

CONCRETE CONNECTIONS

1/2012

DELTABEAMS USED IN

CONSTRUCTING ARCHITECTURALLY
DEMANDING FAÇADE

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USED IN NEW SENER ENGINEERING
OFFICES IN MADRID

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ON THE COVER:

Peikko's Deltabeams were used in the construction of an architecturally demanding façade of the Metsätapiola office building in Espoo, Finland.

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CREATIVITY MAKES THE WORLD A BETTER PLACE



I was once a visitor in one Asian country and was presented a massive construction scheme, a city plan. My hosts were obviously very proud of it. However, to my great surprise, the city plan resembled a part of a city in another continent, which I was very familiar with. My hosts were proud of having been able to make a large-scale copy of the city I already knew.

Will copying the city plans of other cities make the world be a better place? In my opinion it will not, not in the least. In some ways, I felt sorry for my enthusiastic hosts. After all, copying a city plan implies lack of vision and creativity.

To copy existing systems makes a company or an organization mediocre – a mediocre place to work and a mediocre company which reaches for mediocre goals. This is what we at Peikko are very aware of. In some product areas, we need to offer a full range of services, where some nonpatented products come as a part of a bigger package.

However, doing that always makes us upset, again, it does not make sense to invent the wheel again. On the other hand, where-ever patents are existing, they should always be honored.

We are currently putting great effort in developing new solutions in our bolted connections product range. We have also been able to find a new, innovative solution for wind turbine foundations based on our existing punching reinforcement products. Coming up with new solutions benefiting our customers is the attitude we at Peikko nurture.

At your service,

A stylized, handwritten signature in white ink on a blue circular background.

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

What completely new could we create to benefit you? Our R&D team would like to hear about your visions and ideas. Please contact your local Peikko office and tell us more. Let's make the world a better place together by being truly creative and innovative – or just a little bit smarter.



DELTABEAMS USED

IN CONSTRUCTING ARCHITECTURALLY DEMANDING FAÇADE OF THE METSÄTAPIOLA OFFICE

The new Metsätapiola office building due to be completed in June this year, stands out from much of today's mainstream architecture. The dynamism of the building's complex geometry and unconventional architectural and technical features is based on a mix of innovative design, construction, and materials. It fits well in Tapiola, the garden city area in Espoo neighbouring Finland's capital Helsinki.

Text: Vesa Tompuri

Photos: Antti Laiho, Matti Vuohelainen, Jari Salonen



Metsätapiola's original office building in the garden city of Tapiola in Espoo was designed by the architect **Erkki Virkkunen** in 1973 and served its occupants well for decades. Space issues and out-dated technology have increasingly become problems in recent years, however, and plans were launched soon after the millennium for a new building, primarily for the company's own staff. Architect **Pekka Helin**, well-known for numerous major office buildings across Greater Helsinki, was selected as the architect early on.

"From the very start, we wanted to respect the original close to nature idea underlying Tapiola," explains Helin. "That's why, for example, we gave the building's façade along the area's major local thoroughfare, Länsiväylä, strong verticals and varied detailing to act as a visual metaphor for a forest of trees. The exterior is particularly important with this building, as it will act as one of the signature

landscapes for the entire area."

The building's basic structural design emerged early on, and made it clear that collaboration between the architects and the structural engineers would have to be much closer than normal to ensure its success.

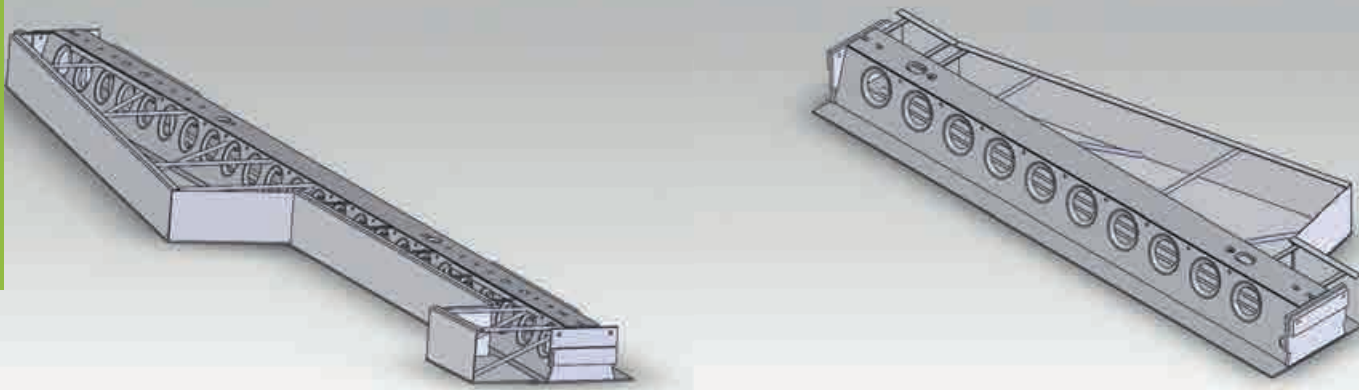
"We initially produced three alternative designs for the façade, changing the direction of the structure's hollow-core slabs," says **Antti Laiho** of Helin & Co. Architects. "The pleated or folded nature of the exterior surface meant that the floors in all three designs were cantilevered out from the structure, and resulted in the choice of Deltabeams as an integral part of the building's load-bearing frame."

Laiho says Helin & Co. has had positive experiences with using Deltabeams in a number of other recent projects, including the recently opened Helsinki Music Centre. The Vahanen Group was responsible for the structural engineering of the latter, as it has been for the Metsätapiola building.

” Deltabeams offer an indisputable package of benefits when you want low, load-bearing structures and frames with continuous beams and single-storey columns.

"Deltabeams offer an indisputable package of benefits when you want low, load-bearing structures and frames with continuous beams and single-storey columns," says Project Manager **Matti Kannisto**, who was responsible for the Metsätapiola project at Vahanen. "We were able to leverage these benefits even more because of the way the Peikko Group operates, which enabled us, as the lead





The Deltabeams were manufactured with a formwork mold according to the shape of the facade. This way in-situ formwork could be avoided.

structural engineer, to get all the design documentation for the Deltabeams and final dimensions in good time.”

QUALITY INTERIOR SPACE

The type of contract to be used on the Metsätapiola project was also decided at an early stage, along with the basic architectural and structural aspects of the building. Under the project management contract model, the lead contractor is responsible for putting out to tender, commissioning, and supervising all the construction-related aspects of a project on behalf of the developer. The model is not based on traditional sub-contracts, but rather ‘system contracts’, which enables designs to be fine-tuned during the construction phase and also makes it easier to keep costs in check.

“As the developer, we wanted to have the opportunity to have our say in things such as the space intended for our own

staff,” explains **Tauno Nokelainen**, Metsätapiola’s Managing Director. “Around 85% of the entire one and half hectares of space in the building will be used by us, after all. We also wanted to ensure that the space was designed with flexible use in mind, as the building is intended to have a long life and needs will probably change over the structure’s lifetime.”

The fact that around 13,500 square metres of the building’s space is intended for the developer’s own use put particular emphasis on the need for a high standard of interior design, which was the responsibility of Helin & Co.

“The office space of the new Metsätapiola building has been designed to be both modern and adaptable to different types of use,” says **Mariitta Helineva** of Helin & Co. “We’ve also given a lot of detailed attention to the materials used. It’s particularly important to plan where the Deltabeams end well, as this can free up a lot of interior height. Deltabeams

are also easy to work with as an interior feature, as they can be left visible at ceiling level.”

Plenty of height in the building’s internal spaces is essential because of the advanced building technology systems specified for the structure. These include ceiling units that provide both heating and cooling, supplied and installed by Are Oy. Technology like this will help ensure a good working environment for staff and help the developer achieve his target of securing a LEED Gold environmental certificate for the building.

SITE PLEASED WITH THE DELTABEAM

The positive previous experience that both the architects and the structural engineers had had with Deltabeams meant that the Peikko Finland was able to come on board at an early stage in the project. This was important, as it enabled the optimal dimensions for key parts of the structure to be agreed in line with the project’s overall budget early on.

“We decided to use Deltabeams throughout the building, not just for the complex façade, giving us cleaner lines and overall design continuity,” says Antti Laiho.

Second-stage concrete was poured on-site for the cantilevered sections of the façade and resulted in an integrated structure with the building’s Deltabeams. The cantilevered sections were tied into the hollow-core slabs using rebar reinforcement.

The benefits of using Deltabeams also proved useful in solving the challenges associated with differences in slab height

“These are easier to deal with when you’re using Deltabeams, as the beams also act as forms for concrete work,” says Site Foreman **Jari Salonen**, from the constructor Haahtela-rakennuttaminen Oy.

Working with Peikko Group was a positive experience overall, says Salonen.

“They handled their responsibilities



▲ The Metsätapiola office building is based on a column-beam design.



▲ The zigzag surface of the façade was easy to implement using Deltabeams.



© Helin & Co Architects

well. The Deltabeams beams arrived on site when they were supposed to and in the agreed volumes, typically one or two truckloads every two weeks.

"You know things are going well when the supplier sticks to the agreed delivery times and everything fits just as it should do, in other words all the dimensions are just right. If I remember right, Peikko had just one manufacturing fault in its total delivery of 428 beams, which is a very low figure. And that one fault was corrected very quickly as well."

Works Manager **Jari Pelkonen** echoes Salonen's views.

"Peikko did a good job, in fact the whole project went well. It was very positive that we all had enough time to do our job well, as the developer had completed all the preparations for the project in good time. That's certainly not always the case in construction today," he says.

Peikko's Project Engineer **Jarno Backman** who was responsible for the project at Peikko, also has only good things to say about the project.

"This was a particularly demanding job for us, both in terms of the size of the contract and the design challenges of the structure. It's been one of our largest to date in Finland." ■



▲ Site Foreman Jari Salonen has been very satisfied with the smooth running of the site.

► Architect Antti Laiho was responsible for the ideas behind many of the innovative details of the unusual and distinctive façade of the new Metsätapiola building. "Getting the rhythm of the 'folds' in the exterior just right was very important."





Architects: Corstorphine & Wright, Frame Sub-Contractor: CIDON Construction, Engineers: BJB Consultancy

DELTABEAM PROVIDES SOLUTION TO SHEFFIELD MULTI-STOREY CAR PARK

Text: Reeta Paakkinen

Peikko's Deltabeams proved an ideal, space-saving solution in the construction of yet another car park in the United Kingdom. The Rockingham Street car park is on the site of the old Assay Office in Sheffield. It was completed in July 2010 to budget and on time. In addition to 531 parking spaces, there is a set of small retail units on the ground floor.



John Metcalfe, Managing Director at Peikko UK Ltd., says the use of Deltabeams solved a height problem which appeared in the construction of Assay Office car park in Sheffield. In the UK, there are height restrictions for new buildings in congested city centres. Planning authorities are often concerned another tall building would block light to existing windows.

"The original design of the car park was restricted in terms of parking spaces because of the height of the adjacent building, which is very close by. As conventional design was not viable, engineers of the Assay car park had to optimize the overall building height and the number of parking spaces in the low area. Using Deltabeam, they could build more parking spaces, making the car park a much better investment," Metcalfe explained.

FIVE SUSPENDED FLOORS SUPPORTED BY 1,400 METERS OF DELTABEAMS

The Rockingham Street car park has five suspended floors which consist of 500 mm hollow-core slabs with 100 mm structural topping supported by Peikko Deltabeams and in-situ concrete columns. Peikko's contract with CIDON Construction included 1,400 meters of Deltabeams and Peikko's Hidden Corbels. The Deltabeams for the project were manufactured at Peikko's factory in Kralova nad Vahom, Slovakia, and the other components at Peikko's factory in Lahti, Finland.

Peikko has completed several similar car park projects in Europe – for example the one at Galleria shopping center in Lappeenranta, Finland. Assay Car Park is the fourth major car park project Peikko UK Ltd. has delivered in the United Kingdom. Before Sheffield, it completed similar

multi-storey car park applications Stratford in East London, in Plymouth and Gloucester. The car park in Sheffield is now being operated by Q-Park Limited.

Miikka Toivola, Deltabeam Product Manager at Peikko Group, said Peikko's Deltabeams provide an economical solution in spaces like car parks where slim floors and long spans are needed. "Deltabeams are safe choice for the user of the building also thanks to their integrated fire proofing. Once beams are cast, the fire proofing is there without any additional work, permanently."

MULTIPLE BENEFITS OF DELTABEAM

Deltabeam offers multiple benefits in the construction of car parks. Metcalfe notes other suppliers in the UK market tend to offer either a deep precast or steel downstand beam supporting a precast floor (typically 800–1000 mm deep overall). But with Peikko's Deltabeam, it is possible to make the floor only 475 mm deep and avoid

downstand beams completely. "Savings in cladding, services and foundation can save 2–5 percent on overall build costs," he said.

Deltabeam also enables the easy and fast frame structure and easy fixing of electrical and other infrastructure works. It offers good visibility in large, open spaces, and has fire resistance without the need for intumescent treatment.

Michael Scott, Sales Manager at Peikko UK Ltd., said the order was made after conversation between the architects of the project and its engineers at BJB Consultancy Ltd. Initially, the design looked at a traditional steel framed structure. But due to the planning restrictions on the height of the building, an alternative solution was required. Added to this the city centre site was restricted as it is bound on all four sides by roads which could not be closed. The design team lead by BJB introduced the concept of Deltabeam combined with hollow-core slabs and precast columns.

"This not only solved the height problem allowing the five suspended levels, but also



dealt with buildability issues as well. We then worked closely with the design team to develop the Deltabeam solution," Scott said. When the sub-contractor was appointed the only major change was to substitute the precast columns to in situ columns – this was done to suit a revised build program and the Peikko corbel connections were readily incorporated into the revised column design."

Further economy was made by fixing external cladding and support steel directly to perimeter Deltabeam during factory production.

Traffic barrier anchors were installed to in-situ area near to Deltabeam, which was most economic and safe option when compared to alternative of drilling and resin anchors.

PEIKKO FOCUSES ON BUILDING SITE SAFETY

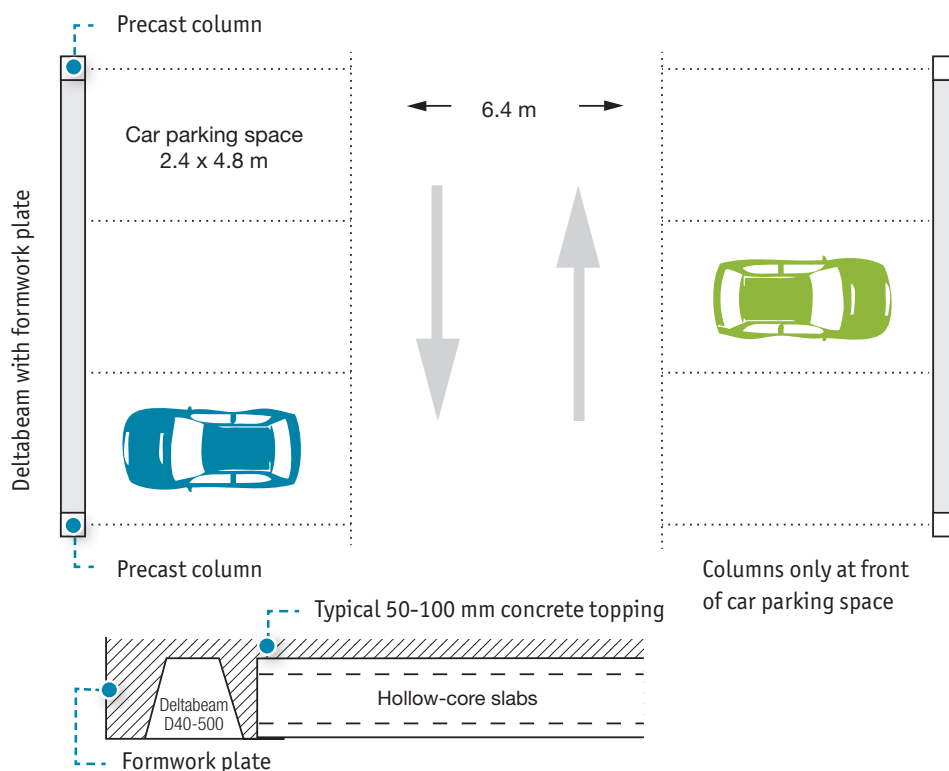
Peikko also took additional precautions in order to keep safety at the building site of the car park at a high level. Some 50 people died last year in UK construction industry – many of these by falling injury. To avoid such accidents, fixing points in the beams are factory made to allow proprietary edge protection to be fixed when Deltabeams arrive at site and are on the ground. When Deltabeams are lifted into position, the edge protection barrier is already in position and forms a safe edge for persons working at height. This is a simple process for Peikko and represents a very significant benefit for site safety," Metcalfe explained.

The project advanced smoothly and deliveries arrived to the building site on time. Metcalfe thanks all parties for their active involvement in the early design phase. "Early planning made the process smooth and easy to manage. We always optimize the use of materials to make the project as efficient, sustainable and cost-effective as possible. These are excellent ways to ensure our customers are satisfied and wish to use Peikko and Deltabeam on future projects," he concluded. ■



DELTABEAM IS THE IDEAL CHOICE FOR MULTI-STOREY CAR PARKS

Peikko has developed a multi-storey car park model where the use of Deltabeams together with hollow-core slabs results in a car park with ideal space use.



Ease and safety of parking are the key issues in selecting where to shop and spend money. This is something every developer and constructor values. What makes a parking building driver-friendly?

Less corners, less columns, more light evenly distributed throughout the car park are the most often mentioned properties of a perfect car park. All this can be achieved

with straight, flat soffit structure, long spans, and straight columns.

How to build a parking building with long spans and straight ceiling?

Use Deltabeam together with hollow-core slabs to achieve flat soffit and long spans. The Deltabeam's bottom flange can be painted white for more light. Peikko's Hidden Corbels in columns help

avoiding space limiting concrete corbels, also helping in better distribution of light.

Efficient, time – and money saving. This solution is not only driver-friendly, but also efficient giving more parking area and minimizing completion time of the building. For the few columns needed the use of Peikko column shoes and integrated anchor bolts speeds up building significantly!

DELTABEAM BENEFITS IN MULTI-STOREY CAR PARKS

LEVEL SOFFIT ALLOW FOR

- Simplified services installation
- Improved internal aesthetics
- Better distribution of light

COMPOSITE ACTION PRODUCES

- Efficient design
- Effective use of materials
- Fire resistance without additional fire protection

COST BENEFICIAL

- Reduction in storey height, resulting in façade materials savings
- Rapid build programme when used with precast hollow-core slabs, minimize on site labor
- Long spans achievable, increasing column grid

INTEGRATED SYSTEM

- Standard connection to steel, precast or in-situ columns
- Edge protection safety systems may be secured before erection

EXTENSIVE SUPPLY

- Deltabeam has been used for 20 years throughout Europe in over 10.000 buildings
- Supply to above and below ground parking structures

RECENT & PROMINENT PROJECTS

- Drakes Circus Shopping Center, UK
- Tigne T II Car Park, Malta
- Tuborg Butiksarkade Mall, Denmark
- Myrmannt Shopping Mall, Finland
- Galleria Shopping Mall, Finland
- Badeparken III, Norway
- Solvfastoya, Norway



PEIKKO'S STRUCTURAL CONNECTIONS

USED IN NEW SENER ENGINEERING OFFICES IN MADRID

Text: Adrian Liste

Peikko works with precast company Artepref constructing new offices for SENER, a multinational Spanish engineering company.

Peikko's column shoe and hidden corbel systems were used for connecting prefabricated columns and beams in this significant office project. The new office building was integrated with SENER Engineering's current complex in the Technology Park of Tres Cantos village in Madrid.

The new office building has a rectangular plan. It is approximately 20 metres wide and 34 metres long. It has three floors and a basement floor connected to the parking area of the complex. The whole structure of the building is made of precast concrete: columns, beams and exterior cladding panels.

SENER, which was founded in Spain more than 50 years ago, is today an international reference in civil engineering and architecture, aerospace engineering, aeronautical and vehicle, actuation and control, power and process and naval engineering. It has more than 2,500 employees in thirteen offices around the world.

Artepref decided to use Peikko's products in the project because they reduced the overall construction, material and labour costs. The system was easy to adapt to any type of structure, which provided security, speed and cleanliness at the building site.

Juan Moreno, Technical Director of

Artepref, said he chose to use Peikko's PCs Corbel System because it gave the firm the opportunity to build slim floors with hidden corbels. "This is a very nice aesthetic and architectural solution for offices." The system was also perfect for fulfilling the technical requirements imposed by SENER Engineering for the new building. "It was possible to avoid the traditional big concrete corbels, which take up more space and increase the total height of the building, for the same numbers of floors".

The columns were produced and transported without corbels, which were placed in the exact position once the columns



were assembled. The erection of the beams was easy, fast, safe and clean as there were vertical and horizontal tolerances for the corbels, and tolerance in longitudinal direction for the beams, Moreno added.

The adaptability of the Peikko connections for beams and columns was a key factor in meeting the requirements Artepref had set for the project. The technical department at Peikko Spain calculated and designed the connections for the project.

Both the floors and the roof of the building were made with pre-stressed concrete slabs, Artlum and Artplack types, originally patented by Artepref. The cladding of the building was made with precast concrete panels, in arid finish, in the same look and color as the rest of the complex of buildings in which it is integrated.

The structure of the building was designed with precast concrete columns of various sections, such as 50x50 cm, 50x60 cm and 60x70 cm rigidly connected at its base using Peikko HPKM Column Shoes along with corresponding HPM Anchor Bolts. Short Anchor Bolts type HPM L were used in the connections to the foundation. Long

Anchor Bolts type HPM P were used in the connections of the columns to the cast-in-situ wall and column-column connections.

The beams of the building are prefabricated and have inverted L and T sections. The PCs Corbel (placed in the column) and PC Beam Shoe (placed at the ends of the beam) have been used for hidden beam-column connections in the second and third floors of the building.

When using Peikko's Hidden Corbel System, the torque effort existing in the isostatic beam-column connection has to be analyzed, and if needed, a system that absorbs this effort has to be used. There are several methods to do this. In this case, Peikko's technical department designed a welding solution to be used between steel plates incorporated into the column and the beam.



The erection process of the beams was performed in a fast, safe and clean way. To finish the erection work of the beams the joint between beam-column was filled with non-shrink grout. To get the fire resistance and durability for the structure the recess box of the PC beam shoe is also filled with non-shrink grout.

There were multiple benefits in using the Peikko column connections in the project. "It was quite easy to place the long bolts type HPM P inside the wall and columns. The interference between Peikko bolts and reinforcement of the wall and columns was minimal. Besides, it was possible to reduce the section of the upper precast columns," Moreno said and added: "The assembly process was faster and safer than traditional systems because it was not necessary to brace the columns, which in this particular project, would have been difficult and insecure."

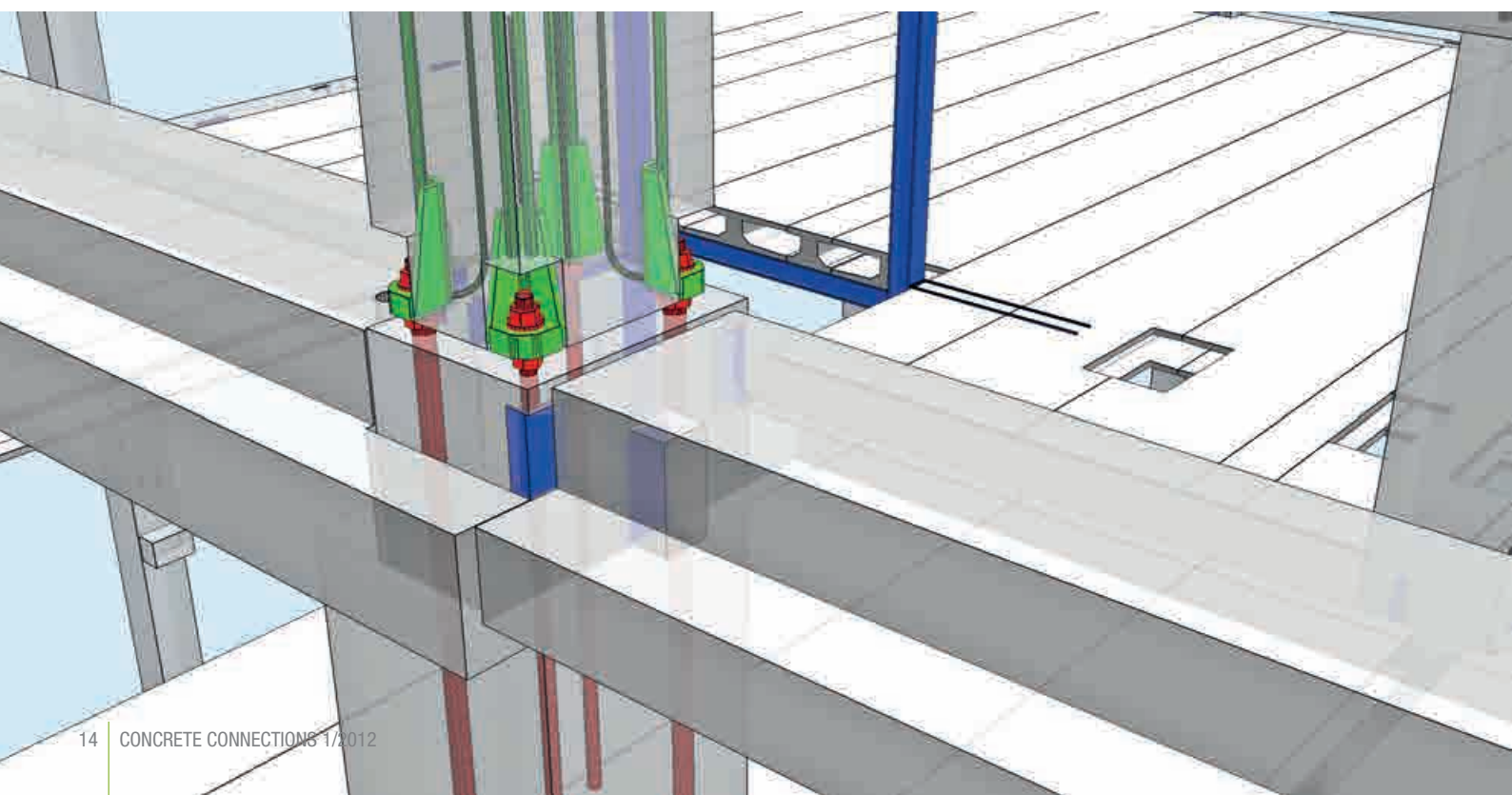
Peikko provided technical support for Artepref throughout the project. Peikko calculated all the PCs Corbel connections and gave Artepref support with calculations and high quality and well defined details. Peikko also visited the building site regularly and instructed the construction team at site how to proceed in assembling the beams with Peikko PCs Corbel system.

"These were the most valued benefits of us cooperating with Peikko," Moreno concluded. ■



WHY TO USE PEIKKO'S SOLUTION IN MAKING A RIGID ELEMENT FRAME?

- Faster erection system for precast structures compared to traditional systems. This means shorter assembly time and cost savings in specialized workers and cranes.
- Safer system during and after installation of the columns and beams compared to traditional systems. This greater safety is very important in large scale projects where there are a lot of people and traffic at the same time in the building site.
- The connection of the columns using Peikko's system is rigid immediately after tightening the nuts. Temporary bracing is not needed in the erection of the columns. Final strength in the connection is achieved after grouting of the joint and once recesses have been done and cured. This means savings in braces and labor costs for installation. It also eliminates the need for auxiliary elements on the site, which would make the access of cranes and lorries difficult and slow down the pace of construction.
- The system allows leveling the structures several centimeters in height in a quick and easy ways, relating to the height of the project (-2 cm, +3 cm depending on anchor models used)
- Factors like cold weather or rain do not affect the timing of erection work.
- The accuracy required in foundations when placing the Peikko anchor bolts helps the rest of the precast structures fit perfectly, which is not always the case with traditional systems.





PEIKKO CONTRIBUTES TO ABU DHABI VISION 2030

A STATE OF ART PRECAST SHOPPING CENTRE TO BE COMPLETED IN AUTUMN 2013

Text: Reeta Paakkinen
Photos: Abu Dhabi Precast

A new precast shopping centre will be completed in Abu Dhabi, the United Arab Emirates, in April 2014. Peikko's precast connections technology is being used in the construction of the four storey building, the ICAD residential City (IRC) Shopping Centre. It will house shops, restaurants, a bowling hall, a gym and an entertainment centre, among others.

Once opened, the IRC Shopping Centre will become a central landmark in the immense Industrial City of Abu Dhabi (ICAD), which spans one million square meters. ICAD City is a privately managed residential area for foreign workers in Abu Dhabi. It is located only a few meters away from the area where many workers from Pakistan, Bangladesh, India, live. The IRC Shopping Centre is targeting consumers with a low or middle class income. The construction of the shopping centre started in October 2011. To date it has proceeded to the lifting of the 141 columns used in the structure. The total cost of the 50,000 m² building is approximately 150 million Emirati Dirhams (MEUR 31.5).

FOUR TYPES OF PRODUCTS

Peikko delivered four different types of products to the site: PPM Anchor Bolts, PEC Column Shoes, PPL Installation Plates and

Casting Boxes. All products were manufactured at Peikko Gulf's factory at Ras al-Khaimah. The total value of delivered Peikko products exceeds 600,000 Emirati Dirhams (EUR 120,000).

Peikko's heavy duty bolt connections are being used in all of the columns of the building. The columns come in two heights: 23 and 27 metres. High strength steel PPM Anchor Bolts and PEC Column Shoes allow the columns to be erected without additional support.

PRECAST BEAM-COLUMN DESIGN MAKES A UNIQUE STRUCTURE

Asjid Mahmood, Technical Manager and Structural Designer at Abu Dhabi Precast, said the shopping centre is a unique structure due to its precast beam-column design. "Once the columns have been erected, they will completely support the total load of the





building, which has a maximum span of 8.2 meters," Mahmood said.

The IRC Shopping Centre is the second major project where Abu Dhabi Precast has used Peikko's precast system. The precast firm first used Peikko's products in the construction of the Queenex tissue factory in Mussafah Industrial Area, Abu Dhabi in 2009. "Our relationship with Abu Dhabi Precast kicked off after conversations between engineers. That led to company visits and cooperation," **Jaakko Sovio**, Technical Manager at Peikko Gulf said. "We are very happy with our cooperation. A team from Peikko visits us regularly at the building site and supports us in the different phases of putting up the anchor system," Mahmood added.

ORIGINS AND QUALITY COUNTS

Competition for customers in the UAE market for firms providing precast construction systems is moderate. There are approximately six precast plants in each of the seven states in the UAE. "Price is a big issue here but so is quality," Mahmood said. "Competitors for precast connections come mainly from China and Germany. In addition to price we also look at the origins and quality of the product. Chinese products are not selling so well in the UAE market. A suitable price-quality relation is why we chose Peikko in the first place," Mahmood explained.

CONSTRUCTION BOOM TAKES ON ABU DHABI

The Abu Dhabi government is working on a wide-scale urban development plan, the Abu Dhabi 2030 vision. It consists of new residential areas and new infrastructure throughout the state. The state also envisions attracting a growing number of foreign professionals and expects the city's population to grow from the current 700,000 to 3 million by 2030. Approximately 1.5 million people live in the United Arab Emirates. The capital of the UAE is Abu Dhabi. It has a population of 700,000, of which two thirds are foreign workers and laborers. "The urban development plan means a massive, crazy construction boom in Abu Dhabi," Mahmood said. "There will be a need for a lot of new facilities like schools, shopping centres, public buildings and housing and thus, a huge demand for quality steel connections and anchoring systems in the future. This plan is making investing in Abu Dhabi very attractive these days." ■

ABU DHABI PRECAST IN A NUTSHELL

Abu Dhabi Precast is one of the leading manufacturers of precast and pre-stressed concrete components in the United Arab Emirates.

The company's expertise areas are in the fields of planning, estimation, architectural and structural engineering, mould preparing, casting, erecting, fixing and sealing of all types of precast concrete elements.

Abu Dhabi Precast is a wholly owned subsidiary of the ASCORP HOLDINGS Group of companies, founded in 1981 by Khalfan Saeed Al Kaabi.

► Asjid Mahmood, Technical Manager and Structural Designer at Abu Dhabi Precast.





PEIKKO EXPANDS IN THE MIDDLE EAST

Peikko's operations in the Middle East started with the establishment of Peikko Gulf in 2008. Since then, the firm has gradually gained foothold in the region, and is now determined to expand further. In early 2012, Peikko agreed with its major subcontractor in the area to move production machinery and nearly 40 employees to Peikko Gulf's operations.

According to **Topi Paananen**, CEO of Peikko Group Corporation, there is a lot of potential in the Middle East market. "We are continuing our investments to further develop and expand our localized operations to increase reliability and shorten delivery times. We are especially happy that local

precasters have adopted the technological advantages of the bolted column and beam connections. Only a few other companies can promote their products with their technical qualities," Paananen said.

Peikko Gulf has recently delivered several substantial orders in the Middle East. These include two kilometers of floor joints (TERA Joint) to Al Jedar company for their project in Khalifa Port, United Arab Emirates, concrete connections to beams and columns to Prainsa company for the expansion of a cement factory in Saudi Arabia, and all concrete connections to beams and columns to Abu Dhabi Precast for a large shopping center in Abu Dhabi. Moreover, the very first

locally manufactured Deltabeam delivery to Dammam, Saudi Arabia, was made in late 2011.

Peikko Gulf is a joint venture formed by Peikko Group Corporation and Rashed Abdul Rahman Al Rashed & Sons Group, a dynamic trading and industrial conglomerate in Saudi Arabia. Peikko Gulf has two production facilities; Peikko Gulf LLC operates in Ras Al Khaimah Industrial Area in the United Arab Emirates and Al Rashed Peikko LLC operates in the Kingdom of Saudi Arabia.

For more information please contact:
Arto Pohjonen
 General Manager, Peikko Gulf
www.peikko.ae



EFFICIENT DESIGN

NEW TOOLS FOR DESIGNERS

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1. INTRODUCTION

Peikko Group has manufactured and developed innovative products and solutions for construction needs since 1965. During the last few years, the product range has grown to serve concrete construction, regardless of the frame solution or the purpose of use of the site. Peikko's solutions typically speed up and facilitate the design and construction process. This often also means that they differ from the general solutions presented in construction

standards. The suitability for use of our solutions has been proven in both domestic and Europe-wide product approvals.

Product approvals require that the quality of the manufactured products is monitored, their suitability for the purpose of use is proven, and that adequate information is available on how to use the products correctly. In addition to meeting these basic requirements, Peikko considers it important to support and facilitate the work of

designers in the various phases of design in order to utilize the features of products in the best possible way. Among the concrete results of long-term efforts are technical manuals of Peikko products which help in design and use of the products, product components and connections for widely used design software that speed up structural design. Additionally, Peikko has developed an own design software Peikko Designer®, which facilitates the selection of structural solutions in design work.

2. AVAILABILITY OF TOOLS

Structural design work is rapidly becoming more international, which creates additional requirements for the availability of information and tools. So that designers can be reached around the world in a rapid and effective manner, design-supporting tools are available on www.peikko.com, and free of charge. Peikko Group has renewed its website to serve its customers in the best possible way. The ongoing renewal of the websites of Peikko Group's subsidiaries supports international design and construction projects by offering the same tools on all national websites quickly, efficiently, and free of charge. The subsidiary websites will be renewed during the 2012.

The shortcuts on the frontpage of www.peikko.com lead to the download pages of technical manuals, Peikko Designer® and product components. The success of design work is conditional upon the use of up-to-date tools. In order for Peikko to provide information on future updates and new features of products and tools, the user must register when downloading Peikko Designer® and product components.





3. TECHNICAL MANUALS OF PEIKKO PRODUCTS

A technical manual provides extensive information on a product family, and it is used to make sure that the suitable product is selected and used correctly. The readers of technical manuals include many of the parties involved in a construction project.

The content and layout of technical manuals are being revised, taking into account user feedback and the valid European EN standards.

The content of technical manuals is organized into clear sections that are suitable for various user groups. The content is divided as follows:

- The inside of the cover gives a quick idea of the purpose of use and features of the product.
- The Product Information section clarifies the operating principle, restrictions on use, features, and resistances of the product.
- The Product Selection section presents matters related to product selection and the principles of product naming.
- The Appendices contain material related to the previous sections, such as additional reinforcement details, resistance curves, calculation examples, and special use cases of the product.
- The last spread contains matters related to identifying and installing the product.

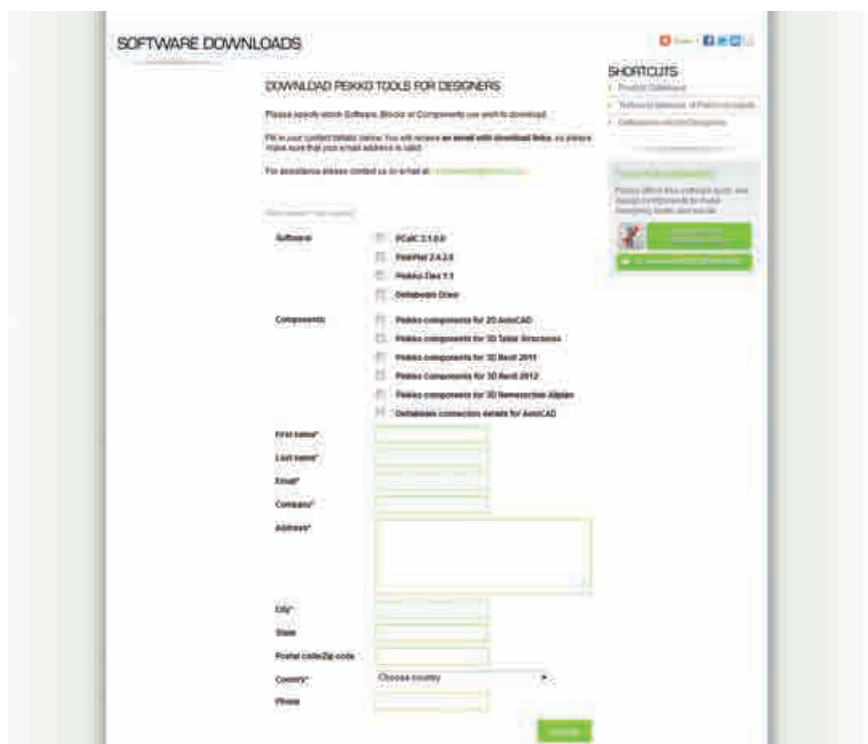
Technical manuals take into account European EN standards, such as those related to resistances and additional reinforcements.

Www.peikko.com always has the latest version of a technical manual. Revised manuals replace older versions. The revised manuals can be recognized by the green bar at the bottom. Revision of manuals is constant.

On the website, technical manuals are organized so that the shortcut on the frontpage of www.peikko.com leads to the English versions of the technical manuals, where the technical information has been determined using the EN standards and the recommended parameters. Country-specific manuals are available through the shortcut on the country-specific pages of each Peikko Group subsidiary.

4. COMPONENTS AND CONNECTIONS FOR DRAWING AND MODELING PROGRAMS

During the last few years, 3D modeling programs have been used increasingly more often than 2D drawing programs to produce design documents. The efficiency generated by modeling is based on the fact that one realistic model is an easy way to obtain information about the different needs of users. The visuality of a 3D model promotes success in design work, especially in geometrically challenging and exceptional construction sites. Simulating the



construction process through models generates information on planning and scheduling the process. Peikko has for a long time offered 2D components for its products in order to support the drawing and modeling phase. Over the last few years, it has expanded its offering to include 3D components, which significantly speed up modeling and, for example, the creation of quantity lists.

By clicking on Download software and components in the Tools For Designers toolbox on the frontpage of www.peikko.com you will be linked to the Tools For Designers page (www.peikko.com/software) that briefly presents the tools available for download. Each tool has a link to the actual download page, where the user chooses the desired components according to the user's program and fills in a contact information form.

Once the user has filled the form and clicked on Submit, an email message containing download links for the requested component packages will be received. The links are explained in more detail below on a program basis. If the firewall of the user's organization or on the user's computer prevents delivery of messages containing links, the user can send the registration information and component request to components@peikko.com, where help is available. Component-related wishes and feedback can also be sent to the same address.

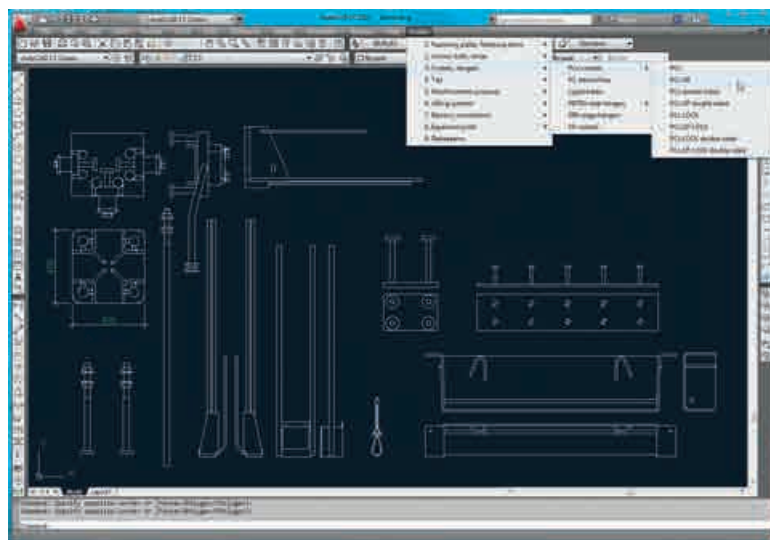
4.1 AUTOCAD

An extensive range of 2D components for fastening products and Deltabeam has been created for AutoCAD users. In addition, a comprehensive library of Deltabeam connection details are available for download.

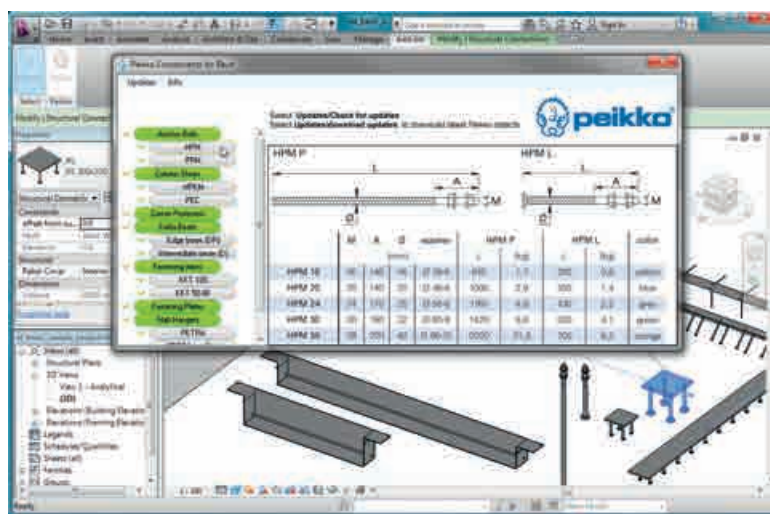
In AutoCAD, the component to be added to the plan can be easily found under the Peikko menu for components. The user can create the Peikko menu in AutoCAD by following the instructions contained in the component download package.

4.2 REVIT

In 2011, Peikko released the first 3D components (fastening plates, bolts, corner protectors, and a hollow-core slab hangers) in order to support Revit users. This year, the product range will be expanded to include, for example, Deltabeam and column shoes.



AutoCAD 2D components

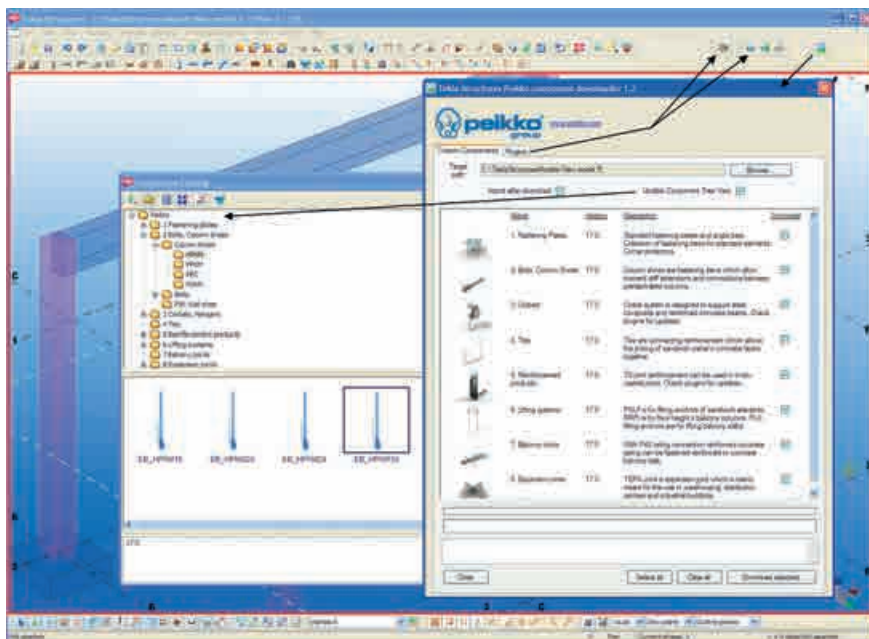


Revit 3D components

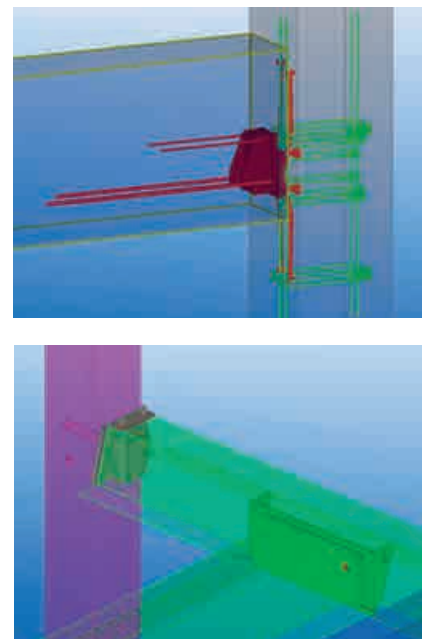
The user can download the installation package for the Peikko Components for Revit user interface through the link received by e-mail. The Peikko Components for Revit user interface is installed in the Add-Ins menu of the program. The latest available content can be downloaded by selecting Download Updates.

The success of design work is conditional upon the designer using up-to-date

components, which is why Peikko has focused on making component updates easier. By selecting Check for Updates in the Peikko Components for Revit user interface, the program will check for updates or supplements for the component range in use. As a result, the program will highlight with different colors the product families for which newer updates are available. By selecting Download Updates, the changes will be updated in the user interface.



Tekla 3D components and connections



4.3 TEKLA

Peikko also puts a lot of emphasis on the components and connections used in Tekla. Designers can use components to add the required individual products to the 3D model. Some of the components have been realized as custom components, and others as plugins with more features. Components are available for most of Peikko's products, and new components are added when needed.

Connections speed up the mutual connecting of structural items and determine the required objects such as parts and cuts. All connections have a large number of features, which makes them plugin-type components. Most connections are related to Deltabeam, and their number will be increased in the near future.

Peikko's components can be downloaded to the Tekla Structures model through the Peikko Component Downloader program, which can also be used to download Peikko's plugin-type components, such as the Petra plugin, to the user's computer.

Peikko's components and plugins are available by filling in an order form. After specifying which components or software the user wishes to download and filling in contact details, the user. Through the download links in the email the user

chooses the download program that suits his/her computer best. The download list also contains separate components and connections for those users who want to define file installation themselves. Download instructions for Tekla can be found on the Tools for Designers page (www.peikko.com/software).

5. PEIKKO DESIGNER®

5.1 GENERAL

Peikko Designer® software, which was originally released in 2010, already has thousands of users around the world. This is an indication of the fact that designers are interested in boosting their work and using the latest technology in design.

Although resistances have been given to Peikko's products in accordance with the design standards, designers must always take into account the environment and the related structures separately. This refers, for example, to the properties of concrete in structures, the physical dimensions of structures, the distance of products from the edges, reinforcement in concrete structures, various load combinations, etc. In addition, the use during installation and the end use differ from each other, and they must be checked separately. Peikko Designer® software boosts the designer's work when selecting the most suitable

product for the structure in question. In this case, the features of the product are used efficiently. The program can also be used to analyze the consequences of changes in the environment and to look for the most economical solution for the site in question.

In addition to selecting the structural solution, the software enables the generation of printouts and files for various purposes, including calculation documents, lists indicating the quantities of the products required, and details on additional reinforcement (where applicable).

The structure of Peikko Designer® software is based on modules. The first release of the software included the Column Connection module for column connection checks. The Punching Reinforcement module for punching reinforcement checks in cast-in-situ slabs was added to the software in the same year. The latest module – Fastening Plate – was released last fall and is used to check fastening plate connections. In conjunction with the releases of new modules – and often also between releases – new features are added to existing modules according to users' needs. New features are typically related, for example, to expanding the range of structural solutions, updating the product range, adding design standards, and improving the user interface.

Peikko Designer® software keeps itself up to date. The existence and availability of a new version for the program is checked automatically upon startup. If a new software version is available, the user is advised to update Peikko Designer. Version checks and software updates require an Internet connection. Peikko Designer can be used without an Internet connection and the version update checking feature for 30 days.

Peikko Designer® will continue to undergo strong development in the future. Feedback and development suggestions are welcome. All feedback sent to peikkodesigner.support@peikko.com will be taken into account when planning and scheduling software development.

5.2 INSTALLATION AND USE

The Peikko Designer® installation and registration page can be accessed directly through the link on Peikko's home page. After registration, the user will receive an e-mail with the password required to use the software. Installation is easy as the software is installed automatically, and no admin rights are required.

Minimum equipment requirements:

- Operating system: Windows 7, Windows Vista, or Windows XP SP2
- Processor: 1 GHz or faster 32-bit (x86) or 64-bit (x64)
- RAM: 1 GB (32-bit) or 2 GB (64-bit)
- Screen resolution: 800 x 600
- Hard disk space: 50+ MB

The checkbox for the module to be used opens up when the software is started. The box can be used to start a new design project or to open the latest projects for processing purposes.

The module selected for use opens up in the default view, which is divided into the following parts:

- 1 3D view – interactive 3D model that shows in real time the structure to be processed.
- 2 Initial data – vertical panel in the middle or horizontal panel at the top for entering initial data.
- 3 Results – horizontal panel at the bottom that shows the calculation results.
- 4 Case summary – floating window that enables the management of module-specific cases of the project in question (creating, copying, or deleting).
- 5 Project tree – vertical panel on the left for project management.

As different views are best suited to different users, the editing of the default view has been enabled. The user can save his/her edited views for future use as a default view. The basic default view of the software can be restored if needed. The language for use and printing can be selected from the bar at the bottom on the right, and it can be changed at any time (e.g. the language for printing can be changed after calculation).

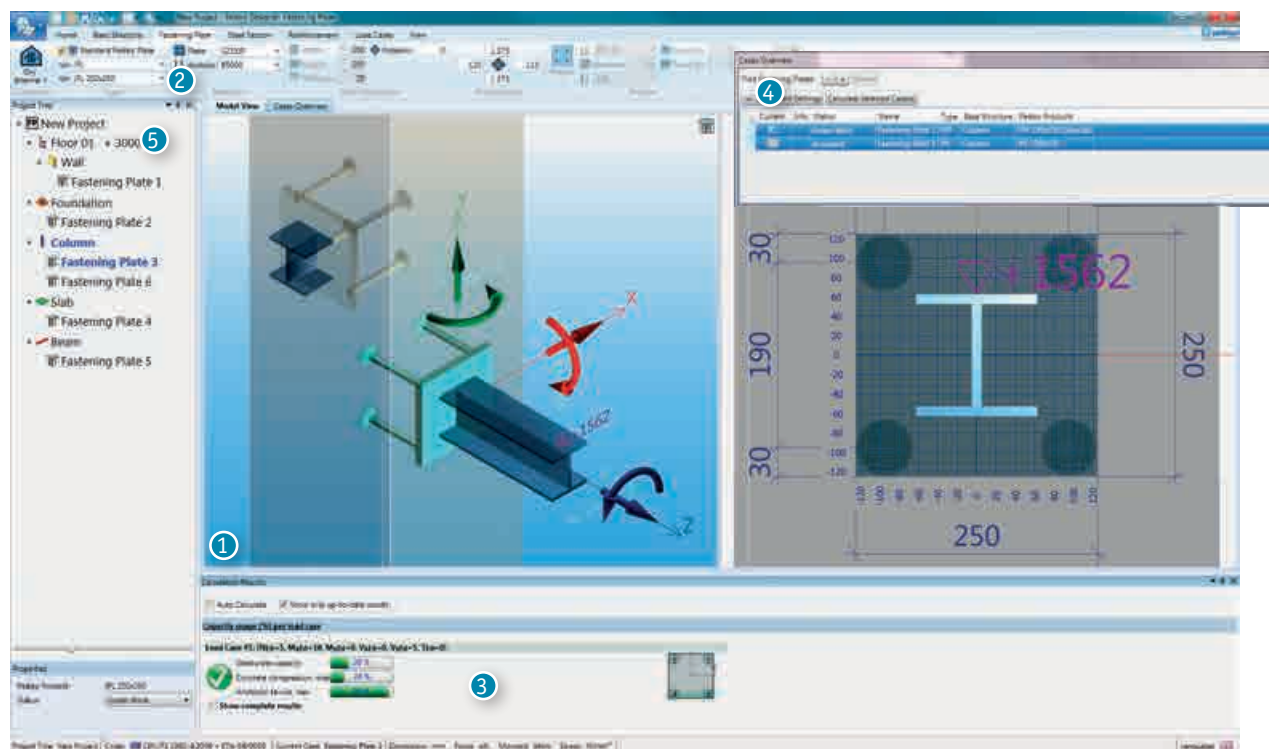
Project-related information (project name and location, designer information) can be entered in Project Settings. The design standard to be used and the measurement units can be selected in Project Settings as well as in the bar at the bottom of the view. The national appendices of EN standards and other design norms will be added later on.

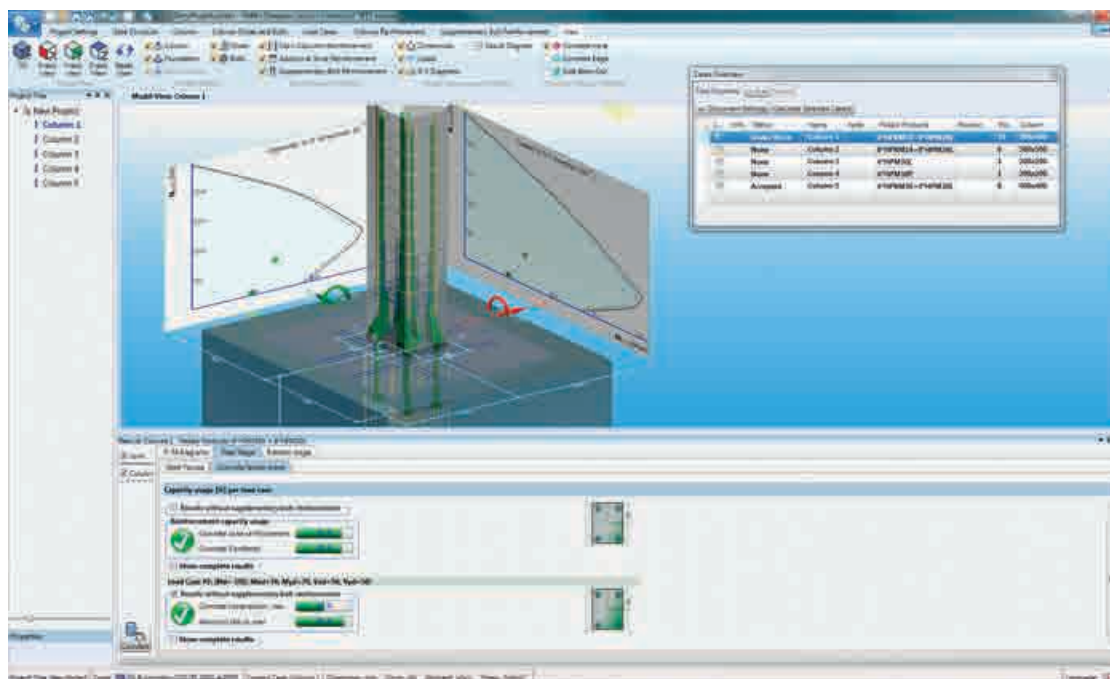
The data content of printouts can be defined in Printing Settings.



Checkbox for the module to be used

Default view of Fastening Plates module





Column Connection module

5.3 COLUMN CONNECTION

The Column Connection module is suitable for checking the bolt connections of columns that transfer normal force, shear force, and bending moment. A concrete or steel column can be connected to a base column made of concrete or directly to a concrete foundation. Peikko's column shoes for concrete columns and anchor bolts for the footing can be used to transfer forces from columns to the foundation. A concrete column can be rectangular or circular. In a rectangular column, the middle shoes and bolts can be replaced with user-selected components that are one or two sizes smaller. A steel column has a base plate, which enables its connection and the transfer of loads to the foundation through Peikko's anchor bolts.

The program distributes the stresses acting on connection to column shoes and anchor bolts, and it specifies the connection resistance during installation (before grouting) and in the final structure (after grouting). If so desired, the program also specifies the cross-sectional resistance of reinforced concrete columns, provided that the column reinforcement data is entered as initial data. This enables the comparison of the cross-section of the column to the connection resistance.

The connection resistance is presented as a interaction curve of normal force and bending moment, and the loads specified by the user are described as location points in relation to the curve. When a load-describing point is located inside the curve, the load resistance of the anchor bolts and column shoes chosen for the connection is sufficient.

The user can import load cases from other calculation programs by using the copy/paste function. The order of the columns in the load case table can be modified by dragging.

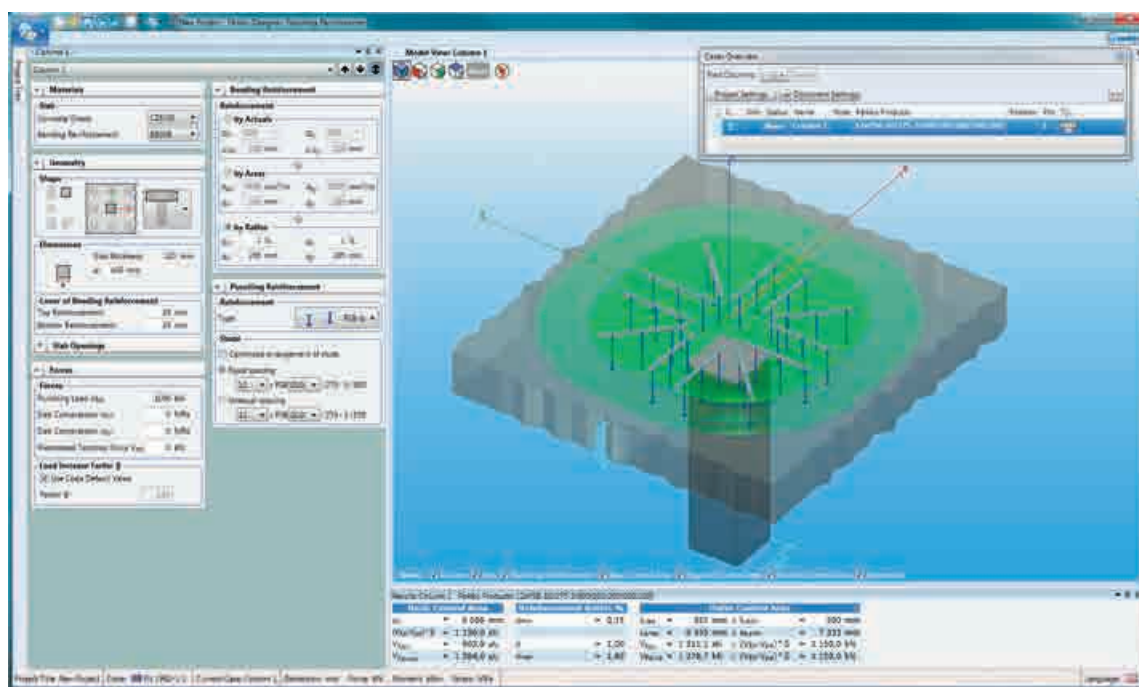
In addition to calculation and quantity documents, reinforcement details can be exported to AutoCAD as printouts.

Anchoring checks for short HPM and PPM anchor bolts according to technical specification CEN/TS 1992-4:2009 as referred to in the EN standard will be added to the module during spring 2012. The program performs resistance checks in relation to all failure cases referred to in the technical specification and reviews the need for and adequacy of additional reinforcement.

5.4 PUNCHING REINFORCEMENT

The Punching Reinforcement module can be used to check the punching resistance of massive slabs without punching reinforcement and with PSB punching reinforcement, which increases the punching resistance of Peikko's slabs. PSB punching reinforcement consists of multicomponent reinforcement that is manufactured from rebars by studding and efficiently increases the punching resistance of massive slabs. It is easy to install and is suitable for use as both cast-in-situ reinforcement and solid slab reinforcement. Punching can be checked when slabs are connected to columns, walls, or corners.

The program calculates the punching resistance of slabs without punching reinforcement and compares it to the given loads. If the slab resistance is not sufficient without punching reinforcement, the program designs the punching reinforcement required to achieve needed resistance and places it in the slab. The possible irregularities of the slab, such as edges and holes, are taken into account when deciding where to place the reinforcement in the slab.



Punching Reinforcement module

Calculation and quantity documents can be printed either on a case-by-case basis or as the sum of more cases.

PSB-F punching reinforcements to be installed in solid slabs during manufacture are the latest feature of the module.

5.5 FASTENING PLATE

The latest module – Fastening Plate – was released in October 2011. The module helps designers choose fastening plate solutions that transfer loads from connections to concrete structures. A fastening plate equipped with anchors as defined in the calculations is fastened to the mold or reinforcement before casting the concrete structure. The desired steel structure can be welded to the fastening plate.

Fastening plates are used in very different types of connections in both cast-in-situ and precast structures. Due to this, various concrete structures, such as foundations, slabs, walls, columns, and beams, are available in the program. Correspondingly, the user can choose a profile to be fastened to a plate c from the standard profiles or create a case-specific profile.

Peikko's product range has long included standardized fastening plates that can be used in most connections. In special cases, the user can create a case-specific fastening plate that meets the relevant requirements. The program calculates and Peikko manufactures case-specific fastening plates in accordance with the same principles used for standardized fastening plates. Therefore, the quality, functionality, and safety of case-specific fastening plates are the same as those of standardized fastening plates. This is how Peikko wants to support designers in choosing the right fastening plates for the site.

Case-specific fastening plates are rectangular plates with anchors fastened at regular intervals. The dimensions and material of the plate as well as the type, length, and number of anchors can be selected freely.

The module checks failure models according to the EN standards. It checks the resistance of plates, compressed concrete structures, and anchors, as well as the failure models of concrete structures in relation to the given load cases. In addition, the program calculates the support reaction forces in connections between a

plate and a concrete structure, such as the compression force of concrete, the shape and size of the compressed area, and the tension and shear forces of anchors, using the generally accepted behavioral model of rigid plates. Friction between the plate and concrete structure has not been taken into account when determining the shear resistance.

6. SUMMARY

Automation of design work is the key to its efficiency. Peikko's innovative solutions are already extensively used by European designers and constructors, and they have also generated interest outside Europe. The solutions are considered reliable, effective, and at the same time easy to use. With its design tools, Peikko supports the success and efficiency of design work. ■

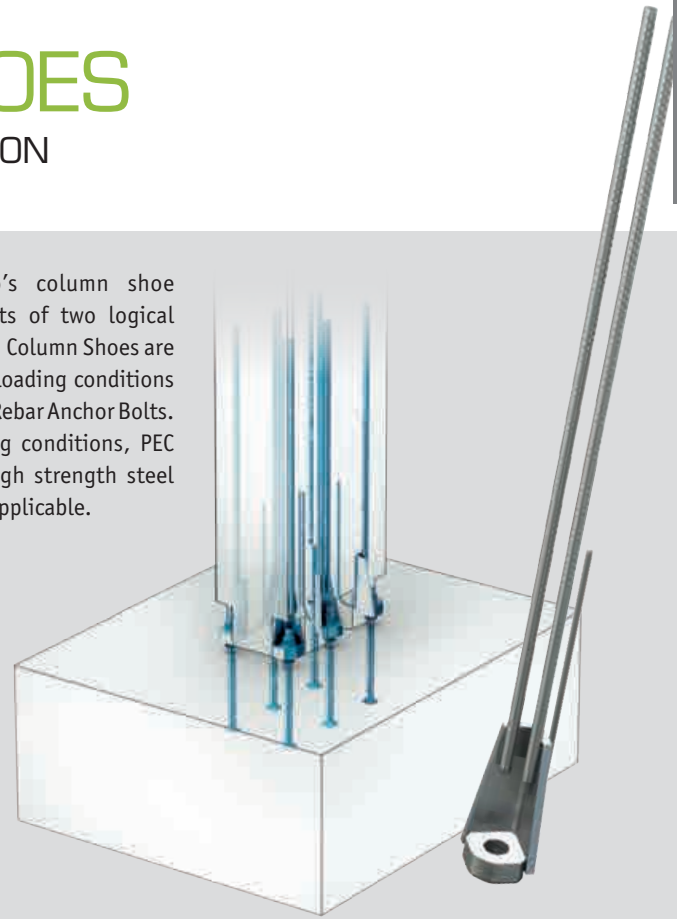
PEC COLUMN SHOES

– FOR HEAVY DUTY COLUMN CONNECTION

Peikko is modernizing and clarifying its column shoe product range to correspond to changing international requirements. Previous generation PPKM Column Shoes have been removed from the selection and they have been replaced with PEC Column Shoes. PEC products have been used successfully already during several years in a large number of projects.

PEC Column Shoes are designed according to Eurocodes and they have been approved by authorities in many European countries. Other tools available for designers and users among other things are multilingual technical manuals, 2D and 3D symbol libraries and Peikko Designer® calculation software which are all available at www.peikko.com.

In future Peikko's column shoe product range consists of two logical product families. HPKM Column Shoes are suitable for moderate loading conditions and are used with HPM Rebar Anchor Bolts. For heavy duty loading conditions, PEC Column Shoes with high strength steel PPM Anchor Bolts are applicable.



ECO GALVANIZED ANCHOR BOLTS

– RELIABLE AND ECONOMICAL PROTECTION AGAINST CORROSION

Peikko ECO Galvanizing is an EN-standard based surface coating method for the protection of steel against corrosion. It is used to protect anchor bolts, which are exposed to weather or other environmental stress. The coating is made on the specific part of the bolt where concrete's protection influence does not exist. Our standard anchor bolt product range includes economical ECO Galvanized options for HPM and PPM Anchor Bolts.

Minimum local thickness of zinc coating on Peikko products is 100 µm which fulfills 50 years life cycle in urban environment (according to standard EN 9223-1002, class C3). The performance of ECO Galvanizing corresponds to performance of hot dip galvanizing when similar thicknesses are compared. Correspondence has been verified in laboratory tests.

ECO Galvanizing has several functional and ecological benefits compared to traditional coating methods. For instance stress corrosion cracking, hydrogen embrittlement, heat transfer during coating process and zinc reaction in fresh concrete can be avoided by using ECO Galvanized anchor bolts not to mention lower carbon foot print of entire supply chain and good value price.



PEIKKO PROJECTS FROM AROUND THE WORLD

Peikko's country of origin Finland is often referred to as exotic. After all, the country is very far on the Northern side of Europe, in many cases not even visible in European maps. What is exotic in the eyes of one individual is always subjective. Nevertheless, there are not many people who have visited all the following places where Peikko's products have been used: Greenland, the Faroe Islands, Vietnam and Uruguay. We are proud to have great projects around the world.

PROJECTS UP NORTH

HOME FOR THE ELDERLY, FAROE ISLANDS

The Faroe Islands are a group of islands located between the Norwegian Sea and the North Atlantic Ocean, approximately halfway from Scotland to Iceland. In the town of Klaksvik a home for the elderly was built with Peikko's Deltabeams. The architect of the project was FUGLARK and the contractor Kanjon.



PATIENT HOTEL, NUUK, GREENLAND

Do you know where Greenland is? Yes, it is very much up in the North and has a growing population. A nice hotel called the Patient Hotel was constructed in autumn 2011 in the capital of Greenland, Nuuk.

The Patient Hotel was designed by the Danish architect office Jan Wichmann Arkitekter A/S and their unit in Nuuk, KITAA Arkitekter A/S. The building frame was constructed by using Peikko's Deltabeams.

More info: Peikko Denmark,
www.peikko.dk





PROJECTS IN THE FAR EAST

SLIM-FLOOR PROJECTS IN VIETNAM

Peikko has delivered two small Deltabeam projects in Vietnam in partnership with a structural design company LPC, which operates both in France and in Vietnam. The first project in the summer of 2011 was a car showroom and an office in Hanoi. In this project, the use of Deltabeam enabled the use of hollow-core slabs with flat ceiling structures.

The second project was located in Vinh city, about 300 km South of Hanoi. The project was an office for company Vinhland, a branch of larger TECCO Group. In this project, Deltabeams were used on five floors and the length of individual beams was 11,6 m. The use of Deltabeam resulted in a great open space, and a column in the middle of the office could be avoided.

More info: Peikko China, www.peikko.cn



PROJECT IN SOUTH-AMERICA

PRECAST CONNECTIONS IN URUGUAY

Peikko made significant deliveries in 2011–2012 to a pulp mill project in Punta Pereira, Uruguay, South America. The project is a joint venture of Arauco of Chile and Stora Enso of Finland. The project comprises a pulp mill, a deepwater port and

power generating unit based on renewable resources. Peikko delivered to the site various types of precast connections, such as column shoes, anchor bolts, fastening plates and rebar coupling systems. Peikko's deliveries totaled more than 300 tons of steel products.

More info: Peikko Spain, www.peikko.es



CONCRETE CONNECTIONS



visit www.peikko.com