PERI UP and VARIOKIT

The Mega Scaffolding Kit for sophisticated scaffolding solutions

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Important notes

All current regulations and guidelines applicable in countries where our products are used must be observed.

The photos shown in this brochure feature construction sites in progress. For this reason, safety and anchor details in particular cannot always be considered conclusive or final. These are subject to the risk assessment carried out by the contractor.

In addition, the computer graphics used are to be regarded as system representations. To facilitate understanding, these and the detailed illustrations shown have been partially reduced to certain aspects. The safety installations that are not shown in these detailed descriptions must nevertheless be available. The systems or items shown might not be available in every country.

Safety instructions and load specifications are to be strictly observed at all times. Separate structural calculations are required for any deviations from the standard design data.

The information contained herein is subject to technical changes in the interests of progress. Errors and typographical mistakes reserved.

The interplay between PERI UP and VARIOKIT

The Mega Scaffolding Kit for sophisticated scaffolding solutions

When scaffolding church towers, bridge structures and industrial plants, a combination of shoring, working and safety scaffolding is often required. While shoring is used to transfer surface or point loads, working and safety scaffolds as well as access points form the basis for safe work operations at height. When these different scaffolding functions are combined, the scaffolding company can make optimum use of the benefits of the compatible VARIOKIT and PERI UP modular systems.

Fully integrable modular systems
The scaffolding work in the above-mentioned examples is usually very demanding due to the complex geometry of the structure, confined spaces and restricted access routes. Suspended, cantilever or bracket scaffolds in particular are more planning-intensive and more complex to assemble than conventional standing scaffolds. As such, the combinability of the two modular systems PERI UP and VARIOKIT is particularly beneficial in terms of simplifying the assembly work considerably.

Two modular systems combined with ease
Thanks to the logical metric construction and connection grid arrangement of 12.5 cm, 25 cm and 50 cm, the two systems combined can be adapted with almost no restrictions to any building geometry or required load transfer, no matter how complex.

As such, both the hole matrix of the climbing rails and steel walers from the VARIOKIT Engineering Construction Kit as well as the components from the PERI UP Scaffolding Kit consistently adhere to the octametric dimensional order for building construction stipulated in DIN 4172.

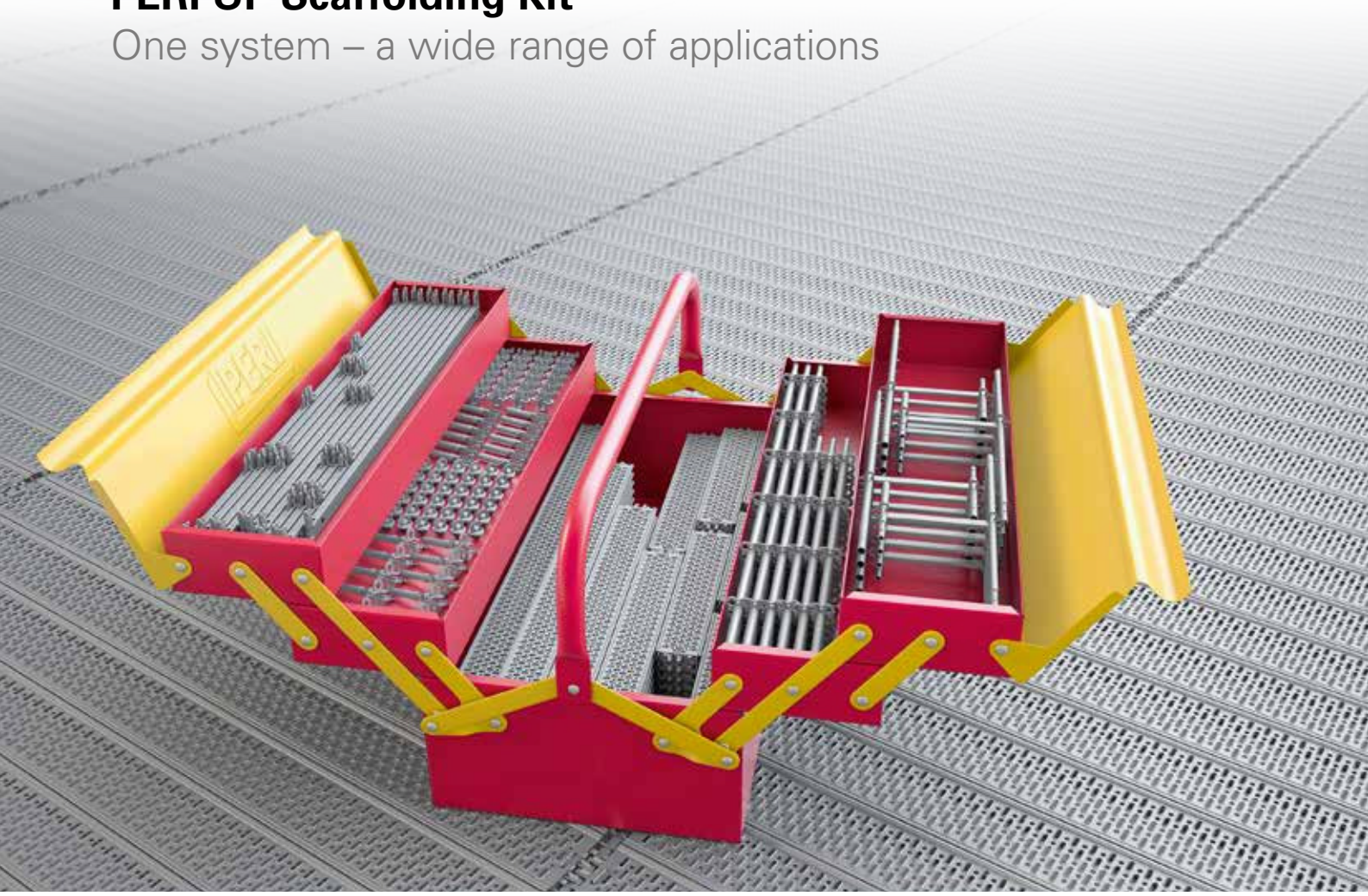
Despite their low number of core components, both modular systems enable a wide range of assembly and design variants and offer numerous advantages in application. Their consistent assembly logic involving only a few standardised fasteners also delivers valuable advantages in terms of speed and safety. The staircase solutions of the PERI UP Scaffolding Kit are a prime example in terms of safety. They can be installed quickly and offer a high level of system-integrated safety due to the self-securing locking technology. Assembly is carried out in just a few steps using lightweight components and is virtually coupling-free. Closed deck surfaces, equal step heights and level landing platforms prevent tripping hazards and also ensure a high level of safety when working at height.

From planning through to execution
In most cases, the decision as to which project-related planning and execution services are to be carried out by the scaffolding company itself or outsourced, depends on the company's size and staffing levels. PERI offers its customers both options. For example, a team of experts can assist the client with all phases of a construction project, regardless of its complexity – from costing, planning and work preparation to material logistics, execution and project completion.

But the other approach can be taken at any time, with PERI providing support in developing the company's own personnel and organisational strengths. PERI can accommodate this comprehensively with a diverse programme of training courses, information media and software tools for 3D CAD planning, not to mention dimensioning and project management supplemented by open component libraries for BIM applications. This results in a holistic solution for the personal requirements of each individual customer.

PERI UP Scaffolding Kit

One system – a wide range of applications



Would you prefer a frame scaffold or a modular scaffold? Scaffolding companies are faced with this fundamental question time and time again. If you opt for the PERI UP Scaffolding Kit, however, you do not have to weigh up the pros and cons. After all, this system combines the advantages of both types of scaffolding in one integral modular system. The PERI UP system components are compatible with each other and can be flexibly combined. This means that facade, industrial and engineering scaffold erectors can handle almost all applications with just one scaffolding system.

In practical terms this means that in a new construction or redevelopment project, the PERI UP Scaffolding Kit can connect the frame version of a facade scaffold seamlessly to the vertical variant of a staircase, for example. Therefore, thanks to this versatile system, the various scaffolding solutions can be combined with each other directly.

Integrated scaffolding nodes provide greater versatility

The trick behind this new generation of scaffolding systems is the integrated scaffolding nodes. They are found on all central vertical components, both on frames and verticals, where they are firmly welded to the component. The node area offers up to 16 connections for parts such as ledgers, diagonals and console brackets – maximum versatility, especially for complex scaffolding requirements.

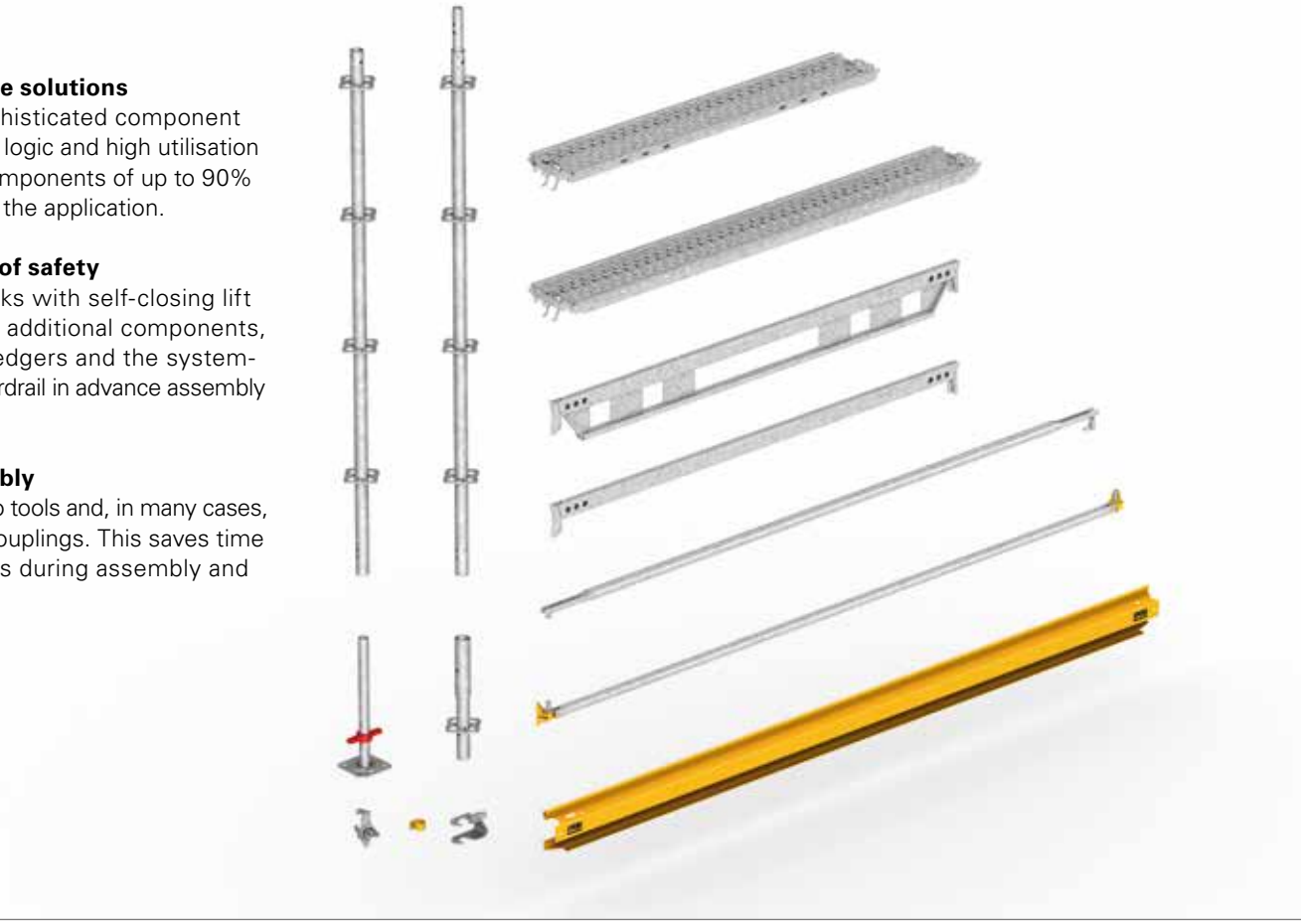
Quick, safe and easy to install

The integrated scaffolding nodes save scaffolders the time-consuming task of fitting couplings in many places during assembly. But this is not the only thing that simplifies handling – the PERI Scaffolding Kit has other features that make work easier, increase safety on the construction site and can speed up assembly and disassembly. For example, fixing the scaffold ledgers to the nodes is extremely simple: the Gravity Lock from PERI ensures that the wedges of the ledger only fall into the receptacle of the scaffolding node due to their dead weight, and close the ledger. Only one jarring blow is then required to secure it in place.

Cost-effective solutions
thanks to sophisticated component and assembly logic and high utilisation of the core components of up to 90% depending on the application.

High degree of safety
thanks to decks with self-closing lift locks without additional components, self-closing ledgers and the system-integrated guardrail in advance assembly system.

Quick assembly
with next to no tools and, in many cases, without any couplings. This saves time and cuts costs during assembly and disassembly.



The "Locking Deck" lift lock device integrated as standard in all scaffold decks, access decks and entry platforms also makes handling easy, as additional securing from above is completely unnecessary.

The Locking Deck causes the decks to engage under the ledger once they have dropped and are immediately secured. They can even be removed quickly from below at a later stage if, for example, individual bays need to be opened.

Lightweight components, sophisticated system logic
Generally speaking, the components of the PERI UP Scaffolding Kit weigh only a few kilograms. The sophisticated component logic includes a number of compatible core components that can be used in all scaffolding solutions as well as additional solution-related components. To this day, the scaffolding kit still has fewer than 500 system components. The metric grid arrangement also makes it easy to change the decking direction without creating gaps or trip hazards.

Offering an extensive portfolio to all scaffolding companies
With the scaffolding kit, PERI has developed a system that enables scaffolding companies to easily expand their portfolios. In this way, scaffolding companies can impress their customers with customised solutions from a single source. That applies equally to facade, industrial and engineering scaffold erectors.

VARIOKIT Engineering Construction Kit

Solutions for a wide range of geometries and loads

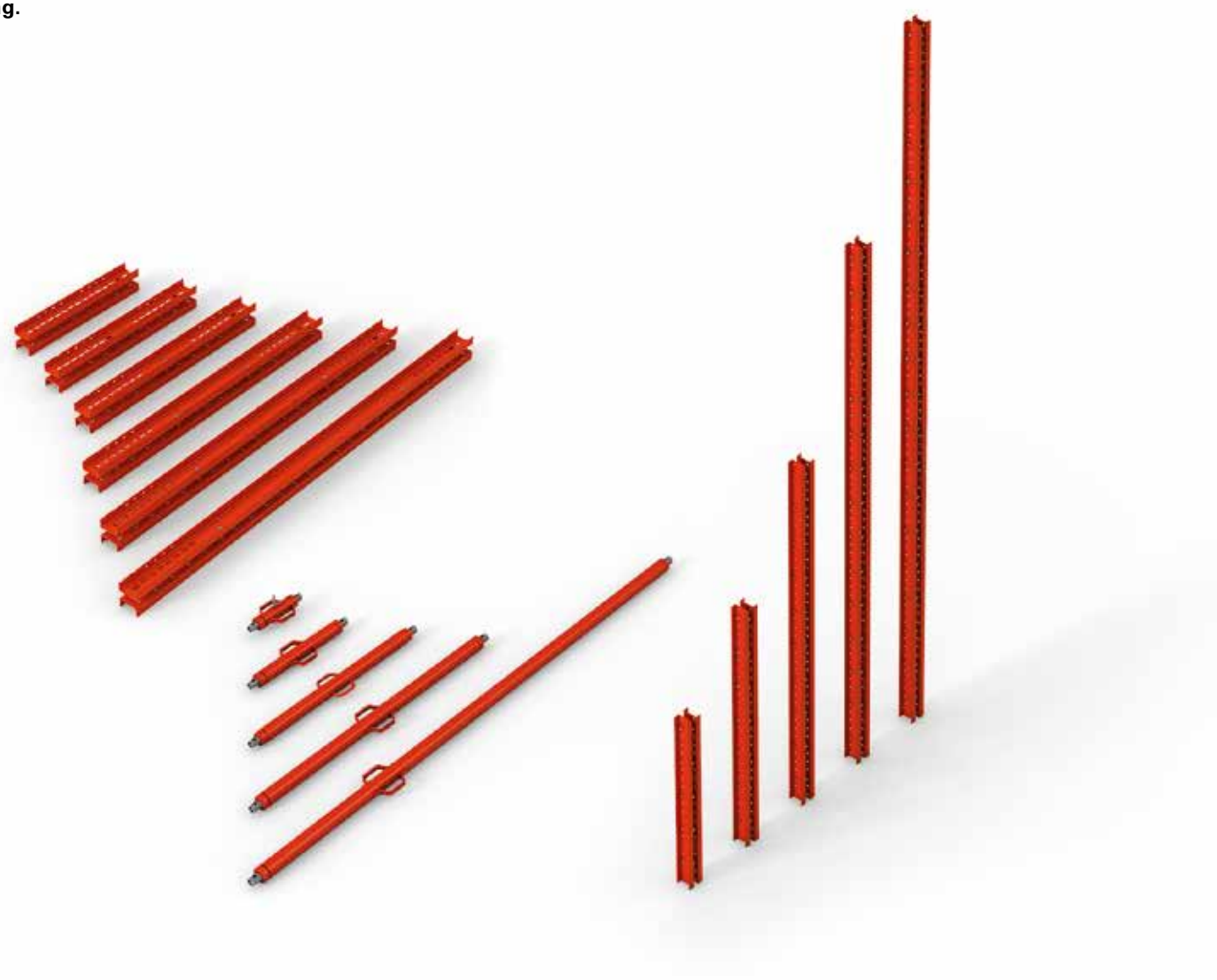
The VARIOKIT Engineering Construction Kit consists of standardised components for various civil engineering applications. The construction kit includes versatile core and supplementary system components with special functions. Due to the straightforward combination possibilities offered by the PERI UP Scaffolding Kit, tailor-made, cost-effective solutions can be created for building, bridge and tunnel construction as well as for transport and plant engineering.

VARIOKIT solutions are typically comprised of 95% rentable core and system components. Only a few special components are required to meet specific project requirements. In general, most solutions can be implemented with just 3 core components:

- **Steel walers**
- **Climbing rails**
- **Heavy-duty spindles**

– and their respective fasteners. This saves time during assembly and cuts costs.

The different lengths of the 3 core components allow for maximum flexibility and variability when it comes to scaffolding complex geometries and bearing high loads.



Cost-effective solutions
through rentable standard components and structurally optimised planning.

Countless possibilities
for bridge, tunnel and civil engineering solutions with core and functional system components, and the combinability with PERI UP.

Minimised assembly time
and fast work operations due to fitting pin connections and simple adaptation with spindles.

In addition to the required materials, PERI also provides extensive expertise as well as comprehensive planning services from a single source. PERI solutions take into account construction and assembly processes as well as the utmost functionality for construction work. The focus of the planning is to ensure that the rentable core and system components are utilised as much as possible to provide the customer with a particularly cost-effective solution. Therefore, technically demanding trusses and load-bearing systems can be executed cost-effectively with the VARIOKIT core components.

In order to minimise on-site assembly times and maintain tight construction schedules, PERI also supplies – if required – pre-assembled units to the construction site.

VARIOKIT is extremely cost-effective, especially for short utilisation times, thanks to the rentable components and assembly advantages.

VARIOKIT and PERI UP are connected seamlessly using the octametric grid arrangement of 12.5 cm for VARIOKIT and the 25 cm grid arrangement of the PERI UP Scaffolding Kit, and with the aid of fitting pins, it is child's play.

PERI UP and VARIOKIT

Simple and coordinated connections

The PERI UP Scaffolding Kit and the VARIOKIT Engineering Construction Kit are easy to connect due to the metric grid arrangement of both systems. Fitting pins are used for this, so the connection is also coupling-free. What's more, given the connecting elements that are matched to the systems, it is not necessary to weld the steel walers together.

The basic grid arrangement or hole spacing for VARIOKIT is 12.5 cm and the deck and ledger grid arrangement in the PERI UP system is 25 or 50 cm. Therefore, both systems are designed according to the octrametric dimensional order specified in DIN 4172 and can be connected to each other in no time at all using fitting pins. This saves time during assembly and means that everything is optimally coordinated from a structural point of view because the grid arrangement is the same. Generally speaking, the fasteners of both systems are standardised components.

Versatile church scaffolding: Systematic adjustments

St. Stephen's Church, Bamberg

When scaffolding St. Stephen's Church in Bamberg, the consistent use of system components and the compatibility of the PERI UP and VARIOKIT modular systems ensured time and cost savings as well as a high level of safety throughout.

Bamberg, with its historic old town is not only a UNESCO World Heritage Site, the Bavarian university town on the Regnitz River is also considered a church town with its countless church buildings.

One of the architectural monuments is the church of St. Stephan, which was consecrated as a collegiate church by Pope Benedict VIII in 1020 and is now the main Protestant church in Bamberg. The oldest and most prominent part of the building is the 58-m-high tower.

Versatile combined solution

Extensive restoration work on the church tower, the west gable and the roof structure meant that St. Stephen's Church had to be partially scaffolded. The appointed scaffolding contractor, Karl GmbH from Viereth-Trunstadt, combined components from the PERI UP Scaffolding Kit with the VARIOKIT Engineering Construction Kit to carry out the complex scaffolding work.

On the one hand, with PERI UP, it was possible to adapt each deck level extremely precisely to the church facade with its numerous projections and recesses without time-consuming tube coupling work. On the other hand, with the aid of the VARIOKIT core components, it was possible to create a bridging construction over what is known as the ice pit. This meant that the main access road leading directly past the church to the upper Stephansberg could be kept clear for traffic without any danger.

Scaffolding planning and structural analysis
The PERI UP scaffolding was designed for Load Class 4. In close cooperation with the project team from Karl, engineers from PERI created a 3D scaffold design for the complex church geometry. On this basis, it was possible to precisely determine the scaffolding materials required and optimise the subsequent assembly work. The scope of planning also included the implementation solution for the bridging construction using VARIOKIT and PERI UP together with verifiable statics.

Systematic working platforms and access points
The metric system grid arrangement of PERI UP provides an ideal basis for adapting to complicated building geometries. For the church scaffolding in Bamberg, tube coupling and woodwork were virtually unnecessary. The integrated deck lock also made it possible to design the working platforms as level, closed surfaces. According to site manager and master scaffolder Kevin Fleischmann from the company Karl GmbH, the ability to dispense with the otherwise necessary woodwork alone saved almost a week's work. With PERI UP, the integrated deck lock secures the decks as soon as they are installed without the need for additional components – another important time and safety advantage. This meant, for example, that the 58-m-high church tower could be scaffolded in full in 19 days by only 2 workers.

Both the ability to adapt PERI UP precisely to the geometry of the church and the level decking without trip hazards made the scaffold safe to use. In addition, integrated stairways with a width of 1.00 m provided convenient access to the scaffolding, which at the same time also provided an access point for rescuing injured people.

Working efficiently above while shopping in peace below

Working platform at the Würth office in Oberschleissheim

A working platform based on a customised system combination enabled conversion work to be carried out swiftly on the hall ceiling without interfering with sales activities in any way.

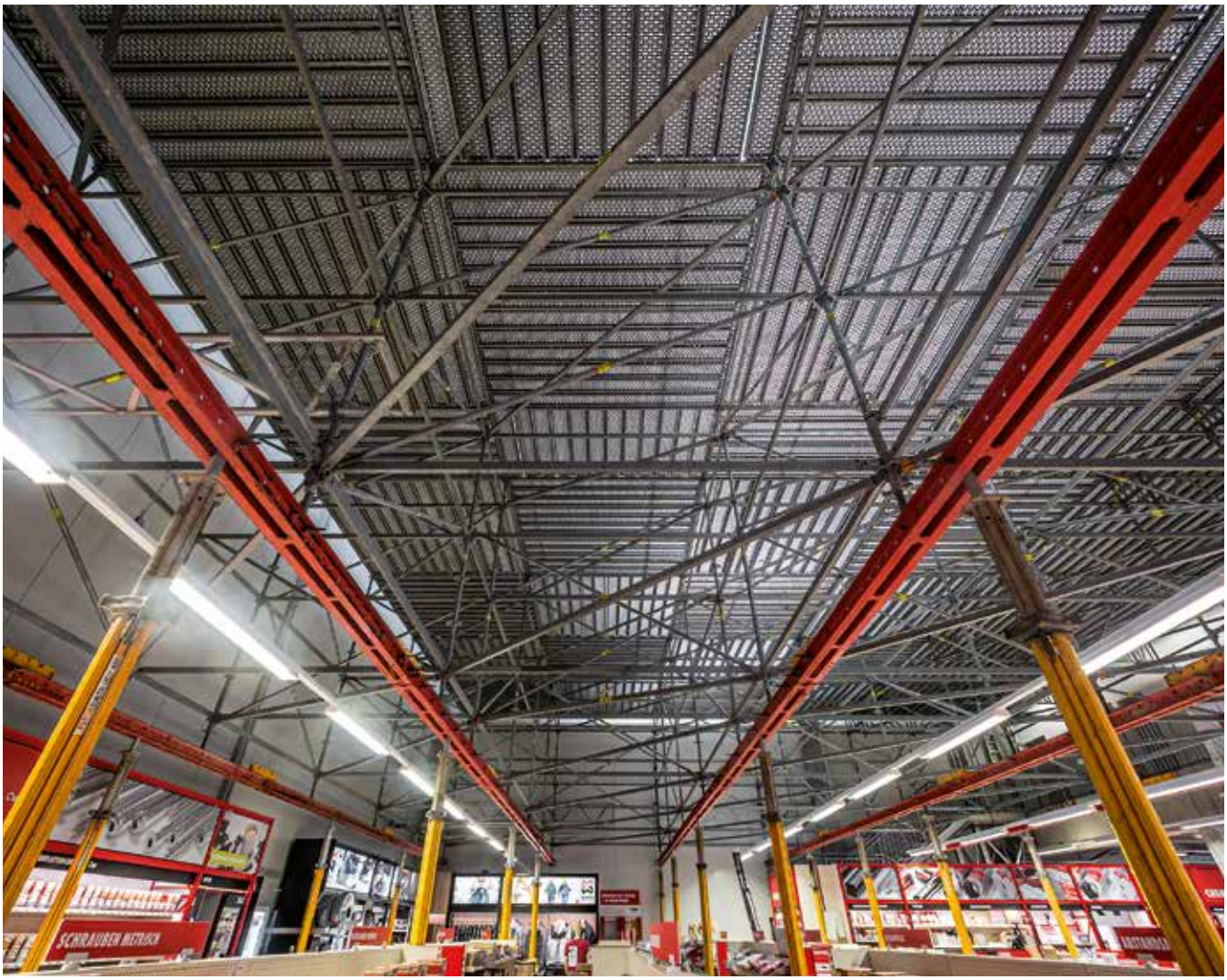
Adolf Würth GmbH & Co. KG supplies customers from the trades, construction and industry at over 500 sales branches throughout Germany and covers any bottlenecks in case of immediate need. The company's slogan is that the closest branch office is only a 20-minute drive away.

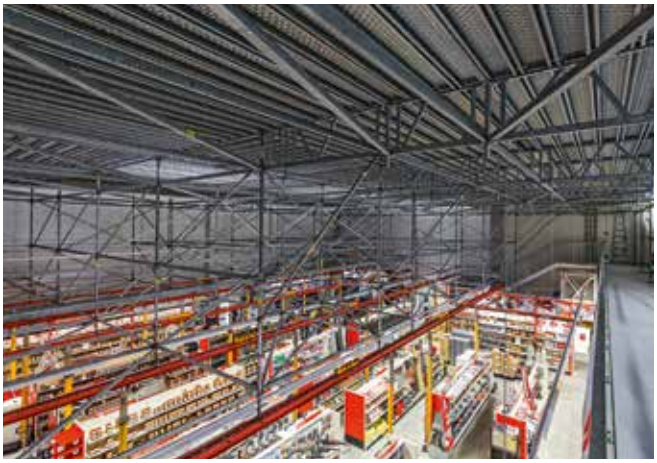
For this reason, the Würth sales branch in Oberschleissheim near Munich was to remain open for business even during the planned renovation measures in the summer of 2019, allowing customers to shop without any disruptions.

Tailor-made combined solution

For the electrical and sprinkler installation on the hall ceiling, Kerscher Gerüstbau GmbH, together with the PERI engineers from the Munich office, designed a customised scaffolding solution for a 400 m² working platform at a height of 6.65 m, which did not interfere with sales operations in any way.
Supported by a mere 22 load-bearing MULTIPROP Aluminium Slab Props, steel walers from the VARIOKIT Engineering Construction Kit at a height of 3.60 m were used for load distribution and as supports for the PERI UP Birdcage Scaffold positioned above in a 3.00 x 3.00 m system grid.

The benefit here was that the yellow MULTIPROP Props could be adapted in almost any way to accommodate the sales area in a 12.5 cm grid arrangement. This made it possible to keep all shelves and walkways clear.





Moreover, the MULTIPROP/VARIOKIT combination and PERI UP were not only structurally but also visually convincing. The airy, pleasant design created an appealing aesthetic with good lighting conditions. This meant that the construction measures were not perceived in a negative way. Quite the opposite, in fact. Customers from the building trade were visibly impressed by what is technically possible in scaffolding construction.

Installation time cut in half

The fact that the use of lightweight, easy-to-assemble system components resulted in fast assembly and disassembly times and therefore a far shorter construction schedule also ensured a high level of satisfaction. The entire 400 m² platform construction including substructure could be assembled and dismantled extremely quickly in a total of only 350 man hours. In the end, only three night shifts were required for the assembly process instead of the originally planned six – without any assistance from machinery.

System solutions and services

The transition to the gallery level on one side of the sales room was constructed by the Kerscher scaffolding team using the PERI UP System Formwork Girder. Its compact individual components are a maximum of 1.50 m long and therefore easy to handle – ideal for cramped working conditions. An additional, important component of PERI's comprehensive solution was the proof of stability. In this case, too, the use of standardised components and, in particular, the force-locking system connections had a positive effect and simplified the structural calculation. For example, the spatially designed PERI UP scaffold construction acted as the horizontal bracing level for the steel walers from the VARIOKIT Construction Kit.

Mobile system combination

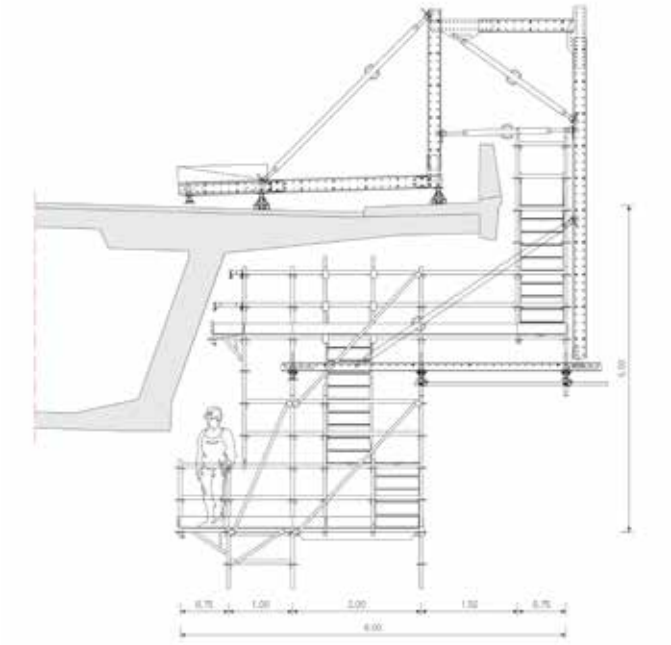
Hammecke A46 Motorway Viaduct, Bestwig, Germany

Two mobile PERI Suspended Scaffolds provided optimal access to the underside of a motorway bridge. This meant that all the work could be carried out over a total stretch of 1,300 m within the specified time window.

The 650-m-long Hammecke Viaduct was part of the A46 motorway extension between Bestwig and Nuttlar. The 5.6-km-long extension to the east provides improved accessibility to the Sauerland region. More than 2.5 km of this section passes over bridge structures. A total of 13 bridges were built for this purpose. The construction site team from Adam Hörnig GmbH used two mobile suspended scaffolds from PERI for subsequent reworking operations on the new bridge. This meant that first the south and then the north side of the bridge superstructure, i.e. a total of 1,300 m of cantilever arm length and the support areas, could be worked on within the specified time frame.

Site-compliant system combination
A decisive advantage of the PERI solution was the possibility to combine VARIOKIT and PERI UP. On this basis, PERI engineers together with the project managers from Adam Hörnig designed an optimised project-specific construction site solution. This was extremely cost-effective and available at short notice because all the components could be rented from the PERI rental park for the specific needs of the project.

The two suspended scaffolds could be quickly assembled on site by the company's own construction site personnel due to the use of standardised system components and connections. Moving from the south to the north side of the bridge was also very straightforward. The low total weight and the possibility of shifting the scaffolding units segment by segment sped up the transfer process and required only a small mobile crane.



Large cantilever – low weight
The suspended and up to 5 m cantilevered working platforms were designed in such a way that the complete underside of the bridge in the cantilevered area was accessible and could be worked on. An integrated stair tower ensured fast and convenient accessibility to the different working levels.

The PERI solution took into account the variable superstructure geometry. Accordingly, the suspended scaffold could be adjusted steplessly by means of spindles and modularly by means of bracket extensions. Despite the generously dimensioned working area, the 3-m-long scaffolding units each had a low weight: Including ballast, each unit weighed only 4 t, allowing it to be moved quickly and easily in the longitudinal direction using conventional construction equipment.

Bridge restoration using combinable systems

Heiligenborn Viaduct, Waldheim, Germany

When a historic viaduct is being restored, there are significant assembly advantages to combining scaffolding and engineering components from a single source. Using the PERI UP Scaffolding System together with core components from the VARIOKIT Engineering Construction Kit makes even extremely complex scaffolding solutions possible due to the fact it can be used in a versatile manner as a supporting structure as well as a standing and suspended scaffold.

180 m long, 40 m high and 167 years old – the historic Heiligenborn railway viaduct near Waldheim is an imposing structure. As such, the restoration work carried out under the auspices of Deutsche Bahn was commensurately complex. The masonry of the arches and the bridge piers made of natural stone and bricks underwent extensive repairs, and at the same time the track supporting structure and the drainage facilities were restored above.

Reciprocal scaffolding

Gloser Gerüstbau GmbH from Walzbachtal near Karlsruhe adapted the PERI UP scaffolding to accommodate the scheduled construction sequence perfectly. Starting from the load-bearing intermediate level with system girders from the VARIOKIT Engineering Construction Kit at the height of the upper bridge arches, reciprocal scaffolding was erected.

While shoring and working scaffolds were made available for the superstructure on the west side, standing and suspended scaffolds were used to safely execute the facade work on the east side. The scaffolds were then moved over to the opposing sections.

Combinable modular systems

The scaffolding work was particularly demanding due to the complex geometry of the structure and the spatial restrictions. In particular, the suspended scaffold design for the poorly accessible

sloped areas was more planning-intensive and more complex to assemble than conventional standing scaffolds. As such, the combinability of the two modular systems PERI UP and VARIOKIT was particularly beneficial in terms of simplifying the assembly work considerably. In addition, the Easy standards for facade scaffolding could be combined seamlessly with the core components of the PERI UP system.

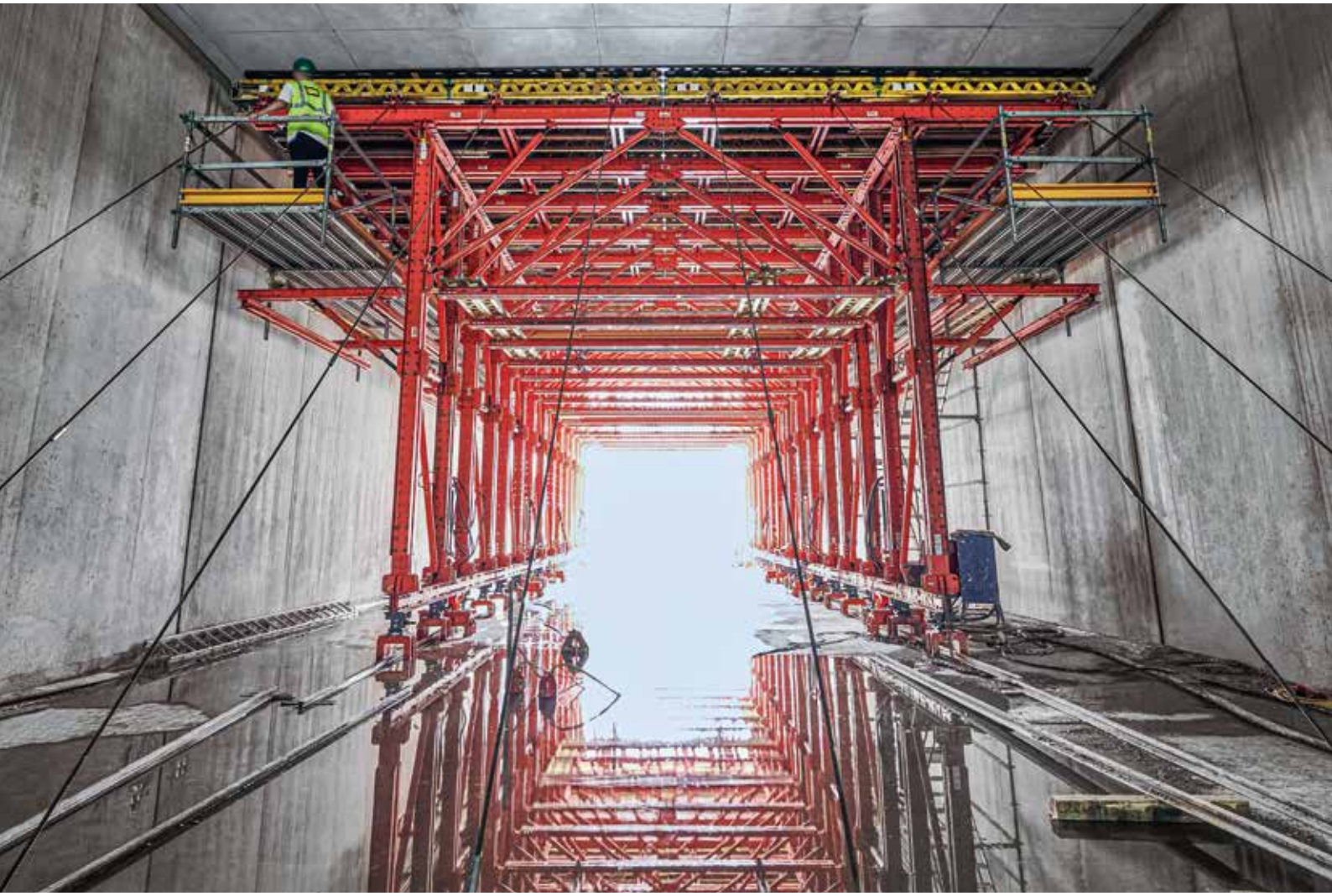
Both of the modular systems PERI UP and VARIOKIT cover a wide range of applications using only a few standardised system components and are based on a metric basic grid. Any adjustments to geometry and loads that are required are made in 12.5 cm or 25 cm increments. The connecting components are also standardised and ideally matched to each other. This simplifies both the planning and installation processes. For example, the load-bearing intermediate level in the area of the bridge arches was designed using steel walers, climbing rails and heavy-duty spindles – versatile core components of the VARIOKIT Engineering Construction Kit, which are also rentable. VARIOKIT core components were also used for the suspended base of the suspended scaffolds.

Integral scaffolding construction
The standing and suspended scaffolds for the facade work on the bridge piers as well as the integrated stair tower were largely assembled using the vertical variant of the facade scaffold from the PERI UP Scaffolding Kit. Above the VARIOKIT intermediate level, the PERI UP core components served as shoring and a working scaffold for the work carried out on the bridge superstructure. One major advantage of the integrally aligned PERI UP scaffolding technology: standards and horizontal ledgers can be combined seamlessly with the Easy standards and decks of the PERI UP Facade Scaffolding.

The Riesa-Chemnitz railway line has six large bridge structures on a stretch of only 7.5 km, straddling the tributary valleys of the Zschopau river. The section is also popularly known as the "bankruptcy mile", because the high construction costs resulted in financial hardship for the private railway company in 1848, which was subsequently nationalised. Today, these large bridges, which are over 150 years old and still largely in their original condition, also attract tourists to the region.

A role model in terms of punctuality

The Erding Circular Rail Link urban railway tunnel



On the Erding tunnel construction project, a partnership-based cooperation between construction companies, scaffolding companies and PERI ensured positive results despite the tight time frame and difficult construction environment.

Franz-Josef Strauss Airport in Erdinger Moos is playing an increasingly important role as an economic driver for Bavaria as well as a global transit point for travellers and goods. To keep up with the enormous growth, the decision was made to improve the rail connections to the airport across the state. The Erding Circular Rail Link is considered a decisive measure in this context and comprises an approximately 26-km-long new line, which is made up of three independent sections.

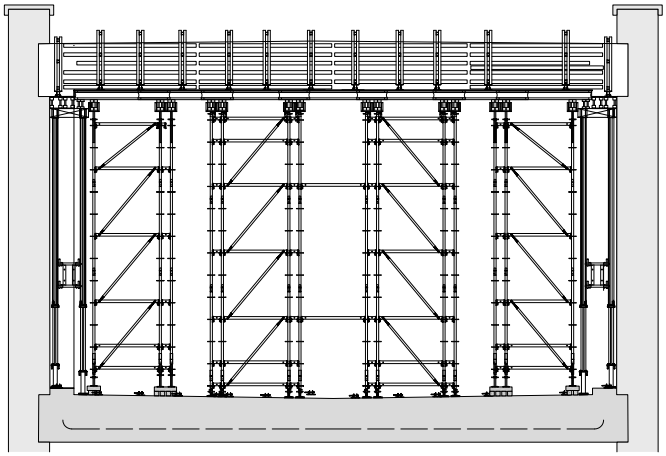
For example, a roughly 1.8-km-long underground extension is being built from the airport to Schwaigerloh in the direction of Erding. The new, twin-track urban railway connection runs directly under the airport complex. The tunnel was constructed below the airport complex using the cut-and-cover method, over the first 16 blocks. "The client only granted us a very narrow time window to construct the tunnel here in the security area of the airport complex, which made 24-hour construction operations necessary over a period of several months," explains Denis Ultsch, Project Manager of the Munich Infrastructure Engineering division at PORR GmbH & Co. KGaA.

The rectangular, 11-m-wide tunnel cross-section will be extended from the airport boundary to the east covering a distance of 1,555 m and supplemented with a 306-m-long ramp structure. The standard cross-section consists of a 1.15 m-thick base, 55-cm-thick side walls placed in front of diaphragm walls and the 1.10-m-thick cover – all of it in architectural concrete.
PORR had already involved PERI in the course of the tendering process and developed a special proposal to form and pour the cover of the first tunnel

block in the area under the airport with the support of shoring, due to time constraints. Instead of using the originally envisaged formwork carriage solution for the rest of the project, PORR opted to construct the first 16 blocks with stationary shoring. Five blocks had already been completed when master scaffolder René Schierstedt from Schäfer Gerüstbau GmbH joined the team: "To further optimise the construction process, the scaffolding materials available on site were increased to accommodate blocks 6 to 16, while the shoring in blocks 1 to 5 continued to serve as emergency support following the concreting work."

The shoring for the slab formwork consisted of several free-standing PERI UP individual towers which were interconnected at the head point by yoke and cross girders via the conventional slab formwork. Using the spindles on the shoring, a projection of up to 5 cm can be achieved, meaning that projection rails are not necessary. "Using shoring for the slab formwork in the airport area has saved us an enormous amount of time," says Denis Ultsch in summary. "The client even praised us for being a role model in terms of punctuality."

"Due to the spatial system of the shoring, relatively free-standing supporting structures can be formed without using horizontal brackets in advance," Schierstedt explains. "It was relatively simple for us to combine the PERI UP Scaffolding System and the VARIOKIT Engineering Construction Kit to construct the formwork carriages. We have both combinable and compatible systems in our own material stock. The decisive advantage for us is that the VARIOKIT modular system, similar to the PERI UP Scaffolding System, is based on a metric grid dimension and is relatively similar in terms of the assembly logic," emphasises Schierstedt. "Normally, shoring is built using large and heavy steel girders that are welded together. You don't have to go to all that trouble with VARIOKIT because you can assemble everything using universal connectors or cross connectors and then easily disassemble it again later – that's sustainable, saves resources and has health benefits," the master scaffolder adds.



Construction of Terminal 3

Frankfurt Airport, Frankfurt am Main

One of Europe's largest infrastructure projects is being built on the land of the former US military base to the south of Frankfurt Airport: With the construction of the third terminal, up to 19 million travellers should be able to arrive and depart from the three new gates each year.

A well-thought-out connection to the new terminal is just as important as the futuristic design of the terminal building with its state-of-the-art technology. Together with Max Bögl, PERI is playing a major role in the realisation of this infrastructure measure – in the construction of the drive-by platform, which will in future provide travellers and visitors with direct access to the departure level of Terminal 3.

The approximately 550-m-long and 27-m-wide drive-by platform will connect the two access and departure ramps to the terminal. At a height of about ten metres on 70 V-shaped supports and a total area of 15,300 m², cars and taxis will then be able to drive right up to the check-in hall.

The team led by project manager Harry Maucher built a complete, 3D customised formwork carriage using the VARIOKIT and PERI UP construction kits with a total weight of almost 500 tonnes. The complete formwork carriage can be lowered by 2.20 m for striking and repositioning via an integrated hydraulic system. Between the V-supports, the solution is made up of 6 individual carriages that can be separated for relocation and striking. Outside the V-supports there are 2 further carriage units that are 40 m in length and can be moved in one piece. For the process of transferring the 500 tonnes in longitudinal and transverse directions, a special hydraulic walking gear was constructed in the PERI Competence Centre Infrastructure, which can be transported manually, easily and quickly between

the individual carriage units. A particular challenge lay in the design of the oblique-angled and V-shaped beams of the drive-by platform. The beams had to be stripped and shuttered separately from the formwork carriage, and this had to be done in a confined area. This was realised by means of a folding mechanism and the MAXIMO structure because of the lower construction height compared to the girder formwork. The girder formwork was operated from a PERI UP platform, virtually in the belly of the formwork carriage. In order to fulfil all the occupational safety requirements, all access points, walkways and working platforms in the formwork carriage were constructed with PERI UP scaffolding materials.

The documentation of the formwork carriage was a key area of focus in this project. In addition to the verifiable structural calculation, which comprised over 1,500 pages, partly digital instructions for use and the first independent CE marking were created at PERI Sales Germany. Using QR codes in the instructions for use, the work steps can be viewed by the workers in short video sequences.

Innovative BIM-based scaffolding concept in industrial construction

New construction of an acetylene plant, BASF Ludwigshafen, Germany

A new, state-of-the-art acetylene plant has been built at BASF SE in Ludwigshafen. The basis for constructing the plant was an innovative, BIM-based scaffolding concept and the PERI UP Scaffolding System with great versatility for consistently safe working conditions.

It is not just the new plant that operates with the world's most modern technical facilities and processes. State-of-the-art planning and working methods were employed during construction of the plant – a basic prerequisite for adhering to the demanding construction schedule.

At peak times, up to 1,300 people were working at the construction site, which covered an area of around 55,000 m² – the equivalent of almost eight football pitches – and had an installation height of up to 90 m.

In order to install the plant technology efficiently and safely, which featured more than 400 machines and pieces of equipment along with a 90-km-long pipe system and electrical installations, the PERI UP Scaffolding System was used in the second construction phase. Almost daily, this created new working levels and access points for the upcoming construction and assembly work.

Forward-looking comprehensive BIM solution

The central project approach in industrial construction is based on a combination of BIM methodology for planning and execution as well as high standards for occupational safety. The innovative scaffolding concept developed together with promaintain forms the basis for a comprehensive overall solution for scaffolding construction management, 3D planning, coordination and execution in order to minimise planning time and costs over the long term. The cross-trade and forward-looking planning approach reduces time and cost-intensive conversion measures.

At the same time, the versatility of the PERI UP Scaffolding Kit in connection with the VARIOKIT core components ensures good adaptability and therefore a high level of working safety. The compatibility also offers advantages when it comes to project management. For example, with the VARIOKIT Engineering Construction Kit, you can produce a wide variety of supporting structures in a cost-effective manner. VARIOKIT and PERI UP are based on metric grid dimensions and are therefore compatible with each other.

In addition to 3D planning of the scaffolding system used, the focus was on topics such as planning coordination, automated collision checks, safety checklists and QR codes for object navigation. In addition, data relevant to the installation of the scaffolding was made available digitally to the construction site staff by means of a tablet solution.

Digital expertise
Digitalisation will fundamentally change the industry, opening up enormous opportunities for all stakeholders. PERI aims to play a leading role in the conception, development and ultimately the implementation of this industrial change with know-how and expertise and to create real digital added value for its customers. The range of digital applications extends from product-related apps for simple calculations for formwork and scaffolding systems through to the online myPERI customer portal which, as a comprehensive information platform, supports the overall execution of a project. In addition, various software solutions ensure that complex tasks and processes can be optimised in large-scale projects. When it comes to BIM, PERI has also been one of the leading companies in the industry for many years now and can already present a number of international project references that have been successfully developed with customers using BIM principles.

Slender scaffold construction saves time and money

DOMO Chemicals gas flare tower, Leuna Industrial Park

Images: Intering GmbH

Combined use of the PERI UP Scaffolding Kit and the core components of the VARIOKIT Engineering Construction Kit resulted in a cost-effective scaffolding solution for a 90-m-high gas flare tower. The slender construction, which was adapted to sit closely up against the building, saved on materials and personnel, and thus time and money.

The 90-m-high so-called torch is one of the landmarks of Leuna, an industrial location. The Leuna gas flare tower, a safety installation for escaping gas, is part of the production facility of DOMO Chemicals, which is a solution provider for the sustainable production of polyamides. These technical materials serve as intermediate products for the production of resins, engineering plastics, high-performance fibres, fertilisers and packaging films.

An adaptation that makes all the difference

In the course of maintenance measures, local company Intering GmbH was hired to carry out corrosion prevention and insulation work as well as the corresponding scaffolding work. It was possible to create safe work areas for all the refurbishment work being carried out with the aid of the PERI UP Scaffolding Kit. The geometric adaptation in line with the structure ensured that, on the one hand, there was unrestricted access to the steel structure and all pipelines. On the other hand, the sufficient spacing made it possible for all surfaces and components to be worked on as required without the need for time-consuming conversion work.

Tapering back the costs

The true highlight of the PERI UP solution was the fact that the scaffold construction was tapered from a height of 12 m, which was cost-effectively implemented using standardised steel walers, i.e. core components of the VARIOKIT Engineering Construction Kit.

This made it possible to have a narrower scaffolding structure for the remaining 80 m. The 3 kN/m² rating of all scaffolding levels resulted in high leg loads, which could be safely transferred and dissipated into the wider base scaffolding via the integrated girder level.

The tapering solution helped enormously in reducing the amount of materials required. Intering's scaffolding manager, Robert Matthiesen, who is the site manager responsible for the project, explained that material savings of around 40% were achieved, along with a significant reduction in assembly work. The scaffolding work was carried out at a far greater pace: After only 3 weeks of assembly, refurbishment work on the structure of the gas flare tower could begin – simply the best solution for the customer, Matthiesen explained in summary.

A systematic approach to work safety
The metric 25 cm system grid arrangement for PERI UP scaffolding components paves the way for virtually any adjustments to local conditions – without the need for time-consuming tinkering involving tubes and couplings. With the help of various system components, scaffolding bays and deck levels can be subdivided in almost any way, meaning that interference points can be redesigned with ease. The fact that the two modular systems PERI UP and VARIOKIT can be combined easily and almost seamlessly and that standardised connecting components are used, contributes significantly to the simplification of planning and assembly work.

The working areas were also designed to be free of tripping hazards so that the scaffolding could be used safely. This was an important aspect in terms of work safety as well as the progress and quality of the refurbishment, especially during the corrosion prevention work carried out on the Leuna gas flare tower, which had to be carried out under full protection.

The optimal System for every Project and every Requirement

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