supported ground level concrete floor construction.

Covering the whole range of construction methods, including screed layer application, long strip concrete floor construction techniques, large bay, jointed and jointless floor construction methods (supported by laser screed technology), as well as the technology of post tension floors. There is a full range of solutions readily available for both external and internal applications, from light to heavy duty usage, and with or without arris armoring capability, solutions for every type of industry and operational environment, even for the most demanding ones.

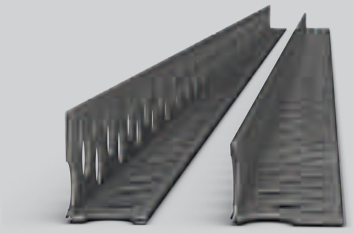
All products are designed to make the floor construction process faster, easier and more reliable, also to enable construction to the highest category of flatness, effectively providing solutions for the whole range of floor categories, loadings and joint openings. The products significantly improve the operational performance, and ensure long term low maintenance requirement of the floor joints, minimizing repair costs and extending the overall service life of the floor. All products are environmentally friendly and 100% recyclable.

SCREED RAILS: UNIRAIL AND UNIFORM



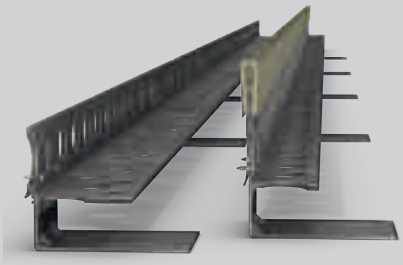
Versatile Screed Rail Systems and basic Free Movement Joint Formworks primarily designed to provide a guide for the screeding mechanism for application of screed layers and for construction of basic contraction and expansion free movement formed joints without arris protection.

UNIRAIL 40/60



A versatile Screed Rail for Thin Section Screeds, roll form manufactured from Zinc Galvanised High Tensile Steel, to very high flatness and straightness tolerances. Used in one orientation it provides a screed rail with a minimum vertical height of 40 mm, simply revolve through 90° to make it into a 60 mm rail. Its high concentration of different diameter apertures along its length are equally suitable for use with tie bars, or for passing service cables and heating pipes through. Simple to use, it ensures a flat surface is obtainable with minimal skills and effort.

UNIRAIL 70/120

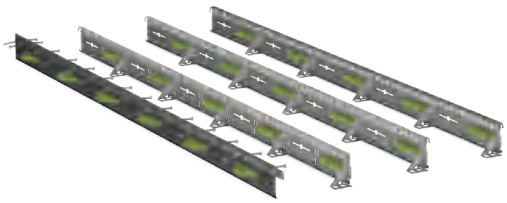


Simply the 40/60 with the addition of Slotted Adjustable Height Feet, all of the benefits of the 40/60 but with the addition of the feet. Suitable for deeper section screeds and slabs. The feet also enable the fixing of the rail to Metal Composite Decking on suspended slabs, as well as enabling secure fixing of the rail to falls, when installing screeds into drains and gully's. A versatile variation which along with the 40/60, can accept the plastic TOPEXTENDER, thereby extending the height of the product to 135 mm, making it a useful intermediary for screeding between the UNIRAIL 40/60 and the UNIFORM.

UNIFORM

UNIFORM 140 is a hybrid between Prefabricated Free Movement Joints and Screed Rails, manufactured from Galvanised Steel, again to very high flatness and straightness tolerances, purpose designed for use in applications where armoured protection to the arris is not a requirement or needed, such as Long Strip constructed floors, or pedestrian walkways. Can be used to form basic Free Movement Joints, both Expansion and Contraction. A cost effective solution for external works such as pavements and car ortruck parks, but especially effective when used with its plastic TOPEXTENDER on such projects as Helipads, Hangars and Yards where no steel is to be present at the slab surface – equally suitable for deep section screeding applications and concrete slabs.

FREE MOVEMENT JOINTS: METAFORM AND TERAJOINT



Prefabricated Free Movement Joint Systems designed for construction of contraction and expansion formed free movement joints with effective arris armoring for all types of traffic, industry and environment. Combined with variety of Load Transfer Systems, providing class leading performance for whole range of potential joint openings.

METAFORM

A modular range of Free Movement Joints for Medium to Heavy Duty floors provides full face armouring to entire joint face and arrises, roll form manufactured from Zinc Galvanised steel to extremely high flatness and straightness tolerances, available in either Preassembled or Kit Form for simple assembly on site. A unique range of joints based on the generic METAFORM Rail which accepts the full range of Peikko Load Transfer Mechanisms, as well as round and square steel bar dowels. The range includes the Single METAFORM Rail - ideal for use as a perimeter form, stop end, etc., the METAFORM DUO – the versatile all round joint, suitable for the majority of ground bearing concrete floors, both internal and external, and the METAFORM DUO SS, a variant of the DUO, but with 3 mm thick Stainless Steel top strips, purposely designed for use in applications where Hygiene or cleanliness preclude the use of Carbon Steel joints, e.g. in environments such as the food preparation or pharmaceutical industries.

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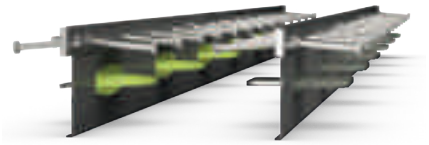
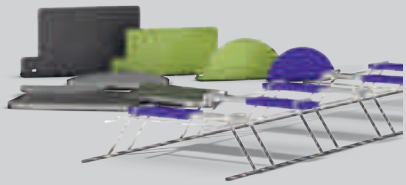
TERAJOINT



A Prefabricated Free Movement System for Heavy Duty Concrete floors. Provides solid steel armouring to joint arrises, can accommodate the full range of Load Transfer Systems up to and including the ULTRADOWEL. Designed specifically for use on Heavy Duty applications, where vehicular traffic and floor loads are particularly heavy, available in Plain steel, Hot dip galvanized version, Stainless steel and Acid proof version.

LOAD TRANSFER SYSTEMS

Dowel Systems providing high efficiency load transfer function through the joint at formed and sawn free movement contraction joints.



TERADOWEL AND ULTRADOWEL SYSTEMS

The comprehensive range of dowels now on offer by Peikko is unequaled by other manufacturers. From the 6 mm thick round TERADOWELS, through the 6 mm rectangular right up to the 8 mm ULTRADOWEL, manufactured from Ultra High Strength Steel, there is a dedicated Load Transfer System that will cope efficiently with the floor loadings required. As the Peikko range of joints are all capable of accepting any of the dowels systems on offer, it simply means that the Dowel System can be easily tailored to the joint being used in the application, with the expected joint gaps and load requirements, ensuring maximum efficiency in performance and cost savings.

PERMANENT JOINT FILLERS

Systems for filling joint gaps in concrete floors which instantly replace traditional joint fillers used in concrete floors and slab joint gaps, removing the need for re-sealing of the joints, minimizing floor downtime, and improving resistance to damage at the joint arrises.

JOINTSAVER

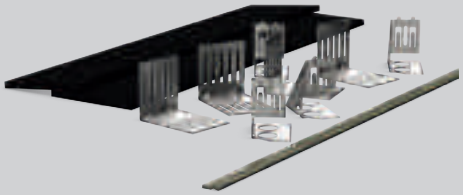
A truly innovative and unconventional joint filling system specifically designed to minimize floor downtime whilst joints are being maintained and repaired. This unique system works the opposite to conventional joint fillers, whereas these are usually gunned or poured into the joint gap (several times in the floors operational life), and can take up to 24 hours to cure before it can be trafficked, JOINTSAVER can be quickly installed and trafficked immediately! Conventional fillers adhere to the sides of the joint, and as the gap widens they stretch and eventually detach, becoming useless and necessitating costly replacement. JOINTSAVER has a patent protected, highly resistant compressible foam insert with stainless steel side plates, which has to be compressed to install it, this means that as the joint gap widens JOINTSAVER remains in firm contact with the sides of the joint, keeping the gap filled and providing support to the arrises. In addition to this, the product has a very attractive aesthetic quality, especially on the wide movement style, much admired by architects.

FIXINGS AND ACCESSORIES

Peikko provides a wide range of accessories to enhance the performance, and assist in the installation of the joints and screed rails, including Snap Fit and Adjustable Installation Feet. In order to convert the joints from contraction to expansion, we have the 15 mm bespoke Pre Cut Compressible Foam Inserts, and to fix the systems together we provide the Plastic Pop Rivets and Rivetting Tools.

Another popular accessory is the plastic TOPEXTENDER. It fits onto the screed rails and is multi-functional in that it:

- Permits smooth transition of the screeding mechanism along the screed rails,
- Increases the overall height of the rail,
- Can be left in the finished floor instead of using joint filler or caulking if used on a Tied or Restrained Movement Joint, or if preferred, it can be removed when the concrete has cured, leaving a perfect sized channel to accept the joint filler or caulking.



PEIKKO INTRODUCES NEW AND IMPROVED

SUMO WALL SHOE

Peikko has developed and clarified its Wall Shoe product range to correspond to changing international requirements. The new SUMO Wall Shoe replaces previous generation Wall Shoe products PSK, HPEW and PPEW. The new enhanced product offers many benefits for designers and user and the selection and use of the products is easier and more straightforward.

SUMO Wall Shoes are designed according to Eurocodes and their resistances correspond to resistances of Peikko's reliable HPM Rebar Anchor Bolts and Strong PPM Anchor Bolts.

SUMO Wall Shoes are used together with Peikko Anchor Bolts to create precast concrete wall connections. They offer a possibility to build stiffening structures of the building of precast concrete which can have big impact on total construction time.

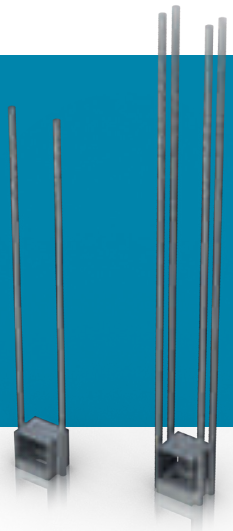
BENEFITS OF THE PEIKKO WALL SHOE SYSTEM:

- Strong tensile connection: enables shear walls, core walls and elevator shafts to be built of precast concrete elements
- Quick and easy erection of walls with good adjustment possibilities
- Connection does not require in-situ welding

More information on SUMO Wall Shoes:

www.peikko.com

and on your local Peikko website.



NEW AND UPDATED TOOLS FOR DESIGNERS

Tools for Designers is a toolbox for structural designers to make their work faster, easier, and more reliable. The toolbox includes design software, 3D components for modeling programs and technical manuals of Peikko's products.

3D MODELING TOOLS

We have released new PCs Corbel custom components for Revit and Tekla Structures.

Revit components contain now our entire standard range of PCs Corbels and the PCs-DELTABEAM connection will be released soon.

With **Tekla Structures** PCs Corbel plugins it is possible to add single PCs Corbels to concrete columns with supplementary reinforcement. We also offer a plugin to add several PCs Corbels to same level with supplementary reinforcement. At the same time with the release of PCs Corbel plugins, we have released PCs Corbel-DELTABEAM connection plugins. With these tools is possible to create a connection between concrete column and a DELTABEAM, or up to four DELTABEAMs.

PEIKKO DESIGNER®

Development of Peikko Designer® software continues: the user interface is further developed, more design standards have been added and the product range is updated.

The user interface improvements include e.g. that the design standard can be chosen when choosing the design module in the start window. The software has a new Help Tab where the user can easily find more information about the products or send feedback to Peikko.

COLUMN CONNECTION MODULE

Design code selection in the Column Connection Module has been changed. The designer can select from two design methods to find the best solution for the design case.

- *Design based on connection performance and resistance*, which includes both EN-standards, ETA approvals and test results. It offers fire design for cases where HPKM Column Shoes are used and takes account stiffness of the joint.
- *Design based on product resistances*, which refers to local standards/EN-standards with resistances based on local product approvals.

The Column Connection Module has gone through several improvements, e.g. splitting reinforcement arrangement has now more possibilities, concrete failure check table has new layout, etc.

PUNCHING REINFORCEMENT MODULE

Design according to Swiss SIA 262:2013, additional parameters for ETA-13/0151, and several new features have been added to the Punching Reinforcement Module. Now the module contains not only structural design for flat and ground slabs, but also design for footings.

Special feature: The effect of slab slenderness based on tests can be taken in to account by separate selection to gain more economical and safe solution.

NEW FEATURES OF PEIKKO DESIGNER®

The development history is now available on our website. More information about new features can be found at **www.peikko.com/software**

TOOLS FOR DESIGNERS

Peikko's components and tools can be downloaded from Peikko websites. In the Software download center you find short introductions about the tools and instructions how to register and receive the tools for download. Simply fill in a form and receive download links in your email. Peikko wants to make 3D modeling and detailing as easy as possible by developing new tools!

Software download center:
www.peikko.com/software

NEWS FROM PEIKKO

PEIKKO MOVE TO **LARGER FACTORY IN CHINA**

Peikko Group's Chinese subsidiary Peikko Construction Accessories (Zhangjiagang) Co., Ltd moved its operations to new premises in Zhangjiagang, north of Shanghai, in the end of 2013. The new premises are located close to the current 3000 m^2 premises and comprise 10.000 m^2 for both production and office use. Investments have been and will be made into new production lines and machinery. The current operations employ about 100 people, and the amount of employees will grow over time. The output of the factory is planned to be tripled in the coming one to two years.

Peikko Group has an active growth strategy in the APAC region. The current operation in China was started in 2011. The unit manufactures various connection parts, lifting systems, and flooring products for Peikko's units as well as serves as a sales platform for Peikko's products in China and the Asia-Pacific region.

PEIKKO TO HAVE **LEGAL ENTITY IN HUNGARY**

Peikko Group Corporation has formed a new legal entity in Hungary, Peikko Magyarország Kft. (Peikko Hungary Ltd.), as part of re-organizing the sales channels in Central Eastern Europe. Peikko Magyarország Kft. has an office in Budapest. Products supplied to the Hungarian customers are mainly delivered from Peikko's Slovakian factory.

In the last couple of years Peikko has been involved in many large construction projects in Hungary. Among others Peikko's DELTABEAMs, concrete connections and floor joints have been used in several large industrial, commercial, logistics, and office projects.

NEW SUBSIDIARY **FORMED IN SINGAPORE**

Peikko Group Corporation has formed a legal entity in Singapore – Peikko Singapore Pte. Ltd. In the first stage the new subsidiary concentrates on serving the precast and concrete flooring sectors. The intent is to start also local warehousing operations along with the sales operations, to ensure short lead times and reliable deliveries to local customers.

Peikko actively seeks growth in the Asia-Pacific markets. Peikko has a manufacturing unit in China situated in Zhangjiagang north of Shanghai. In addition to the new Singapore office Peikko already has sales teams in China and on the East coast of Australia.

Peikko China's subsidiary new premises in Zhangjiagang.

PEIKKO PROJECTS FROM AROUND THE WORLD

Peikko Denmark has received orders for 7.7 kilometers DELTABEAMs and 1500 tons other steel structures to a project named Carlsberg City (Carlsberg Byen) located on the old brewery site of Carlsberg in the heart of the Danish capital Copenhagen.

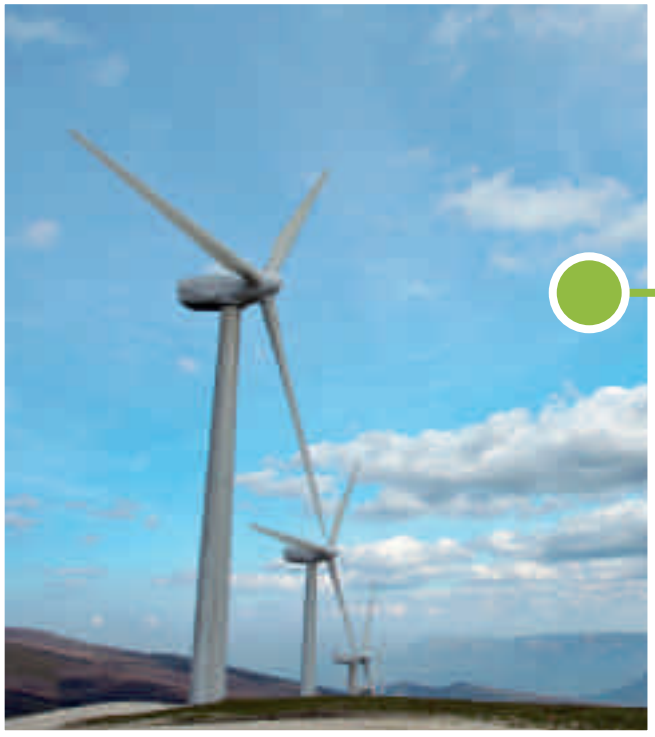
Peikko Russia has delivered NIRO Cantilever Balcony Connectors to a residential housing project Aino to be built on Vasilevsky Island in downtown St.Petersburg, Russia. The total volume of the project is highest in Peikko´s history of NIRO Connectors, a total of 1.6 kilometers equaling 1.600 pieces.

Peikko Switzerland delivered DELTABEAMs to a hospital expansion in Einsiedeln, Switzerland. The hospital is increased by two levels. To save weight and at the same to have a rapid construction were selected DELTABEAM in combination with Ytong - floor elements.

Peikko Slovakia has delivered large amounts of Column Shoes and Anchor Bolts for a precast structure of Tigar Tyres Production plant in Pirot, Serbia. Tigar Tyres is part of Michelin.

Peikko Finland delivers DELTABEAMS and the Composite Frame and a large amount of concrete connections to Opinmäki School Campus project in Espoo, Finland.

Peikko Denmark supplies PCs Corbels, PC Beam Shoes and other concrete connections to the "Copenhagen Arena" in Copenhagen. The arena will be of international premium quality, and it will be used for many types of events within culture, music and sport.

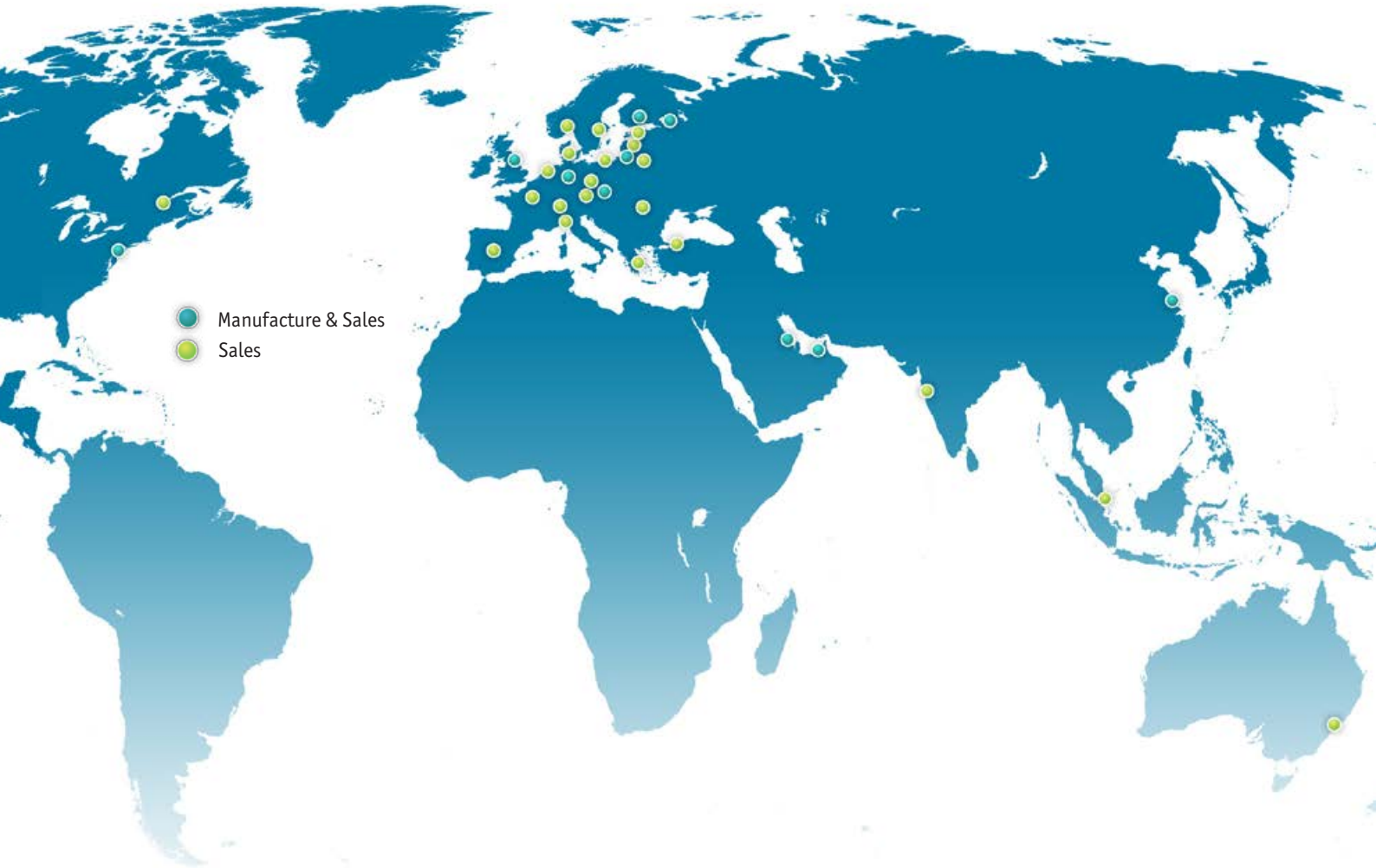


Peikko Finland has received substantial orders for foundation solutions for wind turbines in Finland. The delivery scope varies between the different projects from foundation components (anchor bolts, anchor and template rings, rebar splicing, shear reinforcement, disposable foundation forms), to foundation design and complete foundation reinforcement including design and assembly.

Altogether Peikko delivers foundation technology to 63 foundations of around 80 wind turbine foundation projects currently under construction in Finland.

Peikko Denmark delivers 7.7 kilometers of DELTA-BEAMS, PCs Corbels and PETRA Slab Hangers to Nordea bank's new office building in Copenhagen, Denmark.

CONCRETE CONNECTIONS



visit

www.peikko.com