CONNECTIONS

Peikko guides you towards a faster, safer, and more efficient way to design and build.

1*2022

Are you ready for

greener slab structures?

PEIKKO **WHITE PAPER**

New arena for German soccer club in Freiburg
with Peikko's bolted connections for precast structures

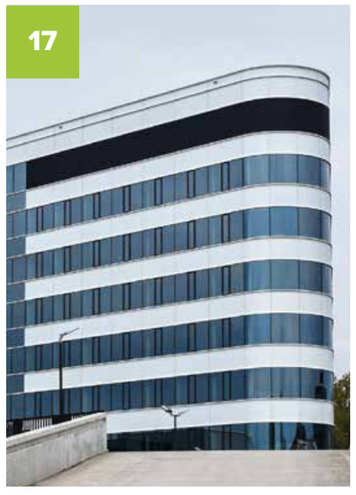
The new sports hall in Romania
will stand on bolts

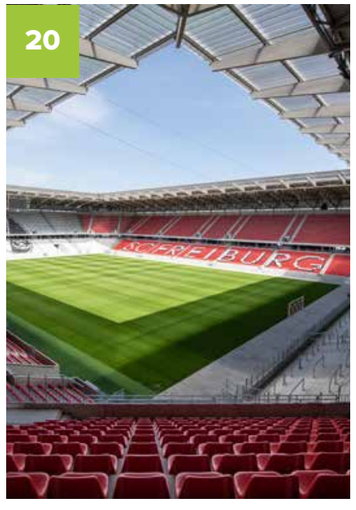
Deepen your know-how – read a White Paper
We asked the authors why you should

peikko®

ISSUE 1 | 2022

Content





Highlights

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CONNECTIONS

PUBLISHER:

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OFFSET:

Lehtisepät Oy
ISSN-L 2489-4516
ISSN 2489-4516 (Print)
ISSN 2489-4524 (Online)

DESIGN:

Peikko Group Corporation

ON THE COVER:

DELTABEAM® Green composite beam cuts CO_2 emissions by up to 50%. The environmental impacts are confirmed by the Environmental Product Declaration, EPD, and project-specific calculations of CO_2 emission are made based on this certificate. Read more on page 6.

Tackle on-site labor shortages with off-site manufacturing

The construction industry has recently faced serious global labor shortages. The most obvious reason is of course COVID-19 and its implications – not only the restrictions on construction sites, but also the restrictions on immigration. It seems that the pandemic may have been used as a handy tool to protect the home markets as well.

But we need to keep building. How do we do that despite the lack of workforce?

1. Use precast and other modular building methods such as mass timber to lower the on-site workforce requirements.
2. Manufacture components in a controlled factory environment for better quality. It's also worth noting that the labor needed in precast manufacturing is only a fraction of what would be needed to build the same structure on site – think about productivity!

We work hard to make precast and other modular methods even more attractive alternatives. Our passion is to offer you tested and certified modular solutions together with guidance and support for structural designers.

Off-site manufacturing technology has become more efficient and affordable – that's something that will raise even the investors' interest.

Productivity will be the key to success in the coming years. With us you can make significant gains. The entire Peikko crew is at your service!

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Quest for carbon neutral construction

Why do EPDs matter?

If we are to succeed in making the construction industry greener, we need a reliable and trustworthy way to compare different solutions. EPD – Environmental Product Declaration – is the answer.

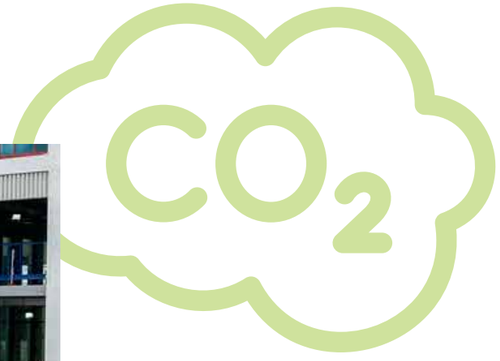
According to Global Status Report 2017, building and construction activities together account for 39% of energy-related CO_2 emissions when upstream power generation is included. Embodied carbon is the CO_2 emissions associated with materials and construction processes throughout the life-cycle of a building or infrastructure. It stands for the carbon footprint of a project before the building becomes operational, but it also refers to the maintenance and the eventual demolition and recycling of the building.

COMMITTED TO LOWERING OUR CO_2 EMISSIONS

The World Green Building Council has set ambitious goals. The first milestone is in 2030, when all new buildings, including infrastructure and renovation projects should have at least 40% less embodied carbon. The final goal is zero embodied carbon in new buildings, infrastructure, and renovations in 2050.

We are committed to lowering our CO_2 emissions. EPDs can help us reach this goal.

> **An EPD gives the summary of a product's carbon footprint and its potential impact on climate change.**



Peikko Group's EPD documents:

WHAT INFORMATION DOES EPD CONTAIN?

EPDs could be compared to nutritional values you find on food labels. While the food labels declare the amount of nutrients, EPD is a tool that provides you with information which you need to make comparisons and informed product choices from the environmental point of view.

An EPD gives the summary of a product's carbon footprint and its potential impact on climate change, ozone depletion, acidification of land and water, eutrophication (an impact of water pollution), photochemical ozone creation and the depletion of abiotic resources. EPDs can also include other relevant environmental and health-related impacts.

WHAT EPDS DOES PEIKKO HAVE?

Although the process of creating EPDs is long and complex, the benefits are worth it. To date, we have chosen to create EPDs for the painted and galvanized DELTABEAM® Green, PETRA® Green, as well as connecting parts and steel structures.

How are EPDs granted?

There are five steps in EPD development:

1. Defining the strategy to ensure that the EPD is right for both the manufacturer and the customer.
2. Collecting manufacturing, transport, and end of life data for Life Cycle Assessment.
3. Conducting and verifying the Life Cycle Assessment to evaluate the environmental impact throughout a product's life stages. The LCA presents a comprehensive view of the raw materials, energy, water, waste generation, pollutant emissions and any other component consumed in sourcing, production, and use of the product. The LCA is verified by an independent party to ensure it meets the requirements defined in the Product Category Rules. The background Report or LCA report is also prepared at this stage.
4. Modelling the EPD using an EPD program operator. The EPD essentially shows the LCA results with additional information about contents of the product and other sustainability information.
5. The completed EPD is submitted for an independent third-party verification through an EPD program operator. Third-party verification involves a review of the presented results and additional information in reference to the used PCR. After verification, the EPD is submitted to the program operator to be processed, registered, and published.

The re-usability of bolted connections now verified by DEKRA! The confirmation covers Peikko HPKM® 16, 20 and 24.


CONFIRMATION

DEKRA Assurance Services GmbH hereby confirms

Peikko Group Corporation
P.O.Box 104, Viinistöntie 3, 15101 Lahti, Finland

the verification for the re-usability of the product HPKM® Column Shoe (HPKM16, HPKM 20, HPKM 24)*, of the category "Bolted Column Connection", on the basis of the following documentation provided by Peikko to its customers on its website:

- Doc. 1: Technical_Manual_ HPKM Column Shoe.pdf
- Doc. 2: Peikko_ Wheelhanger_Bolted Column Shoe.pdf
- Doc. 3: Video_ Peikko_Bolted Connections for precast sandwiches.pdf
- Doc. 4: Peikko_ bolted_circular_2016.pdf
- Doc. 5: Peikko_ Wheelhanger_ CircularFuture_2016.pdf

Concluded is that the documentation on the re-usability of the product

HPKM® Column Shoe 16, 20 and 24 is provided in full and is available on the website: Peikko Group Global (English).

The confirmation 99052033 is valid for Peikko Column Shoes HPMK 16, 20 and 24 from 2021-05-03 to 2022-05-02.

Stuttgart, 2021-05-03
DEKRA Assurance Services GmbH
ppa.
Simone Gläser | Management

Confirmation Number: 99052033

Are you ready for greener slab structures?

With DELTABEAM® Green you can lower the carbon footprint by 50% when compared to a beam made of virgin materials

How we build now, and how we'll do it in the future, has an impact on what the world will look like for our children.

The world is warming up. According to the World Green Building Council, construction and operations accounted for 36% of global final energy use and nearly 40% of energy-related CO_2 emissions already in 2017.

Something needs to be done. And fast.

One way to look at it is to make a carbon budget – how many tons of emissions we can have until the temperature rises by, for example, 1.5 degrees Celsius?

"The IPCC AR6 Report of 2021 reveals that an average country will run out of its carbon budget share in 9 years. In a highly polluting country, the budget will be used much earlier," says **Petri Suur-Askola**, Business Director, Connections at Peikko.

The conclusion? Everyone needs to pull their weight and every little effort helps. Using less concrete means less CO_2 emissions. A shift in attitudes and actions has already taken place.

"The developers are looking for low carbon buildings as that will allow for either tax benefits or more permitted building volume. As an additional bonus, it's easier to find funding for low carbon projects these days," adds **Simo Hakkarainen**, Business Director, DELTABEAM® at Peikko.

ENTER A GREEN BEAM

"With DELTABEAM® Green you can lower the carbon footprint by 50% when compared to a beam made of virgin materials," Hakkarainen says.

Nevertheless, the greener alternative has all the benefits of the original.

"It allows for long spans and flexible open space while making the HVAC installations a breeze."

Being compatible with all slab and column types, DELTABEAM® offers integrated fireproofing, additional room height and most importantly, lower heating and cooling costs.

"But to earn its green credentials, DELTABEAM® Green contains 90% recycled materials," Hakkarainen points out.

ADD A GREEN SLAB HANGER

"We thought long and hard on how to make the slim floor structure even greener. Then we realized that we could further lower the carbon footprint by using the cutoff steel plates from the DELTABEAM® production to make PETRA® Slab Hangers," Petri Suur-Askola explains.

The original PETRA® was conceived to easily support hollow-core slabs and to make openings and configurations into hollow-core slab floors.

"By minimizing the amount of virgin steel and reusing the surplus material flow, PETRA® Green has a 43% smaller carbon footprint compared to standard slab hangers," Suur-Askola says.

WHAT ARE YOUR NUMBERS?

"We use renewable energy to produce both DELTABEAM® Green and PETRA® Green," Hakkarainen says.

The transport from the factory to the site is fueled with biodiesel or environmentally compensated fuel.

"To make comparing the amount of embodied carbon and the products' environmental performance easier, both solutions have been EPD certified."

Another value adding service is the Game Changer calculator which helps you to maximize the return on investment and minimize the impact on the environment. The Game Changer works on three dimensions – building time, space and CO_2 emissions.

"Contact your local DELTABEAM® expert to get the numbers for your project," Hakkarainen says.

WHAT MORE CAN YOU DO?

The industry has been busy developing new products and materials as well as refining its production processes.

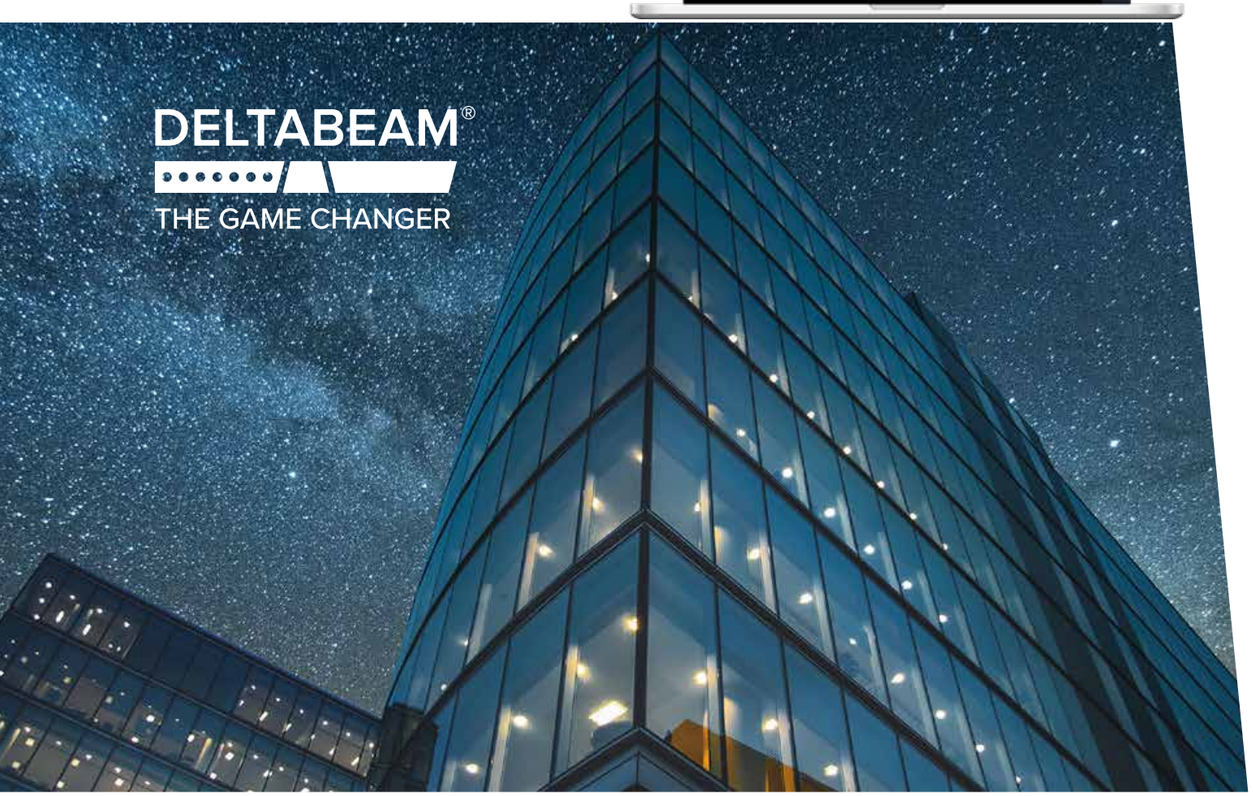
Up to 70% of the precast element's total CO_2 load is in cement.

"There have been interesting advances with low carbon hollow-core. The use of other cementitious materials – such as ground-granulated blast furnace slag from the steel industry and pulverized fuel ash from coal-fired power stations – seems promising," Hakkarainen says.

The other possibility is wood.

"DELTABEAM® Green and PETRA® Green are fully compatible with wooden slabs," Hakkarainen notes.

"Game Changer calculator helps you to maximize the return on investment and minimize the impact on the environment.



High-level international event on circular economy

The goal of this high-level international event is to attract participants from Finland and abroad to hear world-class presentations on practical solutions for circular economy in the construction industry. It also facilitates networking between industry representatives, scientific community, policy makers, and other professionals.

The conference offers you insights, information, and platform for discussions on how we are able to be part of sustainable solutions. We encourage you all, interested in circularity in the construction business, to attend this inspiring event.

Start your event journey now by registering for the inspiring event at: www.constructiongoescircular.com

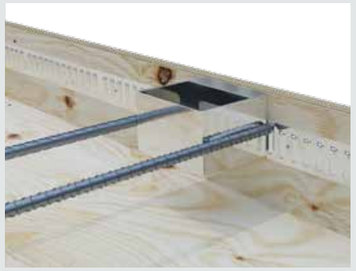
Latest product launches

At Peikko, we are always seeking ways to offer more value for our customers. This year, we have introduced the following new products – for a faster, safer, and more efficient way to design and build.

The new GRIP Recess Plate ensures a rough concrete surface in the joint

The GRIP Recess Plate is a new product to supplement existing wall-connection products from Peikko. The GRIP Recess Plate is a thin, profiled steel sheet used to create a rough concrete surface. With the GRIP Recess Plate, the surface of the concrete is considered to be rough in accordance with EN 1992-1-1 (section 6.2.5). Once the formwork is removed, an embossed surface will remain on the precast concrete surface.

The GRIP Recess Plate is primarily designed to be used in precast wall connections together with SUMO® Wall Shoes, creating a rough surface for improved shear transfer in the joint. However, the GRIP Recess Plate can be used for any application with a concrete surface where a roughened surface is required.



Peikko’s PSB® Headed Anchors simplify rebar connections

PSB® Headed Anchor reliably anchors steel reinforcing bars – rebars – into concrete, transfers the tensile strength of rebar to concrete, and simplifies installation in congested areas of concrete structures.

PSB® Headed Anchor comprises ribbed bar and a choice of forged anchor heads at one or both ends, enabling users to optimize reinforcement detailing and reduce reinforcement congestion in joint areas.

Due to its design and simplicity, PSB® Headed Anchor can be easily and quickly installed, and without the need for special tools. It can be oriented horizontally or vertically, and generally optimized to the space available. Its design avoids the need for reinforcement loops in detailing areas, and reduces anchoring lengths compared with straight reinforcement.

PSB® Headed Anchor can be used wherever rebar anchorage is needed to improve joint detailing or for easy installation at a construction site. Its many applications in concrete elements include foundation and floor slabs, columns; footings, walls, beams, frame corners, and corbels.

PSB® Headed Anchor is ETA (European Technical Assessment) assessed and CE marked. It meets all standards and requirements regarding mechanical, fire, and corrosion resistance.

For comprehensive information on PSB® Headed Anchor, including on resistance and all other aspects of performance, materials used, dimensions, concrete grades, and model options, please consult the Peikko Technical Manual.

Peikko introduced ARBOX® Plus and ARBOX® Strong

Peikko expanded its ARBOX® range with the addition of ARBOX® Plus and ARBOX® Strong, which provide effective joint reinforcement for higher loads.

New product ARBOX® Plus provides a stronger rebar connection for concrete structures. It is a rough surfaced, higher resistance version of ARBOX® Joint Reinforcement, Peikko’s smooth surfaced, ready-to-install system for creating stiff concrete casting joints of reinforced concrete elements.

New ARBOX® Strong provides the strongest rebar connection for concrete structures in Peikko’s product portfolio. It is an indented surfaced, highest resistance version of ARBOX® Joint Reinforcement, and is the best solution in the most demanding applications including major infrastructure projects.

Both new products are in the highest resistance class with rough and indented surfaces according to Eurocode EN 1992-1-1, Section 6.2.5. They enable high longitudinal and transverse shear forces to be transferred to the joint.

ARBOX® Joint Reinforcement efficiently connects reinforced concrete structures, and it simplifies formwork and joint design. Installation is quick and straightforward, and there is a wide range of options.

PETRA® Green Slab Hanger; a new step towards environmentally friendly construction

After having launched DELTABEAM® Green last year, we are now proud to introduce the greenest slab hanger on the market – PETRA® Green. It is produced with the same sustainable methods as DELTABEAM® Green, making it possible to reduce the carbon footprint even more.

The EPD approved PETRA® Green has a 43% smaller carbon footprint compared to standard slab hangers. It is produced using renewable energy, and together with DELTABEAM® Green, they are transported in a way that burdens the environment as little as possible.

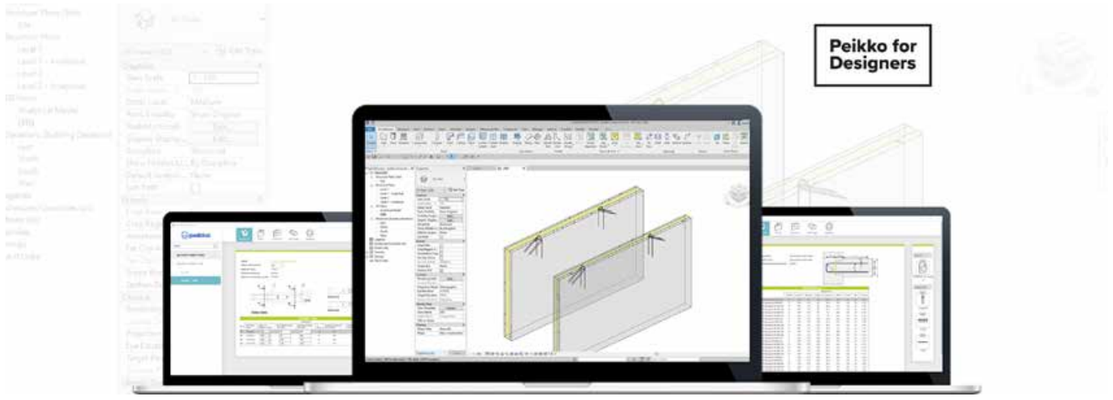
Since the production of PETRA® Green was not yet started at the time this EPD was granted, EPD has been calculated based on its sibling product PETRA®. The production impacts of PETRA® Green can be considered as identical with PETRA®.

PETRA® Green is manufactured by Peikko’s production facility in Finland and available for Scandinavia. All PETRA® Green Slab Hangers are also painted green.

PETRA® Green has the performance and options of standard PETRA® models and is fully configurable to fit most of the hollow-core slab layouts. PETRA® Slab Hangers are used to support hollow-core slabs and make openings and configurations into hollow-core slab floors. It is a unique technical solution that has all the benefits of a standardized product, while being used for applications that usually require careful static analyses and tailor-made structural solutions.

Peikko for Designers

Your journey to faster, safer, and more efficient design starts with the free Peikko Designer®. Use the software to select the most suitable Peikko products for your structures. Want to complete your design with Peikko Products? Use our 2D and 3D detailing components to complete your design. Read more: www.peikko.com/for-designers



Updates to the Prodlib library: WILJA® available, updated SLADEX® and ARBOX®

The latest updates to the ProdLib library have brought the following changes: the WILJA® Lifting Insert has replaced the PNLF Sandwich Wall Insert, the ARBOX® portfolio has been extended, and the SLADEX® Balcony Slab Connector can now be configured with the PSB® Punching Reinforcement or shear stirrups.

With the latest Peikko library for ProdLib, we have added the SLADEX® tube for supported balcony slabs where PSB® is not applicable. For this application, the SLADEX® Balcony Slab Connectors are modeled in combination with shear stirrups, for which the user can specify the height and edge distances. In Revit, the height offset is now provided for the so-called regular combinations of SLADEX® and PSB®, where the tube of the SLADEX® Balcony Slab Connector is placed in the middle of the balcony slab, but the PSB® may require some height offset.

The ARBOX® portfolio has been expanded in ProdLib as well, and now includes ARBOX®, ARBOX® Plus, and ARBOX® Strong.

In addition to these updates, this version has now added the WILJA® Lifting Insert, which replaces the PNLF Sandwich Wall Insert. The shape and dimensions of the insert will be determined by the thickness of the chosen insulation. In addition, the diagonal pull angle selection will ensure that additional diagonal reinforcement is added to the wall as needed.

In Revit, the WILJA® Lifting Inserts can be inserted either one by one, or in pairs, with a user-defined distance between the inserts. Keep in mind that the designer should verify the minimum spacing requirements between the inserts, the geometry of the wall, and the surface reinforcement required, in accordance with the WILJA® Technical Manual. WILJA® Lifting Inserts can also be modeled 'close to the opening' or 'over the opening', which will result in bent WILJA® configurations with additional diagonal reinforcement. Visit prodlib.com for more information.

ARBOX® Portfolio Update for the Tekla Plug-in

The new 1.5 version of the plug-in now includes ARBOX®, ARBOX® Plus, and ARBOX® Strong. ARBOX® Plus now has a wide range of models and is ideal for most uses. The ARBOX® Plus range includes both single and double rebar models with different spacing options, and has improved resistances compared to previous ARBOX® models. The ARBOX® Strong has fewer model options but is ideal for heavy loads.

When creating a model with the new 1.5 plug-in, ARBOX® Plus is now the default type.

With this update, some previous ARBOX® models have been removed from the plug-in, in order to match the current ARBOX® model lineup. As a result, compatibility issues may occur when opening ARBOX® that has been made with an older plug-in version.

Go to Tekla Warehouse for ARBOX® plug-in 1.5

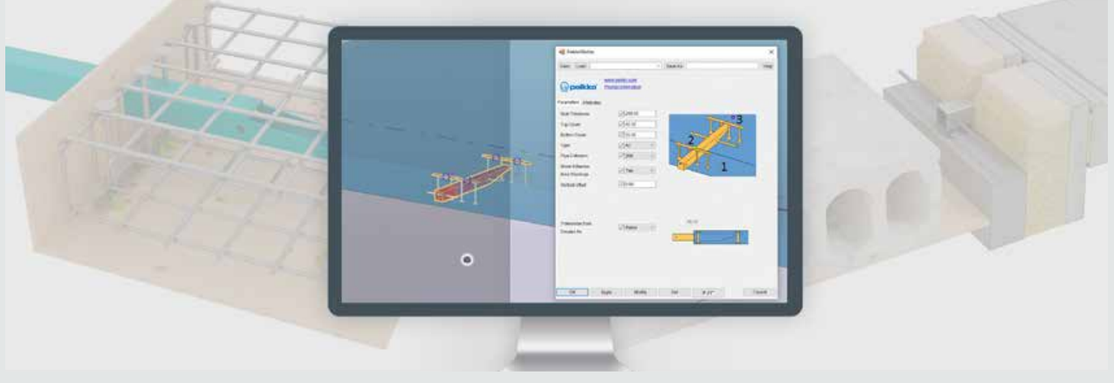
A new SLADEX® 1.0 plug-in in Tekla

We are introducing a new SLADEX® 1.0 plug-in in Tekla. You can find it in Tekla Warehouse where all other Peikko plug-ins are also available. In addition to this new SLADEX® 1.0 plug-in, Peikko Embeds version 4.7 is required to allow SLADEX® components' proper functioning.

SLADEX® Balcony Slab Connector is used as a point support for precast concrete slabs. It consists of a stainless steel RHS tube and rails with PSB® studs. This combination is only possible under certain slab thickness and top and bottom concrete cover conditions. If those conditions are not met, then the product is made of SLADEX® tube and shear stirrups. The user only needs to specify the slab thickness and top/bottom concrete covers, and the tool will provide specific choices based on these three dimensions.

SLADEX® tube should be always placed in the middle of the balcony slab. If this is not possible, the user will be able to define vertical offset for the SLADEX® tube with a short notice to contact Peikko's Technical Support to check the impact on product capacity.

The SLADEX® plug-in works with 3 input points. The balcony slab is defined by the first input point. The second input point should be placed on the slab's edge (tube extrusion is measured from this point). The third point defines direction for the SLADEX® tube and PSB® studs / stirrups.



Hinkley Point C is one of the largest construction sites in Europe

Peikko's references and expertise made it possible to act as a supplier in the demanding nuclear power project.

At Hinkley Point C (HPC) in Somerset, England EDF is building two new EPR type nuclear reactors. The technology for the power plant is delivered by the French EDF. BYLOR Joint Venture is delivering the main civil engineering works for the project. HPC is one of the largest and most complex projects in Europe. It will take 10 years to complete this project from the start of the construction in 2016. There are around 6,000 people working currently at the construction site.

HPC is the first nuclear power plant to be constructed in the British Isles for more than 20 years. HPC is located in the vicinity of the A and B power plants, which were opened in 1964 and 1976. The power plant will have two third generation pressurized water reactors with a total capacity of 3,200 MW. It is sufficient to generate low-carbon electricity for about six million British households by 2026. The HPC power plant comprises two units the size of the OL3 power plant constructed in Finland. HPC will reduce carbon emissions by nine million tons annually, or by nearly 600 million tons during its 60-year lifespan.

A CAREFULLY PLANNED CONSTRUCTION PROJECT

The preparations for the construction site started with community investment and the construction of roads in 2012. After that started extensive environment and wild animal protection measures, as well as planning of infrastructure. A concrete factory, warehousing areas, underground tunnels, reservoirs, tanks, and docks, among other things, were constructed at the site. In addition, accommodation for the workforce and internal transport links were constructed.

"The first time I arrived at the site, I was amazed by the actual size of the site"; remembers **Gatis Počs**, Project Manager at Peikko. Indeed, the HPC site is like a small city where employees are transported from one place to another with the site's own buses. And the row of cranes can be seen for miles, that is how big it really is!

There are more than 50 cranes in use at the site, including the biggest crane in the world, SGC-250, which is used to lift the nuclear reactor, among other things.

SAFETY ABOVE ALL

Safety is the most important concern for nuclear power construction. That is why efforts are made to take into account all possible risks of accident, such as leaks, fires, explosions, or the reactor core melting. Furthermore, the risks of external hazards, such as floods or aircraft accidents, are taken into account. Taking all these issues into consideration in planning and construction is challenging, because the building must fulfill the strictest requirements.

The structure of a power plant consists in the main of extremely massive concrete structures cast-in-place. Hundreds of engineers are working on planning and modelling, and it is their task to ensure that all possible aspects are taken into consideration. The connections must be both safe and reliable. This means that no compromises are made at the expense of safety. Every work phase, both at the site and in the production of a products, are specified in precise detail in advance. The implementation is documented, and the end result is approved on the basis of an assessment.

During the implementation phase, thousands of cubic meters of concrete are cast daily, and hundreds of tons of reinforcement and steel are installed. The schedules at the site are very tight, but no compromises are made as regards nuclear safety. Documentation of even the smallest detail and full retraceability of products are connected with nuclear safety. Information regarding all the products used in construction must be reliably available throughout the building's 60-year lifespan.

"Success in the nuclear power industry requires strong expertise, established operations, as well as a high quality organization.

"The concrete structures have been reinforced densely, and they have a lot of different kinds of cast-in components", Gatis Počs describes. The manufacturing and installation tolerances of products are extremely tight. Peikko delivers all the fastening plates for concreting, frames for structure openings, as well as high strength bolts, for this project.

Počs knows that in deliveries, product documentation is as important part of product quality. Success in the nuclear power industry requires strong expertise, established operations, as well as a high quality organization.

"I am proud to have the opportunity to lead the Peikko team and to be involved in this significant project that aims for emission-free energy".

PRODUCTION IN FINLAND AND IN GERMANY

Raimo Lehtinen, Business Director, says that Peikko has delivered products for nuclear power projects for about 15 years.

"Our first big reference on the nuclear side was the OL3 project in Finland. It was the biggest individual project in Peikko's history until now."

According to Lehtinen's experience, references are very important in the nuclear power business. Experienced and reliable suppliers are sought for the projects. In these projects, a long-ranging approach has to be taken in sales activities. Peikko has been involved in the preparations of the HPC project since 2008. It took nearly 10 years before the first products were delivered at the site. Now, production is going ahead at full force in Peikko's factories in both Finland and Germany.

Lehtinen reveals that Peikko is also actively involved in other nuclear power projects.

"With our experience spanning over half a century, we are able to supply products and solutions for the future projects of the world's leading nuclear power operators. The point is not just manufacturing high quality products, but in the specialized expertise required by the entire project", he emphasizes.

"The point is not just manufacturing high quality products, but in the specialized expertise required by the entire project.

PROJECT FACTS

- Start of construction in 2016
- Deployment target 2026
- Electricity production capacity 3,200 MW
- Cost estimate approx. GBP 22.5 billion

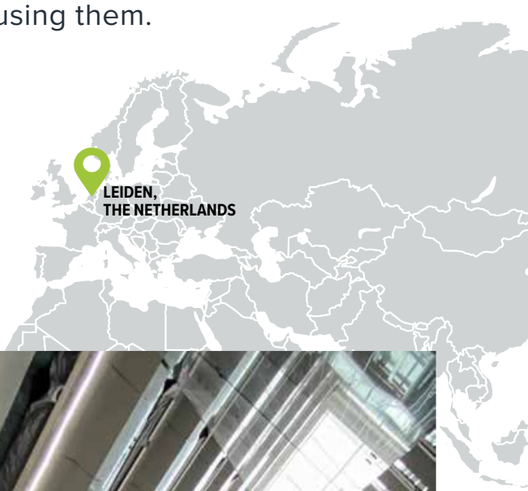
The new TNO lab building allows no air to escape

The Dutch human biology and microbiology research needed space for technical installations and the people using them.

Founded in 1932, the tenant TNO is an independent research organization with a mission to create innovations that boost the competitive strength of industry and the well-being of society in a sustainable way.

Located in the Bio Science Park of Leiden, the new building is dedicated to human biology and microbiology research. Half of it is regular office space with the other half being laboratory area.

As the building had to be totally air-proof, there were strict requirements for the structure.



ARCHITECTURE MEETS USABILITY

Both technical and architectural needs were met with the DELTABEAM® Frame, a composite structure with components that are light to transport and fast to install.

"Due to historical reasons, only a few companies are used to using composites in the Benelux area. But now that is changing. Benelux designers and contractors recognize the benefits composite structures bring to their projects, like extra strength, stiffness of the structure, and integrated fire resistance," says **Wim Zwaan**, Managing Director of Peikko Benelux.

> **With the DELTABEAM® Frame there are no obstructions in the ceiling and the number of supporting columns is lower than in competing solutions.**

The purpose of the building called for a lot of technical installations in the ceiling.

"That's where the DELTABEAM® Frame comes to its own with its unobstructed ceiling."

Also, the architecture benefits from long spans and almost invisible columns.

"With the DELTABEAM® Frame there are no obstructions in the ceiling and the number of supporting columns is lower than in competing solutions," Zwaan describes.

Another striking interior feature of the new TNO building is the central open space that cuts through all the floors up to the glass ceiling. For the facade, there is a glass curtain wall to complement the rounded corners.

TROUBLE-FREE COOPERATION

"Our cooperation with Peikko Benelux was a successful one. The discussions were started early in the process because the entire structure was to be prefabricated," says **Edwin Ouwerkerk**, Director of Bakels en Ouwerkerk Bouwgroep.

The whole frame was engineered by Peikko in a 3D BIM model.

"A lot of components were integrated. A good example is the inserts in the edge beam formwork to be used for fixing the façades in later stages."

In addition to the facade shapes, the beams enhanced on-site safety.

"Prefabricated fixing points were added for the temporary safety fences," Ouwerkerk says.

> **Another aspect of the DELTABEAM® Frame is that the fire-proofing is built in – you don't need to worry about that on site.**

This meant that the rails could be installed already on the ground, and they were instantly in place when the beam was installed.

"Another aspect of the DELTABEAM® Frame is that the fire-proofing is built in – you don't need to worry about that on site," Zwaan adds.

The construction team completed a floor level every three weeks – choosing the DELTABEAM® is an investment that will pay dividends in terms of construction speed and usable, rentable space.

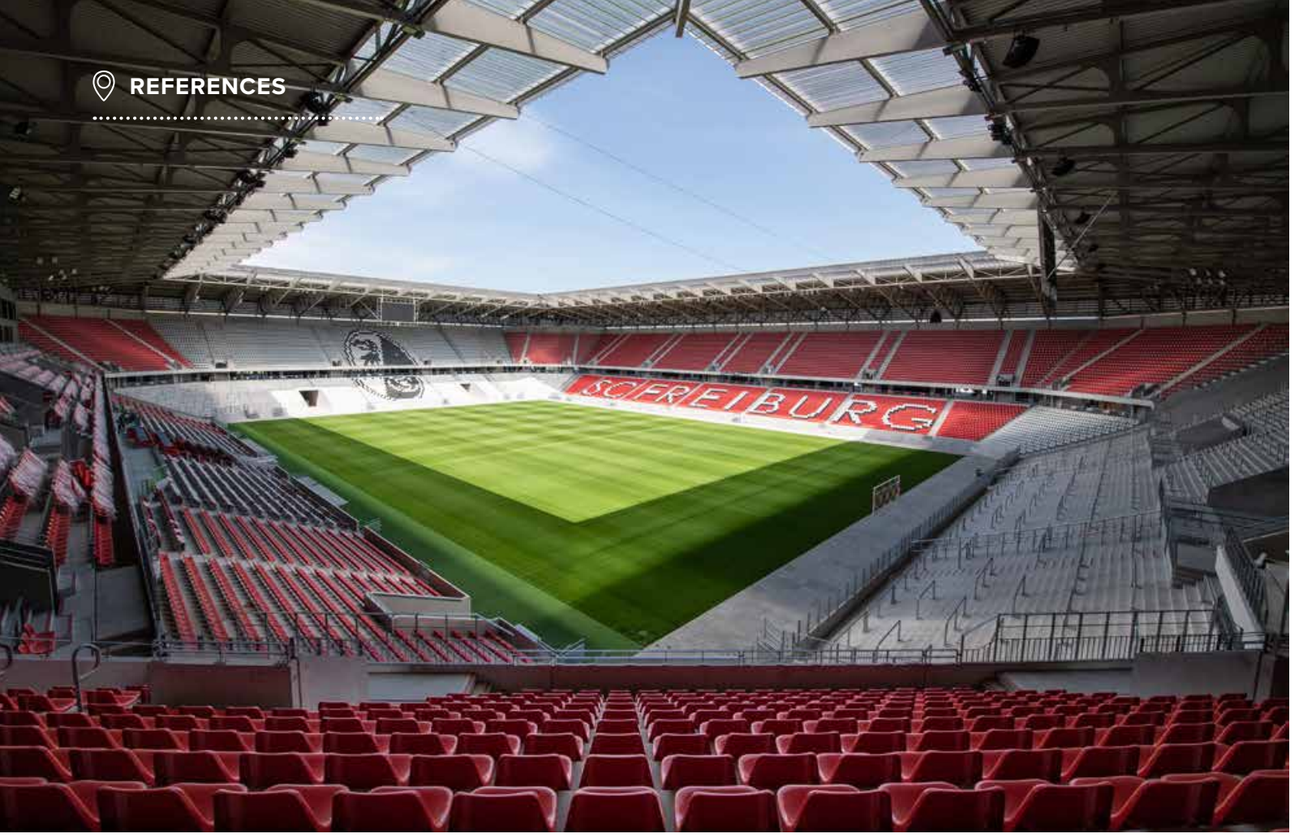
PROJECT FACTS

- Project size: 12,000 m² (14,000 sq yd)
- Floors: 9
- Developer: Leeds Investment
- Construction company: Bakels en Ouwerkerk Bouwgroep
- Architect: Centrum Architecten
- Precaster hollow-cores: VBI (Consolis)
- Structural designer: Van der Vorm Engineering B.V.
- Delivery year: 2020
- Completion year: 2021

New arena for German soccer club in Freiburg **with Peikko's bolted connections for precast structures**

The new "Europa-Park Stadion" with a capacity for 34,700 spectators was designed by HPP architects for German Bundesliga Soccer Club SC Freiburg. Situated in Northern Freiburg, near the airport and with excellent public transport connections, it substitutes the arena from 1954, the "Schwarzwaldstadion".

Photos: Klaus Polkowski ©



Where the roof structure is supported on the precast concrete walls and columns, the anchoring of connections of the steel components in the concrete structure is secured by Peikko's galvanized anchor bolts.

As the previous construction no longer met the requirements of a modern sports venue, it only continued to be used with a special permit from the German Football League (DFL). When a feasability study revealed that refurbishment and extension of the old soccer arena would take around eleven years and would cost little less than a new building, the decision was easy.

BEHAVIOR OF SPECTATORS, SEISMIC AREA AND CONSEQUENCES FOR STRUCTURES

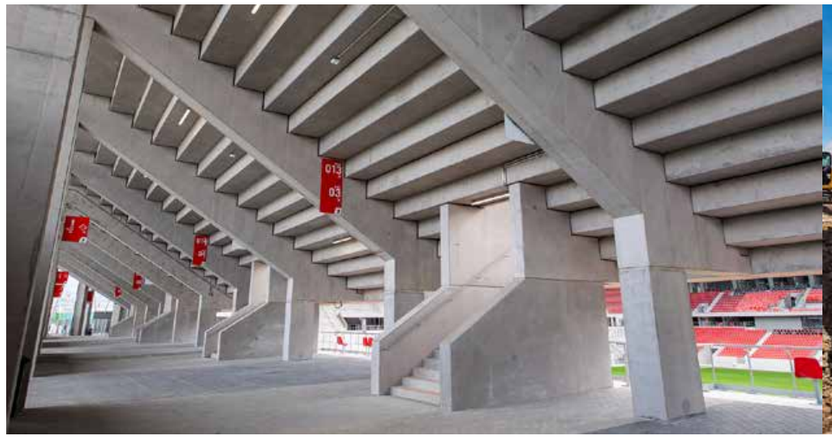
Imagine over thirty thousand spectators at a football game jumping up and down in unison. The structure they are jumping on will be subjected to dynamic loads and vibration in the foundation connections. Additionally, the designing team had to consider that Freiburg is situated in an seismic zone 2.

For demanding projects like this, experts are needed. HPP have extensive experience in the construction of sports facilities, and so have Krebs + Kiefer, who were responsible for the overall structural design and fire protection planning. Their expertise was complemented by Knippers Helbig for steel construction structural design and planning.

In Germany, column connections for seismic loading can be designed according to Eurocodes 2 to 7 in most cases for all seismic zones (0 to 3) in structures of significance category I to III with no more than 6 full floors. This includes precast connections – if necessary in combination with national approvals for the connecting components and, if required, with additional structural provisions according to Annex A of Eurocode 8.

The structural designers chose Peikko's efficient bolted connections for all the precast concrete columns in the arena. The column connections, consisting of standard HPKM® Column Shoes and HPM® Anchor Bolts, serve as cantilever support in the assembly state and as bracing for normal forces in the final state.

Imagine over 30,000 spectators at a football game jumping up and down in unison. The structure is subjected to dynamic loads and vibration in the foundation connections.



Using bolted connections for precast, you can erect the structure of a sports arena within 12 months.

CONSTRUCTION

The arena has a rectangular layout with spectator's stands on all sides, and is wheelchair-accessible. Additionally, it houses the administration of the club in offices on 3 levels, a fan shop, the club museum and utility areas for players. A 24,000 m^2 (29,000 sq yd) cantilevered steel roof structure covers the whole outer layout.

The roof structure was designed by Knippers Helbig as a steel framework construction cantilevering almost 44 m (140 ft) from the outer wall. Where the roof structure rests on the wall or columns, Peikko's galvanized anchor bolts were cast into the upper side for fastening the steel construction. The lattice trusses of the roof are fixed by diagonal outer steel columns that transfer the tensile forces into the fondations. They also make up the arena's unique and characteristic zigzag façade.

"Using bolted connections for precast, you can erect the structure of a sports arena within 12 months," explains **Thorsten Heskamp**, Customer engineer at Peikko Germany. In this case, the construction phase took longer. Construction Company Köster started building the new arena in November 2018. Köster has already built a number of sports arenas using Peikko's products. Due to the COVID-19 pandemic, the building was completed only by the end of 2020, and that the opening was postponed to October 2021, but in the end SC Freiburg is content to finally move in to their new home and start writing a new chapter of their history.

SC FREIBURG'S HISTORY CONTINUES IN THE NEW STADIUM

The friendly opening game against FC St. Pauli with opening ceremony took place on October 7, 2021, in front of 15,000 spectators. On October 16, the first competitive game ended in a draw with RB Leipzig, last season's runners-up in the league. Due to COVID-19 situation, only 20,000 spectators were at the game. **Christian Streich**, the Manager of Bundesliga club SC Freiburg, thinks it is unlikely that the team will need time to settle into their new surroundings at the Europa-Park Stadion. Asked about his experiences in the new arena, he states: "It was great, and when you imagine that there could be 15,000 more, hopefully in the near future, then of course it's fantastic. It will be incredibly loud and emotional."

PROJECT FACTS

- Investor: Stadion Freiburg Objektträger GmbH & Co. KG (SFG)
- Architecture: HPP architects
- Structural Design: Krebs + Kiefer
- Steel Construction: Knippers Helbig
- Checking Engineer: Schlaich Bergermann Partner
- Precaster: SBL
- Construction company: Köster GmbH
- Peikko Products: Rebar Couplers, Bolted Connections (Anchor Bolts, Column Shoes, Beam Shoes)
- Construction: Precast
- Completion: 2020

The new sports hall will stand on bolts in Romania

While the oldest traces of human settlement in Pitesti are from the Paleolithic era, the multifunctional arena is bound to be among the newest.

Located in the seismically active Southern Romania, the new sports hall will have a capacity of about 5,000 spectators.

"It is designed to host sporting events such as handball, volleyball and basketball as well as non-sporting events," says **Laurentiu Dumitrescu,** Sales Manager at Peikko Romania.

PRECAST IN A LAND OF CAST-IN-SITU

With the seismic action in the region, the recommended solution for concrete structures is cast-in-situ. But for the Pitesti project the selected building method was precast.

"We went for precast concrete solution, mainly because of the limited time for execution that was imposed for this particular project," says **Karoly Balint**, the Head of Structural Design at Plan 31 design office.

According to him, precast is a great alternative even in areas with intense seismicity.

"Given the seismic hazard of the area, modern design codes require high ductility structures. In this way, we allow the development of plastic hinges that help dissipate the seismic forces. In view of the fact that the sports hall structure is designed using precast concrete elements, it becomes imperative to design the connections in such a way that they do not interfere with the critical areas where plastic hinges must develop," Balint states.

SPEEDY COMPONENT DELIVERY FOR SPEEDY PRODUCTION

Having been using Peikko solutions since 2009, the precaster Con-A Productions has had a good customer experience.

"It's a fair relationship, Peikko understands our requirements and the market well," says **Lucian Topor**, Director.

And with the production in full swing, the lead time for the connection components is short.

"If the designer draws the element today, we often need to produce it tomorrow. Peikko don't usually have much time to deliver the pieces we need," Topor points out.

THE SIMPLEST AND MOST EFFICIENT SOLUTION

The mutual history of Plan 31 design office and Peikko dates from 2002.

"We get the information and support we need every time. Using Peikko has been easy with comprehensive product information and easy to use software tools," Balint states.

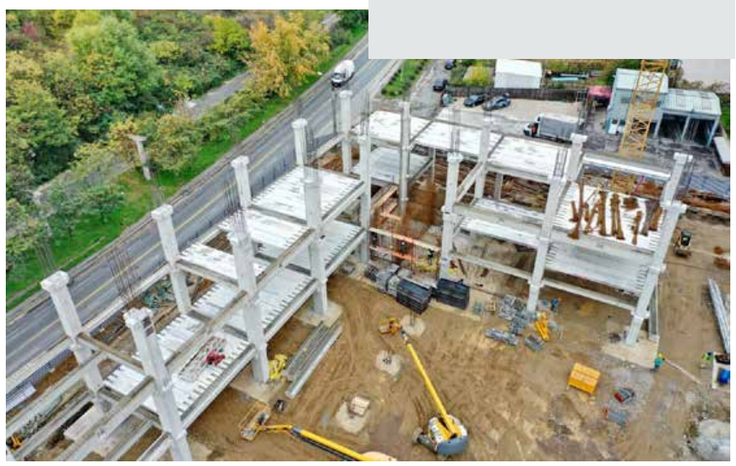
Colleagues often ask about his experiences of using Peikko solutions.

"I always say they get things done. But of course, you must think beforehand of where you are going to place the connection and about its concept."

The Peikko delivery consisted of HPM® Rebar Anchor Bolts, HPKM® Column Shoes and MODIX® Rebar Couplers.

"With heavy elements, Peikko bolted connections were the easiest and most efficient solution for this project," Balint concludes.

> **With heavy elements, Peikko bolted connections were the easiest and most efficient solution for this project.**



PROJECT FACTS

- **Size: 5,000 seats and 6,300 m² (7,500 sq yd)**
- **Floors: 2 underground levels and 3 stories above ground**
- **Developer: National Investment Company – CNI**
- **Construction company: Con-A**
- **Architect: Trs Arhdesign**
- **Precaster: Con-A Productions**
- **Structural designer: Plan 31 design Office**
- **Delivery year: 2021**
- **Completion year: 2022**

Deepen your know-how – read a White Paper

We asked the authors why you should

HOLLOW CORE SLABS SUPPORTED ON DELTABEAM® – POSITION OF SUPPORT REACTION FORCES

WHY WOULD YOU WANT TO READ THIS PAPER?

For fast and economical solutions, prefabricated structural elements are applied in many projects.

Existing building design codes have not covered the detailing of the load transfer from slab elements to slim floor beams like DELTABEAM® so far – especially in case of a fire incident.

The paper provides you with a safe and reliable design approach for the load transfer from hollow core slab elements to DELTABEAM®.

WHAT'S THE KEY TAKEAWAY?

The paper provides an easy-to-apply common design approach for the load transfer from hollow core slabs to DELTABEAM® slim floor beams in different design stages, including fire design. It promotes good communication and common understanding of the design requirements for all building engineers involved.

WHO WOULD BENEFIT THE MOST OF THE PAPER?

Structural engineers and slab designers will benefit from the design guidance.

But also contractors and owners of the building will benefit from increased safety resulting from better communication and common understanding of the interaction of these building products.

Read the White Paper from peikko.com/whitepapers:

ABOUT THE AUTHOR

Oliver Beckmann studied structural engineering in Northern Germany. After some years in bridge design and foundation piling, he joined Peikko Germany for project engineering for composite structures.

During the past years, his job focus has changed towards product development for composite structural products and implementation of national technical approvals for the D-A-CH region.

> **I am constantly looking for improvement potential, for optimizing workflows and technical solutions. I like to work on a motivated team and to listen to other people's needs in their daily work to tackle open issues and practical solutions. – Oliver**

DELTABEAM® USE IN SEISMIC AREAS – DESIGN RECOMMENDATIONS AND CASE STUDIES

WHY WOULD YOU WANT TO READ THIS PAPER?

The building configuration determines the way the seismic forces are distributed and resisted by the structure.

Seismic resisting systems need to be clearly identified within the structure at the early stage of the design so that a satisfactory overall performance can be achieved.

An effective and economical way is to design combined structures in which the seismic resistance is concentrated into fewer elements and the rest of the structure carries only gravity loads while ensuring the global stability of the building.

WHAT'S THE KEY TAKEAWAY?

The DELTABEAM® works perfectly in gravity load resisting systems as a slim-floor composite beam. This brings benefits in seismic applications.

The floor height reduction reduces the mass of the floors and the inertia forces the structure will have to resist during an earthquake.

The lower building height with the same number of stories helps to control the lateral displacement. This restricts the deformation demand on structural elements under horizontal seismic forces and prevents or limits possible damage.

WHO WOULD BENEFIT THE MOST OF THE PAPER?

A designer that wants to know more about seismic design issues and is interested in finding effective solutions.

The paper provides numerous design examples of projects where DELTABEAM® has been successfully used in seismic areas.

Read the White Paper from peikko.com/whitepapers:

ABOUT THE AUTHOR

Elena Camnasio is a building engineer who found structural engineering to be her passion. Her world is a pursuit of equilibrium between forces and resistances!

She joined Peikko after getting a PhD in structural and seismic engineering.

> **What makes my work interesting is that tasks are never the same. There is always something new to look for and new questions to be answered. This might be extremely challenging but also motivating. And when you are able to find a solution to a customer's needs, that is really rewarding! – Elena**

BOLTED CONNECTIONS FOR PRECAST STRUCTURES IN SEISMIC AREAS – PEIKKO SOLUTIONS AND DESIGN EXAMPLES

Read the White Paper from peikko.com/whitepapers:

WHY WOULD YOU WANT TO READ THIS PAPER?

Seismic activity is a global risk. To save human lives, the current structural design requirements aim to prevent the buildings from collapsing.

Learn about real life project examples where high seismic demand has been met with state-of-the-art use of bolted connections technology.

If you are doubtful about the safety of precast structures in seismic areas – read the paper. The reason for past failures has been design deficiencies and poor detailing.

WHAT'S THE KEY TAKEAWAY?

A precast structure behaves well under seismic loading if the connections between the precast elements, such as beams, columns and foundations behave well.

The good performance of the connections is measured in terms of sufficient strength to carry the seismic loads and adequate deformation capacity to accommodate the displacement of the structure.

Peikko offers tested and reliable products and solutions and can also support you so that you can handle the challenging design situations better.

WHO WOULD BENEFIT THE MOST OF THE PAPER?

A designer facing the challenges of seismic design in his everyday work.

But it would be beneficial for the precast industry and investors in general as precast structures could be used even more efficiently and safely.

ABOUT THE AUTHORS

Cem Özer, the Managing Director of Peikko Turkey, is a California Licensed Professional Engineer with over 28 years of professional experience. He has extensive experience in structural design and seismic evaluation of medium to high rise structures in high-risk seismic zones.

The whitepaper was co-authored by **Elena Camnasio**.

> **I find myself lucky to be working in an environment where every project is a new challenge. The challenge to deal with seismic design and also present solutions that utilize state-of-the-art technology and engineering approach that is always awarded by seeing the end products in the field. – Cem**

HEADED ANCHORS – FAST, SAFE, AND EFFICIENT ANCHORAGE TO CONCRETE

Read the White Paper from peikko.com/whitepapers:

WHY WOULD YOU WANT TO READ THIS PAPER?

It will get you up to speed with our new products. The paper provides you with practical tips on what applications they can be used for on site.

WHAT'S THE KEY TAKEAWAY?

Headed anchors offer several benefits when compared to conventional end anchorages such as bends and hooks: fast and simple installation, shorter anchorage, less congestion of reinforcement, superior quality guaranteed by factory production control.

WHO WOULD BENEFIT THE MOST OF THE PAPER?

Designers looking for a versatile anchorage of steel into concrete. Construction companies seeking easier installation of anchoring.

> **I have an internal need to understand how things work and behave. This drives me to increase my knowledge about structures and transfer it to reliable products or solutions for our customers. – Jakub**

ABOUT THE AUTHORS

Jakub Mecar has a Master's degree in civil engineering from Slovak university of Technology in Bratislava. He has worked in the Peikko R&D department for the last 8 years.

Martina Cesneková has a Master's degree in civil engineering from University of Zilina in Slovakia. She has been working for Peikko R&D for 3 years.

Company news in brief

50 new professionals to Peikko's Sales and Engineering

Peikko recruits 50 new talents for sales and engineering positions by the end of 2021. New employees will be located in over 20 countries: Australia, Belgium, China, Czech Republic, Denmark, Estonia, Finland, France, Germany, Italy, Korea, Latvia, Malaysia, the Netherlands, Poland, Romania, Russia, Singapore, Slovakia, Spain, Switzerland, Turkey, and the United Kingdom.

The construction market is expected to grow after COVID-19, and we at Peikko have a unique offering to meet the needs of our new and existing customers. Peikko's revenue has grown every single year in the past 11 years, and we want to accelerate this growth during 2022-2023.

Peikko extended its cooperation with the University of Žilina in Slovakia

Peikko Group has signed a Memorandum of Understanding with the University of Žilina, UNIZA, in Slovakia at the end of August 2021. The purpose is to significantly expand the cooperation between Peikko and UNIZA's Faculty of Civil Engineering over the coming years.

Peikko and UNIZA are aiming to strengthen their cooperation in the field of research, a cooperation that began in 2010. In addition, the parties are aiming to work together to find research topics for master's thesis and Ph.D. work for students of UNIZA, as well as to facilitate internship opportunities within Peikko. The cooperation agreement also includes other activities, such as lectures and building site visits.

UNIVERSITY OF ŽILINA
Faculty of Civil Engineering

Peikko starts manufacturing activities in the United Kingdom

Peikko Group's team in the United Kingdom will start the first steps of manufacturing in a newly established premises in the town of Newton Aycliffe, some 50 kilometers (30 mi) south of Newcastle. Peikko has had its own Sales and Engineering team in the same area since 2006.

The premises comprise a production area of some 3,000 m² (3,500 sq yd) and a large yard area for storing products.

The first products to be manufactured are related to precast connections, such as HPKM® column shoes and HPM® anchor bolts. Once the operations are stabilized, the intent is to expand the product offering and scale of operations rapidly in the years to come. It is estimated that the manufacturing will be started during Q1-Q2/2022 with a team of 10-15 employees.

Peikko signed an agreement with the City of Lahti, Finland, to promote low carbon construction

Peikko Group has signed an agreement with the City of Lahti regarding cooperation with Carbon Neutral Construction Development Center last spring. The center aims to find new ways and technical solutions to reduce the carbon footprint of construction and enable the related pilot projects to take place in Lahti.

As part of this cooperation, Peikko will continue to develop its DELTABEAM® Green product offering. Peikko's goal is to manufacture at least half of the Finnish DELTABEAM® production as low carbon products and thus, decrease the amount of emissions by 25% by 2025. In addition, the parties will be the main organizers of the Construction Goes Circular conference, to be held in Lahti in fall 2022.

LAHTI Winner 2021
EUROPEAN GREEN CAPITAL
An initiative of the European Commission

Peikko Designer® DELTABEAM SELECT – a free online dimensioning tool for easy and fast slim floor structure predesign. Just enter the values to fit the structures within the architecture and carry on with your 3D model.

It's both fast and accurate. And what's best, it's always up to date. Note that while you can save and print your plans, the final beam design and dimensioning is done by Peikko.

www.peikkodesigner.com/deltabeamselect

peikko®