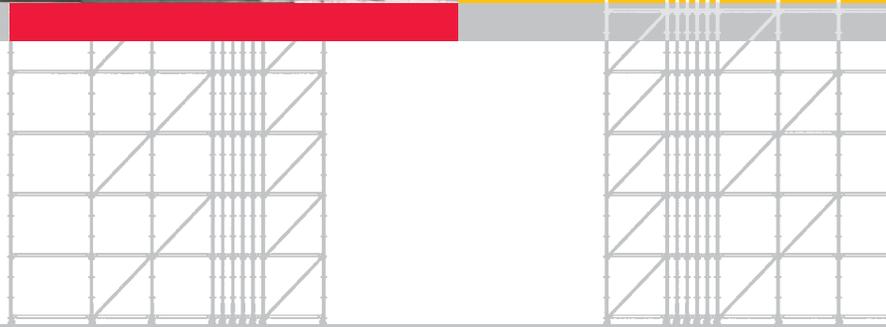
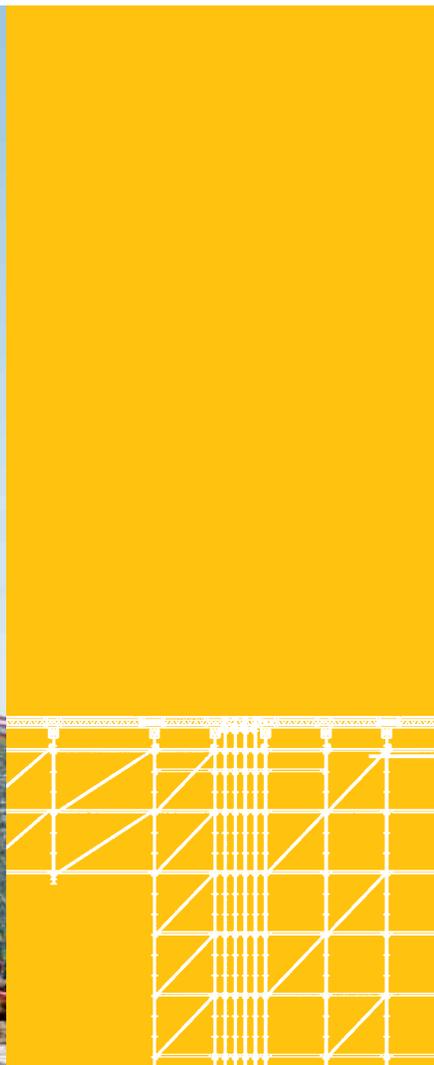
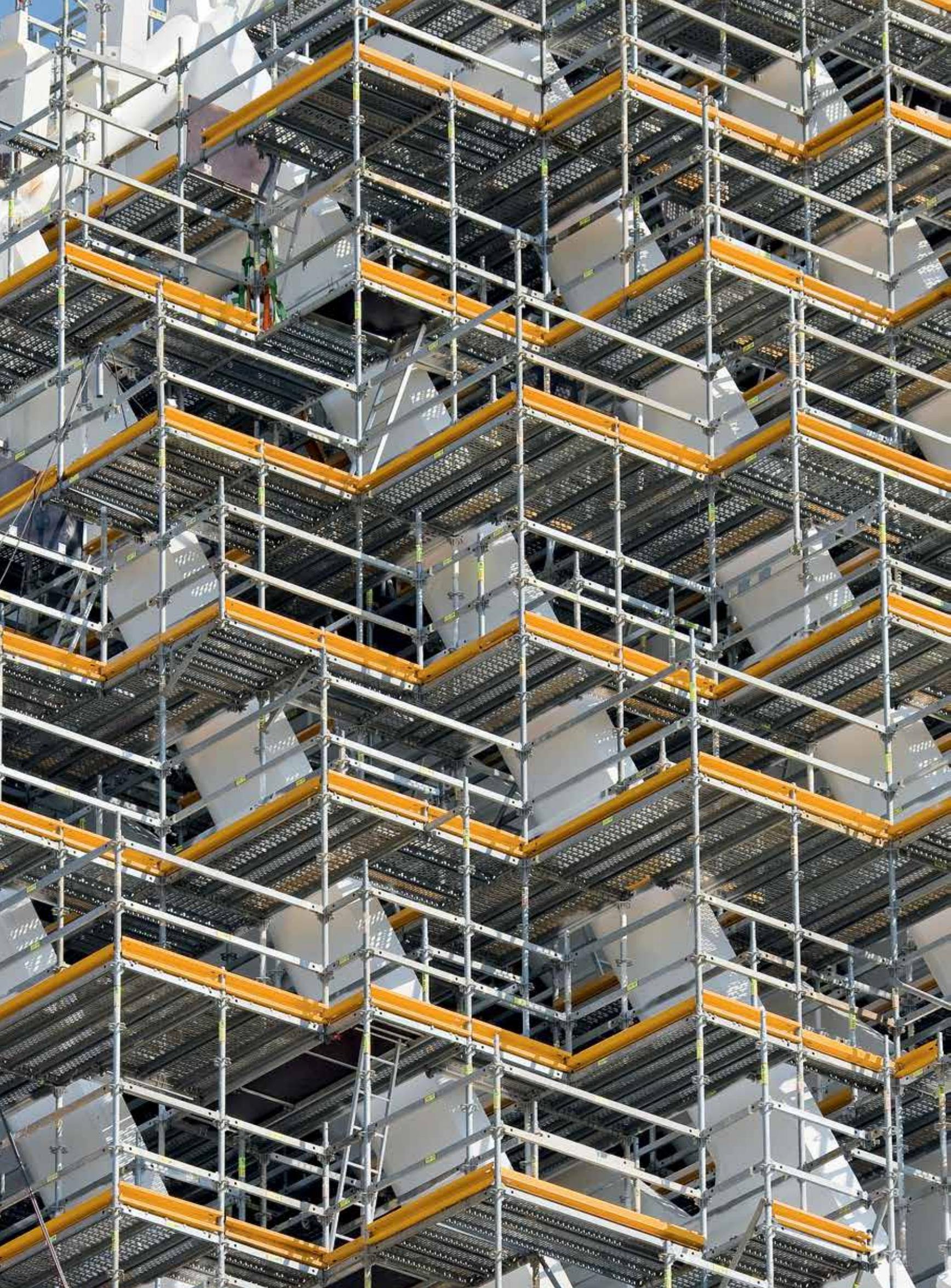


Scaffolding Technology





PERI Scaffolding Technology

Technology References

Edition 03 | 2016

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

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

In addition, computer graphics are used which are to be understood as system representations. For ensuring a better understanding, these and the detailed illustrations shown have been partially reduced to certain aspects. The safety installations which have possibly not been 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.

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PERI – your reliable partner worldwide

Working successfully in the market for more than 45 years

For more than 45 years, PERI has been a competent provider of formwork and scaffolding systems. Apart from proven and innovative products and systems, PERI also offers a wide range of services which improve and further increase the cost-effectiveness of the project implementation. These include not only individual planning and structural calculations but also, for example, optimized logistical operations and constant support for our customers during construction.

In addition to the headquarters in Weissenhorn, over 60 international subsidiaries with numerous branch offices and more than 100 logistic sites ensure close proximity to our customers and markets.

With the in-depth technical know-how of our employees along with extensive knowledge of local requirements, market and practice-oriented solutions are realised for all construction projects – whilst always taking into consideration the total costs resulting from labour and materials.

We know and understand the requirements of our customers intimately, and support them from the first solution idea to beyond the successful conclusion of the project.

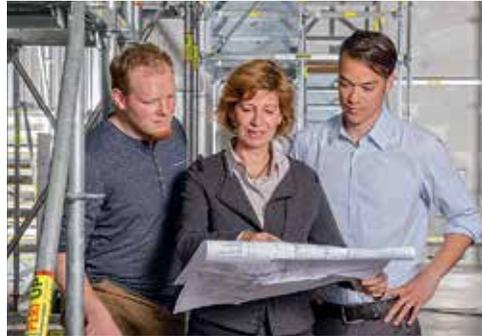
In the process, our maxim is enhanced customer service in all respects. All our employees apply this guiding principle on a day-to-day basis and around the world – they have shaped PERI since the company was founded. This fact along with our experience from over 40 years of company history as well as our worldwide activities benefit each customer and every project – regardless of size.

PERI in Weissenhorn: company headquarters, development and production.





The very latest production facilities along with the expertise of the PERI workforce, efficient operational processes and stringent quality tests guarantee the high quality of PERI products and systems.

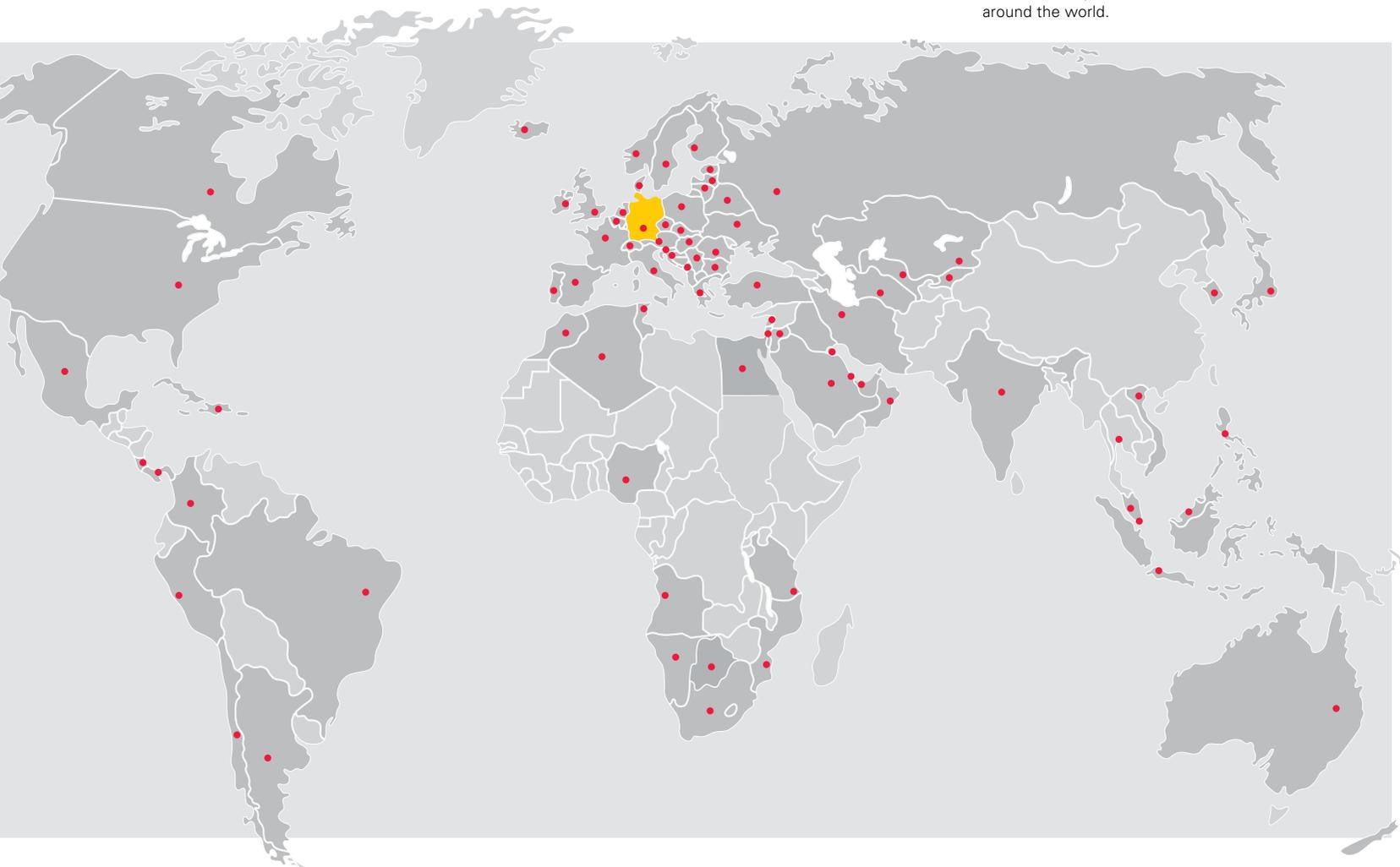


Product development at PERI is teamwork: practice-oriented as well as easy and safe to use scaffolding are a result of the collaboration of specialists in the field, development and manufacturing.



Apart from the purchasing option, PERI also offers the possibility of renting formwork and scaffolding systems. In particular, the combination of both models allows cost-effective project realisation.

With over 60 subsidiaries and numerous branch offices, we serve our customers around the world.



Continuous support provided in all project phases

Your requirements are our business

Our services and performance are project-specific overall concepts which bring our customers decisive competitive advantages. We also support the contractors and site management during the construction phase – continuously throughout the whole project.

The sales engineer is the main point of contact for our customers; he has profound specialist knowledge and knows the requirements and needs of the project parties exactly. The extensive network of sales engineers thus ensures close proximity to the users along with providing reliable support.

Requirements are analyzed on a project-related basis, solution proposals are created and the price-performance ratio is carefully considered. Detailed discussions with the sales engineers, experts from specialist departments and the site management result in optimised and cost-effective scaffolding solutions.

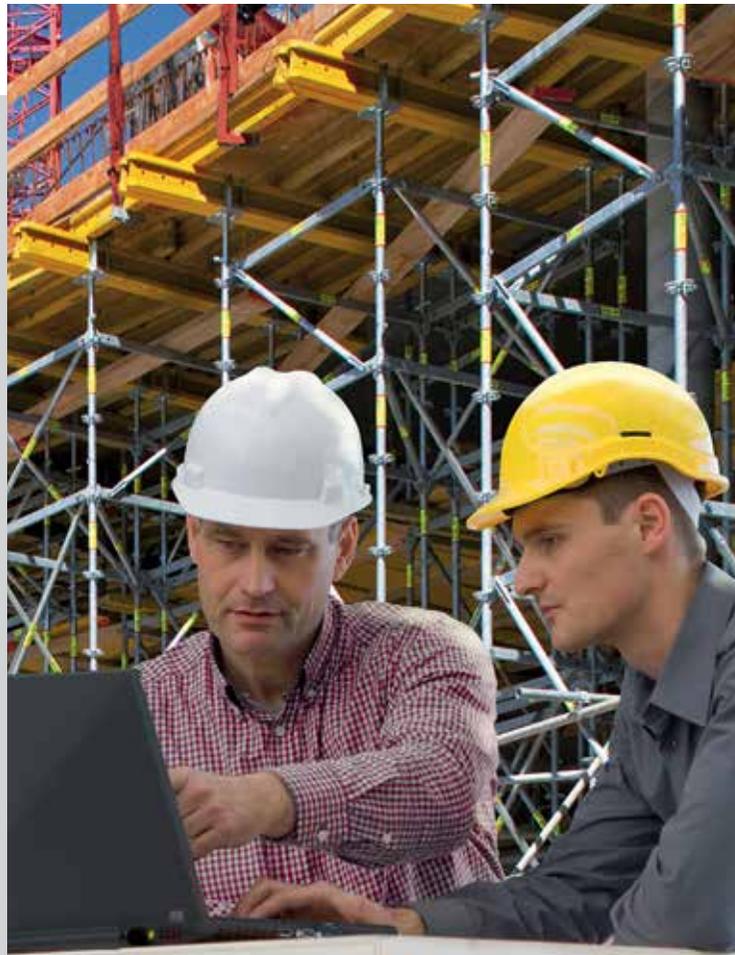
Customer requirements

Cost-effectively optimised system equipment for every application

The optimised solution for every construction task

Safe and economical processing

Reliable partner



Our service

Intelligently designed products with the best quality

For rationalisation of working procedures and the longest possible service life.

Customer-oriented engineering services

Project-related preparation and planning of the best solution.

Competent logistics and distribution

Fast and flexible deliveries as well as permanent support provided throughout the whole project.

Best service for our customers

Our experience and high level of commitment make us a very reliable partner.

The PERI sales engineer

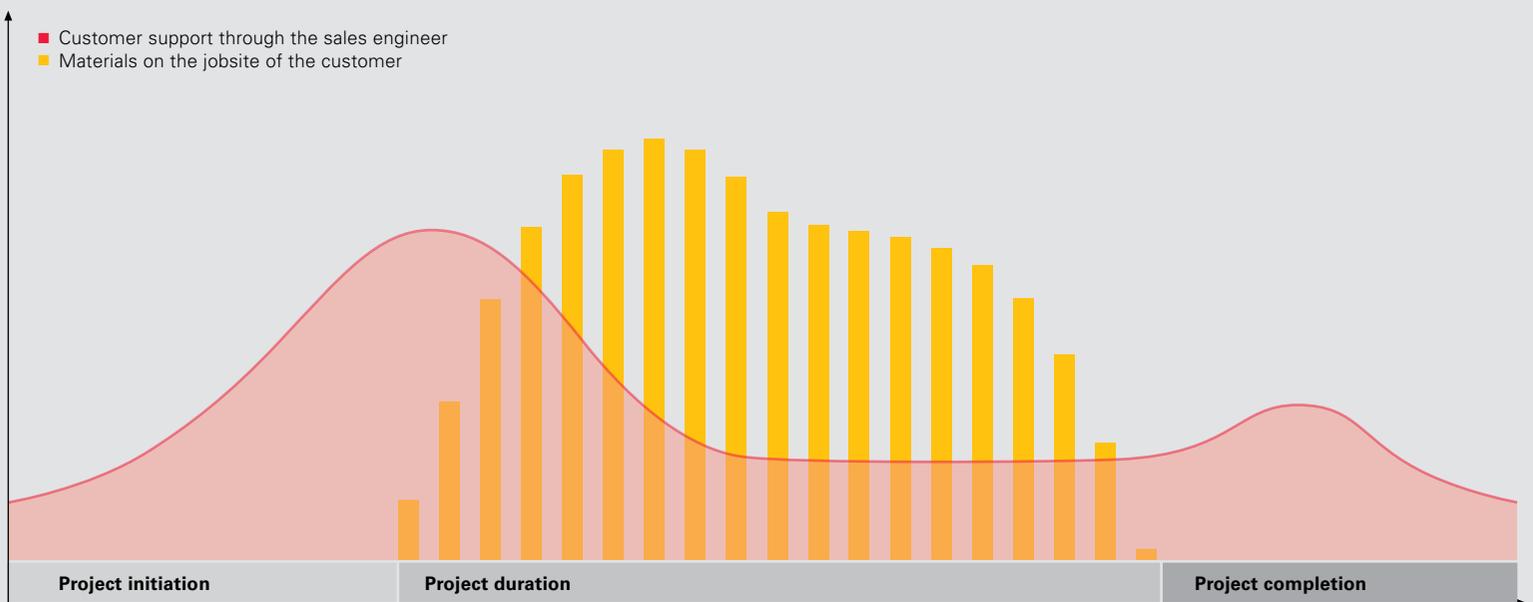
He is the first point of contact for our customers and accompanies them continuously throughout the respective project. Depending on the project phase and requirements, he ensures that the respective specialists are appropriately integrated into the customer support.

Project-specific solutions are developed in a team. Different experiences and approaches of our engineers optimise the solution – particularly from the economical point of view and in terms of safety.



Project process

Our participation and provision of services begins long before the actual start of the project and goes far beyond project completion.



Intelligently designed products with the best quality

Well thought-out down to the last detail and designed for the greatest possible service life

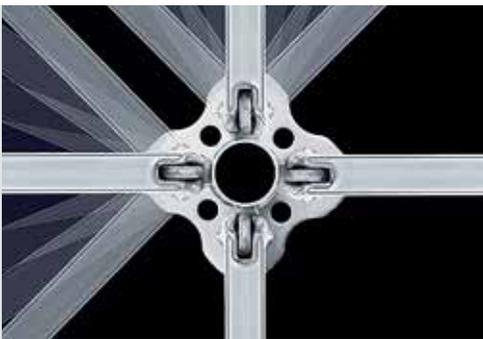
PERI quality assurance already begins in the incoming goods operations. At this point, it is ensured that the raw materials correspond to the predefined PERI requirements.



At PERI, quality begins with the careful selection of materials and the first quality assurance inspection in the incoming goods area. Products are manufactured using real craftsmanship by our highly trained workforce who are supported by the availability of the most modern production facilities: "Quality - made by PERI."

The entire process is subject to continuous quality assurance which is clearly defined and has been repeatedly certified, from purchase through to delivery. The high quality of the PERI systems guarantees a worthwhile investment.

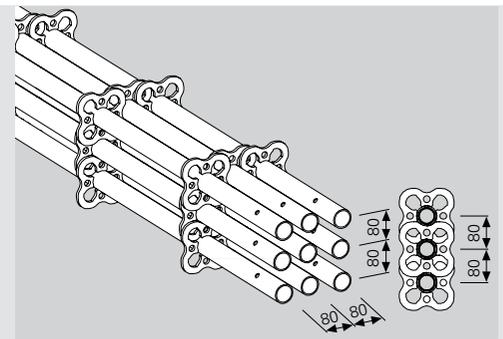
It is the basis for long product life cycles with high utilization rates. PERI products and systems are intelligently designed – for rationalizing work operations, for the highest level of safety during use and for the greatest possible service life.



The PERI UP Rosett allows connections with angles up to 45°.



The guardrail can be mounted by means of a simple waving movement.



The contour of the rosette prevents the verticals from rolling away and facilitates the stacking of the tubes.



The Ledger Brace UBL allows extremely fast and easy assembly.



Well thought-out in every detail: in spite of the integrated handle lock, the spindle can be adjusted to any height.



With the Ledger-to-Ledger Coupler UHA, ledgers can be mounted at any position of another ledger.

Customer-oriented engineering services

Project-related preparation results in the best solution

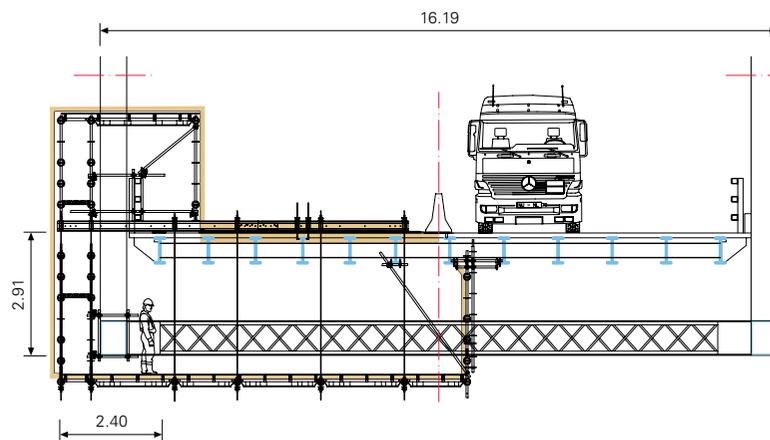
Due to our international orientation, we have to deal with a very wide range of tasks. This requires a lot of creativity from our engineers on a daily basis. We gladly accept this challenge in order to provide all of our clients and every project - regardless of the size - with the benefits of the experience gained over many years.

Our engineers design optimized solutions from the technical as well as economical point of view, frequently during the offer stage.

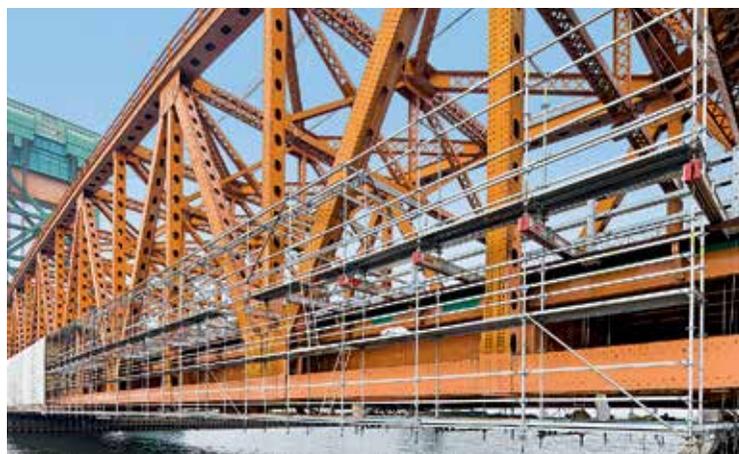
For technical processing, we use state-of-the-art hard and software. Our experts in 3D-planning increase the transparency of pending project requirements with photo-realistic images on the drawings. Three dimensional visualizations and movies additionally increase the reliability of cost estimations for our clients.

For all tasks, PERI engineers also take into consideration the option of providing a special solution. Because even if the large majority of all requirements can be met with standard systems, a special construction can be more cost-effective in some cases.

If required, PERI also provides verifiable static calculations. This means our customers can concentrate on the important tasks in order to fulfil the contract.



The suspended scaffold for the bridge refurbishment has been optimally adapted to suit the existing structure.



PERI Software

ELPOS and PERI CAD – optimised software for scaffold planning

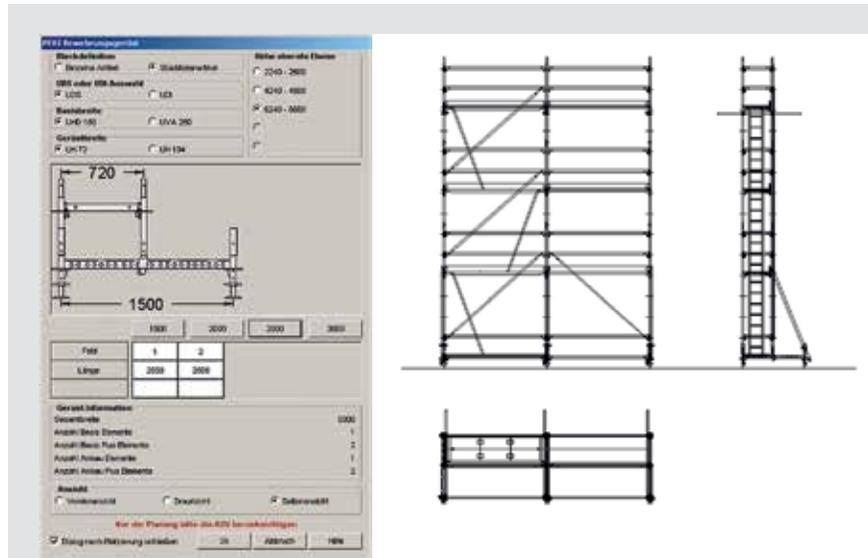
ELPOS and PERI CAD are applications that have been developed for planning PERI systems: with ELPOS, facade and reinforcement scaffolding can be easily and quickly planned using PERI UP Rosett system components – no special CAD knowledge is required for the application. PERI CAD is the professional solution for the experienced user for all tasks.

The two programs are based on the DWG data format thus allowing data transfer between both applications. The integrated component catalogue and the automatism support an accelerated planning progress.

PERI software provides detailed and clearly arranged plans as well as accurate parts lists. This simplifies not only the calculation process and work preparation but also increases cost reliability.

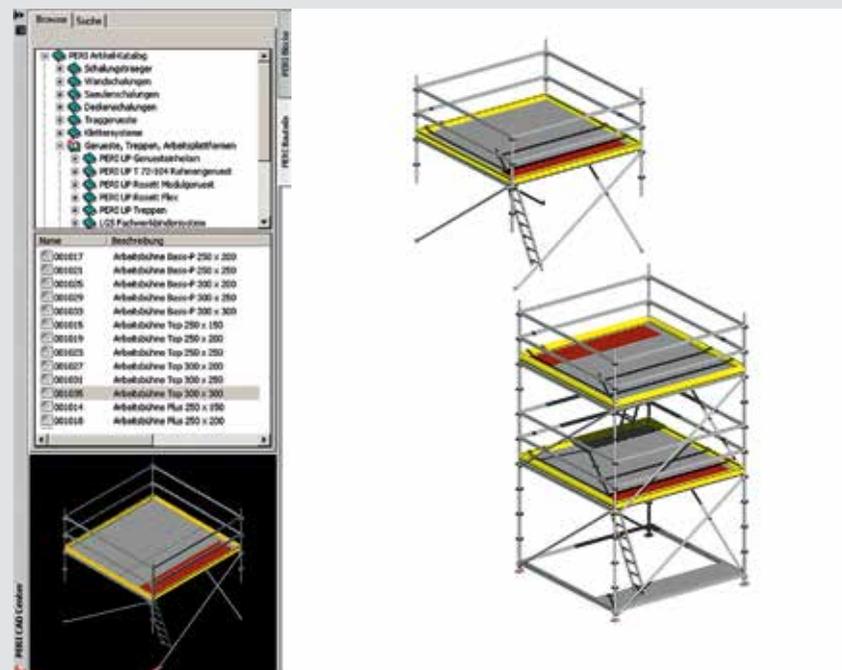
The result of planning with PERI CAD is the creation of professional drawings and drawing compilation – also for complex structures and details.

The fact that PERI engineers also plan with this software is a guarantee that it is always up-to-date and ensures competent support in the application of the software solutions.

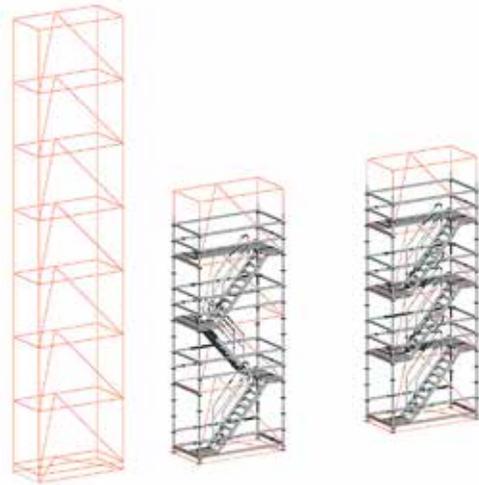
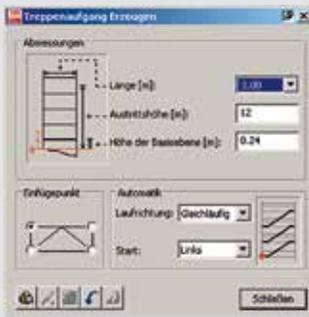


Planning reinforcement scaffold on the basis of PERI UP Rosett is carried out completely automatically with PERI ELPOS and PERI CAD: the software designs the scaffolding according to the number of bays, width and height as well as directly providing detailed parts lists.

Working platforms are included in the program as pre-fabricated units which are easily and quickly adapted to suit the project-specific dimensions.



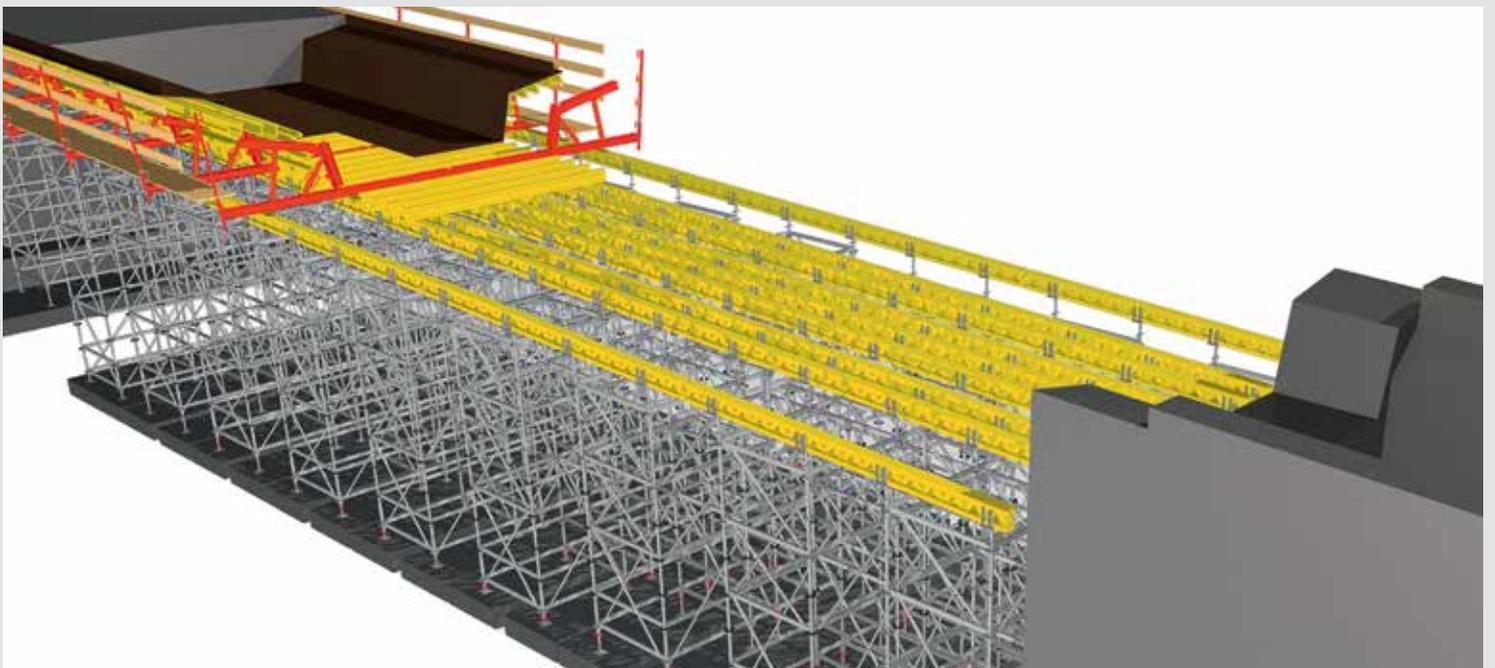
More information can be found in the "PERI Software" brochure as well as on www.peri.com



In PERI CAD, multiform mass elements can be created which are then automatically scaffolded. Even with uneven ground contact areas, the solution is created at the touch of a button.

PERI ELPOS and PERI CAD also allow simple planning of stair towers: based on the ground plan and height dimensions, the stair towers are then automatically created.

With PERI CAD, complete shoring solutions can be planned in 3D – with towers, framework units or birdcage scaffolds. Three-dimensional views enable an easier understanding of complex scaffolding constructions.



Expertise in logistics and distribution

On-site support and throughout the entire course of the project

Our close-knit network of logistics sites in many countries ensures the close proximity to the projects of our customers thus guaranteeing flexible just-in-time deliveries and fast material availability.

Our sales engineers and supervisors provide on-site support for the contractor thus guaranteeing efficient use of PERI scaffolding from the beginning onwards.

For large construction projects, PERI can provide a project manager who ensures that the material quantities match the actual requirements. Through this, on-site material requirements and costs can be further optimised throughout the project.



PERI pallets ensure orderly storage of materials. They facilitate rapid material access and increase transportation safety levels when using a fork-lift or crane.

Apart from the purchasing option, PERI also offers the possibility of renting formwork and scaffolding systems. In particular, the combination of both models aids cost-effective project execution: those materials which can be utilized on a long-term basis is

an investment that building contractors should be making themselves. For covering peak demand periods as well as for special applications, the rental option usually represents the optimal solution.

PERI has the largest rental equipment pool worldwide.

With over 120 rental equipment stockyards, we can reliably and flexibly supply our customers according to the construction progress.



Complete safety in the execution

Reliable provision of technical documentation



Assembly instructions, complete with a presentation of the individual assembly steps and overall structure, support the building contractor by ensuring a fast and safe erection procedure.

Apart from construction drawings and proof of stability, PERI also provides the required approvals, type tests as well as assembly instructions.

These approvals are a tangible result of the successful implementation of the quality management system. Our customers receive a scaffolding system which fully complies with the required proof of stability and working safety – this provides legal compliance regarding material utilisation.

For standard assemblies and extended shoring structures, a general proof of stability is available. For execution of construction work which deviates from standard use, PERI provides a project-related structural analysis.

Instructions for Assembly and Use are available in a range of different languages. They contain all information and details which are required to ensure safe assembly. For efficient storage procedures and safe transportation, packing instructions are also available.



PERI provides comprehensive technical documentation in many different languages.



PERI Customer Seminars

Our knowledge and expertise for your personnel

An extensive programme of seminars featuring a wide range of topics is offered within the framework of the PERI customer seminars - customised to meet the requirements of specific target groups.

We offer our customers the possibility of learning more about and how to apply the latest formwork and scaffolding technologies with all their facets at numerous training centres around the world, and to pass on this knowledge.

On this basis, we support the users to ensure that our systems are efficiently used from the outset also when under time pressure.



The two exhibition halls in Weissenhorn, Germany, have over 4,000 m² of space available for product demonstrations as well as theoretical and practical training.





A large number of training centres world-wide provide the best opportunities for our customers of obtaining valuable know-how for the practice.



Scaffolding – then and now

From individual constructions to modular scaffolding

Although many ancient buildings could not have been realised without the corresponding scaffolding, only a few documents or illustrations are available. As evidence has shown, already in Ancient Egypt timber supports and boards were connected by ropes to form load-bearing and working scaffolding, while components made of iron were additionally used in Ancient Greece. In Asia, bamboo scaffolding has been used from time immemorial.

From the beginning of the 19th century, more complex scaffolding constructions were developed which featured more metallic materials.

The first steel tube and coupler scaffold appeared in 1930 while the first system scaffolding in Germany was introduced in 1952. Today, modular systems determine the scaffolding industry.

At the end of the 1990s, PERI developed the PERI UP scaffold system. Thereby, the company could rely on the valuable experience gained with the requirements regarding working platforms and safety scaffold in formwork construction. At that time, PERI also already had comprehensive knowledge about safety regulations.



Original scaffold constructions are characterized by the use of timber and rope connections. In many countries around the world, such constructions are still being used today.

The development of PERI UP

Adapted perfectly to meet the needs of the user

The most important consideration for designing the new scaffold system was to ensure that users are protected against falling when entering the next level. On this basis, PERI UPT 72 / T 104 frame scaffolding was developed – optimized for facade work and featuring two different system widths of 72 cm and 104 cm. The guardrail for the next scaffold bay is mounted without any additional parts with the T-frame. Scaffolders can work safely and quickly on every assembly level through the integrated collective anti-fall safeguards in the system – without rope protection.

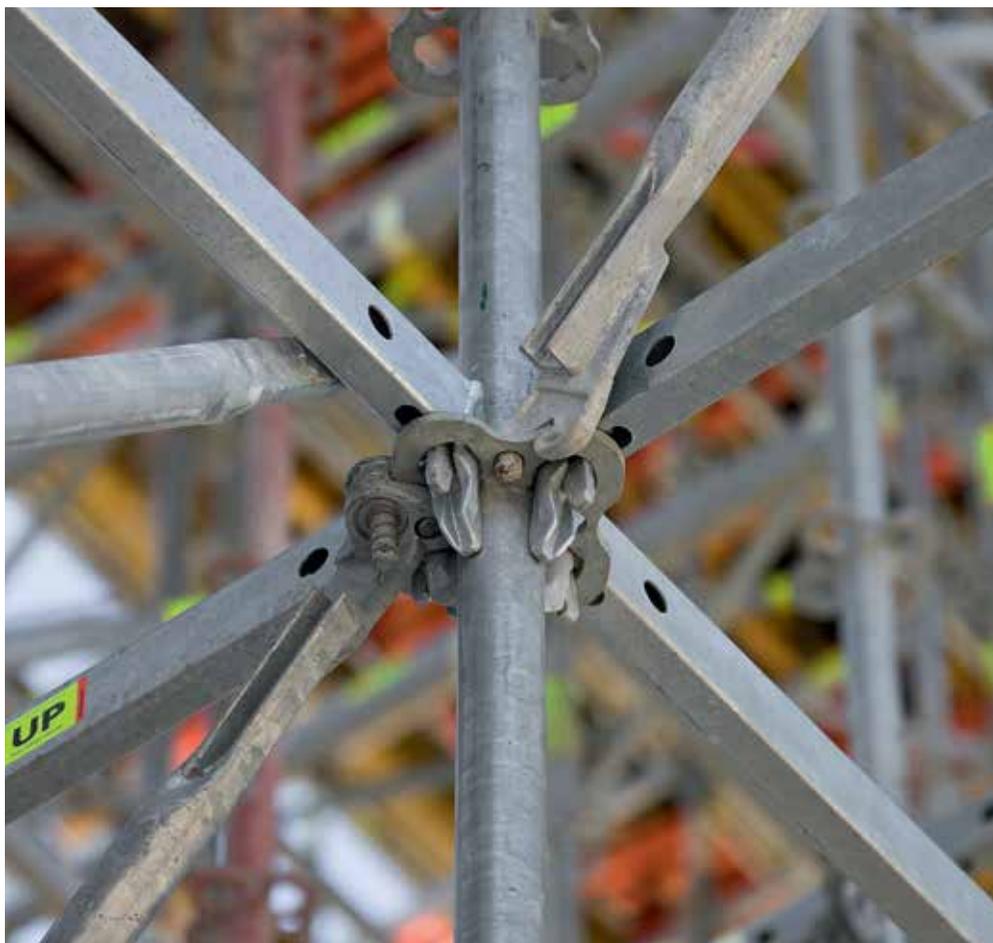
The requirements for a modular scaffolding system – flexibility, low weight while simultaneously maintaining a high load-bearing capacity and excellent handling – were fully met by PERI with the development of the PERI UP Rosett: for easy and safe assembly, the wedge drops into the hole through its own force of gravity when inserting the wedge head into the Rosett, and locks automatically. Positioned every 50 cm, the Rosett node provides connection possibilities in all directions. Complicated geometries can also be scaffolded cost-effectively, e.g. old buildings with bay windows and cantilevers.

Combined with new industrial decking, the PERI UP Flex modular scaffolding is an extremely flexible modular scaffold for numerous applications – from shoring for accommodating high loads through to adaptable industrial scaffolding complete with the highest safety requirements. For the new industrial decking, with an integrated lock against lifting and a non-slip perforated surface, a system width of 25 cm was selected. As a result, the working platforms can be completely covered without leaving any gaps and allow virtually any adjustments to be carried out in order to suit local conditions.

The guardrail in advance provides a very high level of safety for fast working during the erection and dismantling of the frame scaffolding.



The "Gravity Lock" facilitates fast erection of the modular scaffolding. The Rosett node connection is extremely rigid with a high loading capacity.



PERI UP with UDG Decking and UH Ledgers

The maximum flexible modular scaffolding

PERI UP Flex

With its metric grid dimensions, the PERI UP Flex modular scaffolding is optimized for ensuring extreme flexibility in the application. The ledgers primarily have a static function but, at the same time, provide support for the decking at any position.

- UDG Decks are available in widths of 25 cm and 37.5 cm. In combination with the metric UH Ledger lengths and Rosett spacings, the system is extremely flexible in all three dimensions.
- Decking surfaces can be completely closed using system components. Even with obstacles, the maximum clear space is 12.5 cm.
- The mounting direction of the decking can be changed within an individual bay of four load-bearing verticals at any point – also several times if required.
- The decks are perforated and are particularly suitable for use in those operations where slip resistance has the highest priority.
- The static function of the ledger is of primary importance; in this respect, the ledgers are optimized in both form and weight.
- Depending on the length, load classes range between 4 and 6.

PERI UP Flex:
Maximum adaptability to match virtually any local geometrical conditions.

Applications

- Industrial Scaffolding
- Shoring
- Working Scaffolding
- Working Platforms
- Combination of Scaffolding and Formwork Systems
- Access
- Weather Protection Roofs
- Pedestrian Bridges
- Wide-Span Scaffold Constructions
- Facade Scaffolding



The modular design and the metric grid dimensions characterize the PERI UP Flex modular scaffolding. The length and width arrangement in 25 cm increments provides more flexibility in scaffolding assembly, maximum adaptability as well as gap-free completely closed platforms.



PERI UP with UDG Decking and UHD Ledgers

As PERI UPT 72 / T 104 frame scaffolding particularly safe, as PERI UP Rosett modular scaffolding extremely versatile

The UDS-UHD deck-ledger version is optimized for use as a facade scaffolding with widths of 72 cm and 104 cm. First and foremost, the UHD Ledger serves as a support for the completely closed UDS Decking. When using the T-frame, the extremely safe assembly procedure featuring the guard-rail in advance is possible while a modular scaffolding system with enhanced scope for geometrical adjustments is realized using standards and ledgers.

- With a deck width of 32 cm, there is a 64 cm tread width for the 72-type scaffolding and a corresponding 96 cm for the 104 scaffolding. These dimensions fulfil the minimum requirements of the relevant standard.
- The version has been optimised for realizing a low weight and low number of movable components – and thus achieving optimal cost efficiency per square metre of area to be scaffolded.
- The decking is completely closed which provides protection against dust, dirt and rain.
- The geometrical form of the UHD Ledger is optimised to provide the greatest possible clearance in a scaffolding level.
- Depending on the length, load classes are either 5 or 6.



Low weight, high load-bearing capacity as well as quick and easy assembly, characterize the scaffolding with UDS Steel Decks. The integrated protection against lifting is a great advantage when facades are scaffolded.



PERI UPT 72 / T 104: integrated collective safety against falling on every assembly level through the T-frame construction.

Applications

- Facade Scaffolding



PERI UP Rosett: high degree of flexibility for complex forms through the use of Rosett standards and ledgers

Applications

- Facade Scaffolding
- Access
- Public access staircases

PERI UP with Decking UDG and Ledgers UH

The extremely flexible PERI UP Flex Modular Scaffolding



22 **The Modular Scaffolding
PERI UP Flex**

Applications

- 24 Industrial Scaffolding
- 28 Suspended Scaffolding
- 30 Shoring
- 36 Working Scaffolding
- 37 Working Platforms
- 38 Requirement-specific solutions through combination with PERI steel components
- 40 Access
- 44 Weather protection roofs
- 46 Pedestrian bridges
- 48 Wide-Span Working Platforms
- 50 Facade Scaffolding

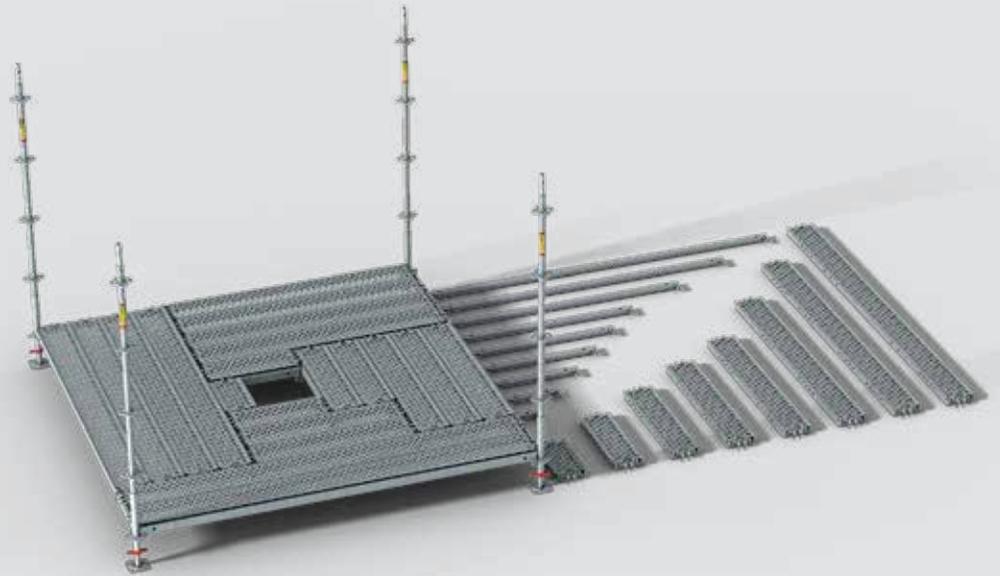
PERI UP Flex Modular Scaffolding

System details

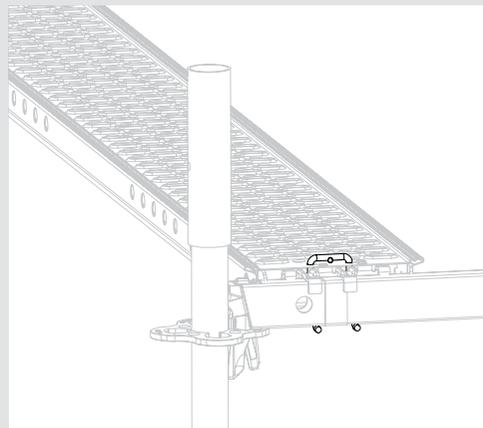
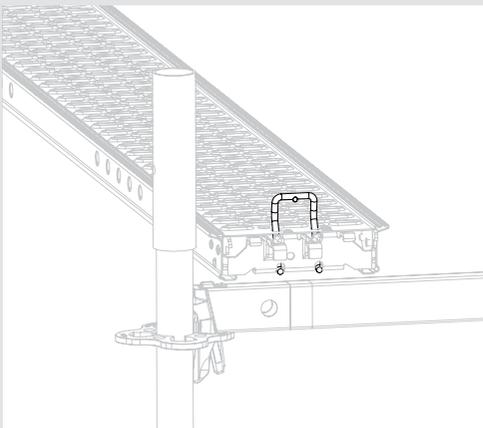
The main components of the modular scaffolding such as standards, ledgers and decks, have uniform length and width dimensions of 25 and 50 cm.

The wide range of ledgers allow the decking to change direction during installation and therefore ensure maximum adaptability to suit project-specific geometries. In addition, PERI UP Flex fully meets the highest work safety requirements regarding realization of the working areas.

The UDG Deck provides maximum flexibility in scaffolding construction. It is self-locking and can be installed at any position in the scaffolding on standard ledgers. Special decking transoms and the required detailed planning are not necessary.



The UVR Standard is available in lengths of 50 cm to 400 cm (in 50 cm or 100 cm increments). The 50 cm Rosett spacings match the logical grid dimensions. The lightweight UH Ledger is available in lengths ranging from 25 cm to 400 cm – with 25 cm or 50 cm increments. Using the strengthened UHV Ledger for spans more than 1.50 m is to be recommended. UDG Decks have lengths from 50 cm to 300 cm, likewise with 25 cm or 50 cm increments.



After installation, the decks of the modular scaffolding are locked in place: simply by the force of gravity, the securing hook slides under the ledger – and the deck is immovably fixed in position.



The Gravity Lock guarantees fast and safe assembly. During the ledger assembly, the wedge falls into the opening of the Rosett through its own force of gravity and locks automatically.



PERI UP Flex Modular Scaffolding

Industrial Scaffolding



Due to the high degree of adaptability of the system scaffold, complex scaffolding tasks can also be easily and quickly realized. By changing the direction of the decking, working areas can be covered virtually gap-free.



The Gravity Lock allows quick and safe assembly with site personnel always in a secure position. By inserting the wedge head into the Rosette, the wedge drops by force of gravity into the hole and then locks in position.



For connecting ledgers and standards to existing ledgers, appropriate connection means are available. In this way, for example, obstacles and discontinuities such as large pipes can be accommodated.

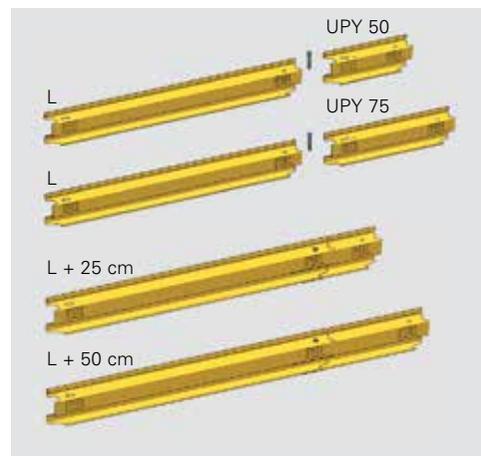
For the use in industrial facilities, the scaffolding system must be extremely adaptable. At the same time, all working areas which have been erected must fulfil the highest safety requirements. In addition, the user demands fast assembly.

PERI UP Flex takes all of these requirements into account. UDG Industrial Decks feature an integrated lock against lifting as well as having non-slip perforated surfaces.

Depending on the required installation direction of the decking, additional ledgers are fitted as support. The ledgers can be integrated at any position using the appropriate connecting elements. This allows the user to install the decking in the most favourable laying direction.

The decks can also be installed with an overlap of approx. 1.5 cm in a longitudinal direction so that cables or diagonals can be fitted between two decks. In this way, approximations of working areas in every industrial facility can be reduced to a minimum.

Toe boards are painted in a signal colour, and are always installed between two vertical scaffold tubes. They border the working platforms on all sides and can also be used around corners. Toe boards are non-combustible, have a very low weight and can easily be stacked on top of each other.



For intermediate lengths, the UPY 50 and UPY 75 Toe Boards can be screwed to longer toe boards, with 25 cm overlaps.

With the trolley, moving completely assembled platforms is possible. The permissible load is 19.7 kN. The position of the standard with regard to the girder axis is continuously adjustable up to 125 mm.



The UFS 20 Trolley is intended for suspended scaffolding which is mounted, for example, on the underside of oil platforms or bridges on I-shaped steel profiles.



The small width of the UH Ledger allows up to 4 ledgers to be carried at any one time by one scaffolder.



Platform completely covered by PERI UP system decking.



The lightweight ledger serves both as support for the decks as well as guardrails. For platforms, standard or reinforced ledgers are used depending on load requirements.



PERI UP Flex Modular Scaffolding Industrial Scaffolding

E dipower Thermal Power Station, Turbigio, Italy



Refinery Expansion C-10, Cartagena, Spain



As Pontes Power Station, La Coruña, Spain



Elektrownia Ostrołęka B Power Station, Poland



Kralupy nad Vltavou Oil Refinery, Czech Republic

PERI UP Flex Modular Scaffolding

Suspended Scaffolding

For the installation of the steel roof construction, the PERI UP Flex suspended scaffolding guaranteed safe and secure access.





The PERI suspended scaffold solution on the basis of the PERI UP Rosett modular scaffolding also made use of rentable PERI formwork system components.



The PERI UP suspended scaffold solution served as working scaffold as well as access means for the safe and problem-free replacement of the glass fibre membranes.



By means of RCS Rails and UFS 20 Trolleys from the PERI UP system, a suspended scaffold for transporting bulky components could be easily moved through the window openings to the outside.



The PERI UP suspended scaffold served as safe access means to the bearing points on the pier heads.

PERI UP Flex Modular Scaffolding

Shoring – Shoring Towers

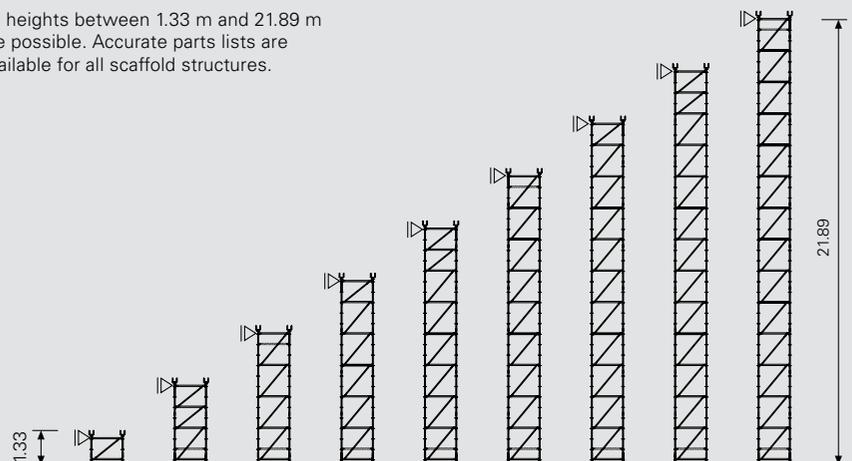
PERI UP shoring towers have been type-tested for heights of up to 21.89 m. This greatly simplifies planning and use on the construction site: providing project-specific proof for the towers is therefore not required and prepared parts lists are available for all heights.

Due to the base widths of 1.50 m up to 3.00 m, square or rectangular-shaped tower layouts can be realised in 50 cm increments. This means cost-effective adaptation to suit load-bearing capacities and geometries can be achieved. As a result, up to ten tower variations for a wide range of uses as falsework, slab table or material platform can be assembled.

With only a minimum of different individual components, every shoring structure can be quickly assembled. From the extensive programme of accessories, decking levels for transporting materials as well as access stairs can be integrated.



All heights between 1.33 m and 21.89 m are possible. Accurate parts lists are available for all scaffold structures.





PERI UP Heavy-Duty Prop

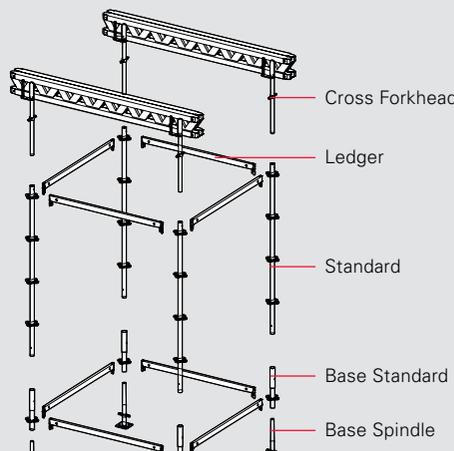
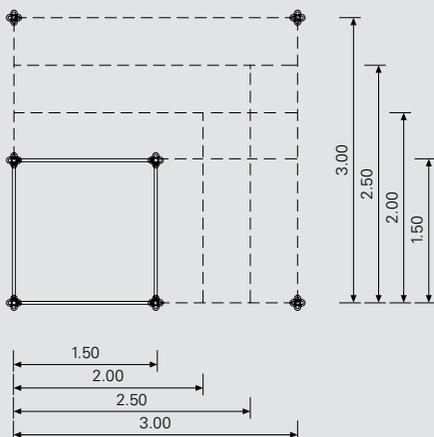
PERI UP heavy-duty props are comprised of lightweight system components with hydraulic lowering and pre-tensioning. The HD Hydraulic Unit consists of the lifting cylinder (up to 68 mm stroke) as well as a hand pump. The manometer shows the pressure (bar) along with the direct force (kN).



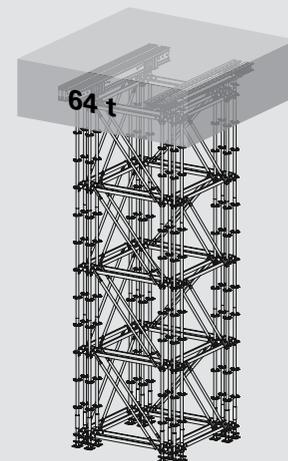
PERI UP Shoring Tower MDS

The shoring tower is safely and vertically assembled using standard components of the proven PERI UP scaffolding system and newly-developed decking. The platforms are installed in advance on the next higher-positioned ledgers; only in this way can assembly operations for the shoring tower be continued. The scaffolder is therefore secured against falling in all situations without requiring any additional equipment. As a result, PERI UP MDS also fulfils the very strict requirements of the French market.

The modular structure of PERI UP Flex allows optimal adjustment of the load area of influence to suit the respective load-bearing capacity of the legs.



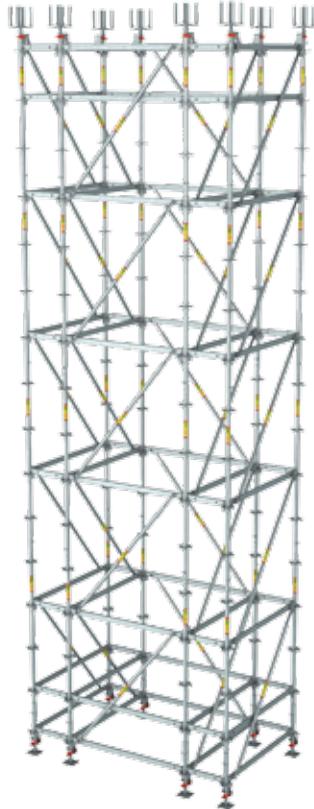
For the erection of a tower with 16 legs, loads of up to 64 t can be carried.



PERI UP Flex Modular Scaffolding

Shoring – Shoring Towers with Additional Frames

The shoring tower assumes the bracing function while the additional frames are simply “attached”:



As an extension of a PERI UP Flex shoring tower, up to two additional frames can be attached to the tower – on one or both sides. The lengths of the spacing ledger are freely selectable between 25 cm and 300 cm.

In transverse directions, the additional frames are braced in each case using UBL Ledger Braces. Bracing in a longitudinal direction takes place only via the tower which means that no diagonals are required for the spacing bays.

Nevertheless, even at large heights, leg loads of up to 40 kN can be transferred.



The positions of the legs can be optimally adapted in each case to the loads which are to be transferred.

PERI UP Flex Modular Scaffolding

Shoring – Shear Frame Arrangement



UDG – UH

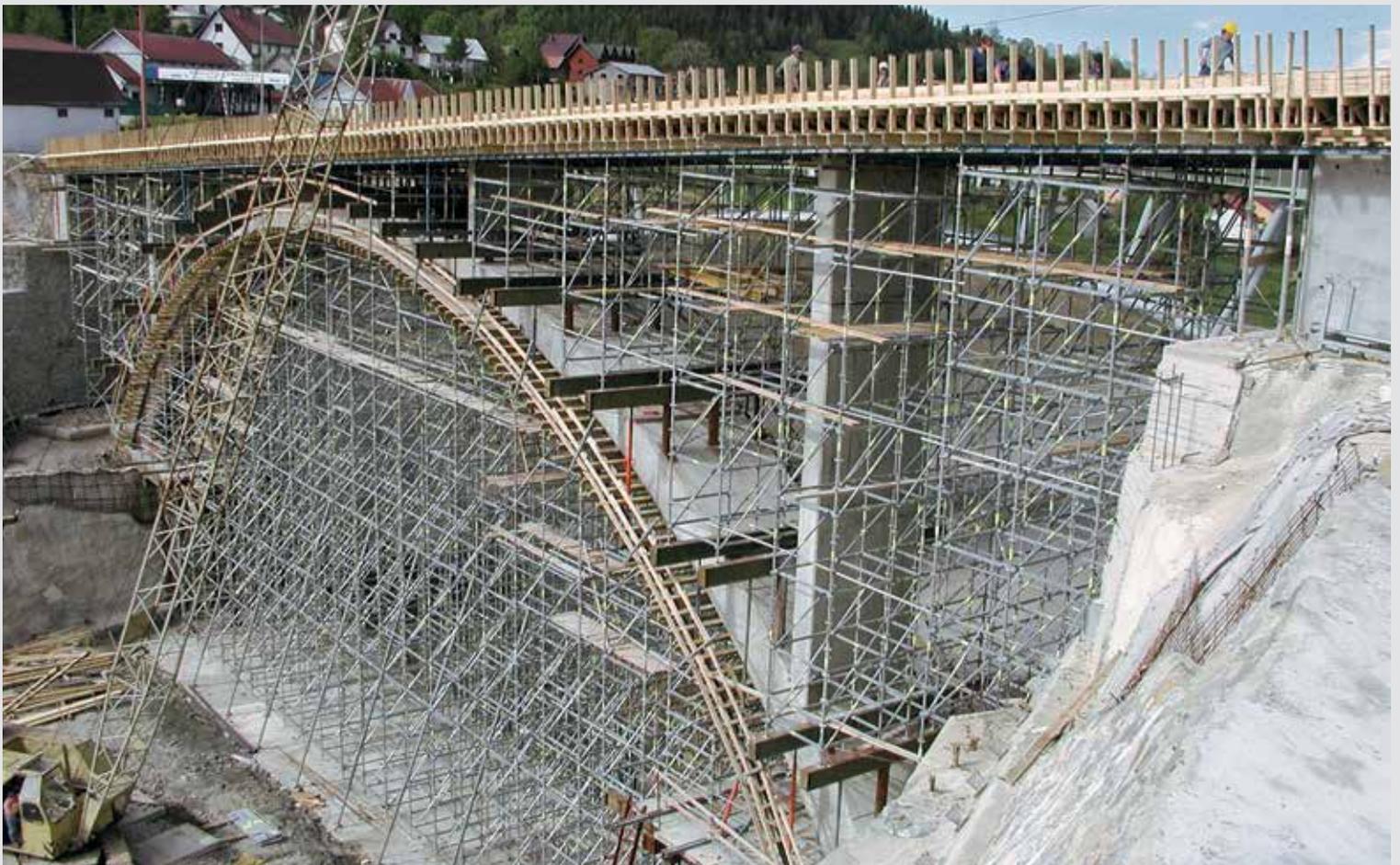
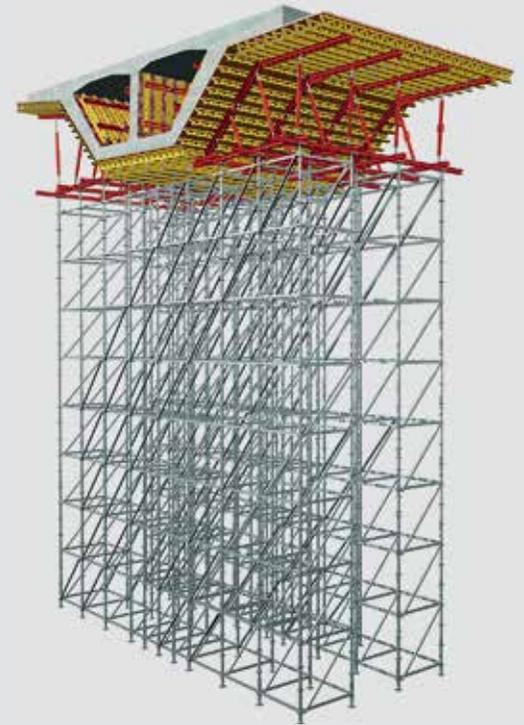
Assembly of the shear frame arrangement is based on shoring towers which are connected in one direction and thus function as shear frames.

The tower can be erected with widths ranging from 1.50 m up to 3.00 m in 50 cm increments. The width of the shear frame is variable. On the basis of a 1.50 m standard field, load-optimised field adjustments are possible in many system lengths.

The section height is 1.50 m – in part 1.00 m in the head area. The overall height of the shear frame arrangement is a maximum 21.89 m or 22.34 m with spindle sections.

As each shear frame is positioned independently from the next, height adjustments at the top and bottom are very easy to realize.

The variable spacing of the shear frames allows optimal adjustment to suit the loads of the superstructure. Compared to a bird-cage scaffolding solution, material savings can therefore be made when using shear frames.



PERI UP Flex Modular Scaffolding

Shoring – 3D Shoring Structures

PERI UP Flex showcases its complete variability when creating three-dimensional shoring structures. Here, the positions of the legs can be adapted exactly to match the on-site load requirements. Very high load concentrations can be transferred just as easily as small area loads. Adjustments to very complicated geometrical shapes are

realizable with standard materials and requiring very little time and effort. The high rigidity of the ledger connections maintains the shape of even very large scaffolding units when being moved with the crane or by means of rollers. Tension-proof connections are used to connect the standards to

each other. Units can be pre-assembled on the ground and subsequently joined together to form large shoring scaffolds. Working platforms for formwork operations as well as access stairs can be integrated in the shoring through the installation of system decks.

Each standard is positioned in the system to suit both the geometry and the load to be carried.





Even very high load concentrations can be transferred in the system without any special components. The photo features a load point carrying 520 kN from a steel superstructure.



Due to the continuous connection of all standards, external forces such as wind loads can be optimally transferred in the system – without requiring any additional measures.



Fast transfer of a 15 m long scaffold unit with the crane.

PERI UP Flex Modular Scaffolding

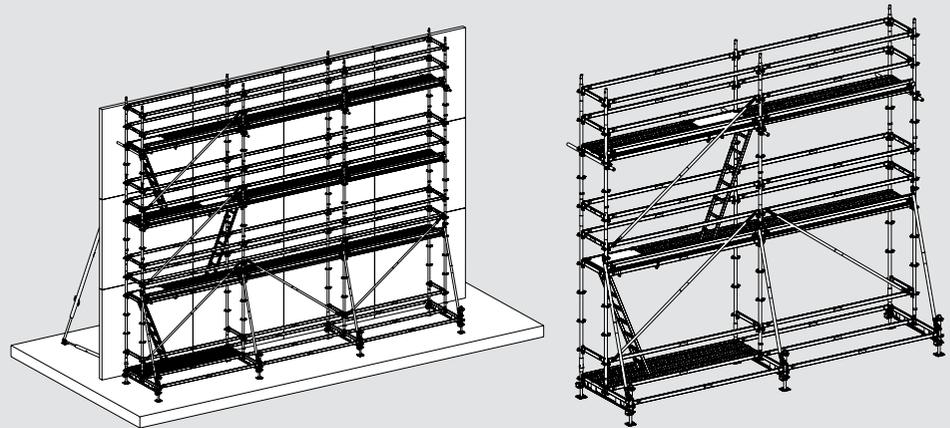
Working Scaffolding

PERI UP Flex reinforcement scaffolding is ideally suited for daily construction site activities such as reinforcement, forming and concreting. Due to the increased level of safety on the working areas, the job performance of site personnel is also enhanced.

The reinforcement scaffold is available with base widths of 150 cm or 250 cm as well as assembly variants of up to three bays in a longitudinal direction. Through the tension-proof connections, large-sized scaffold units can be moved by crane.

PERI UP Flex reinforcement scaffolding guarantees safe working conditions.

The basic units of the reinforcement scaffolding



PERI UP Flex Modular Scaffolding Working Platforms



UDG – UH



With PERI UP Flex, working platforms of all sizes can be realized. The decking forms even surfaces with no tripping hazards on which every type of work can be carried out.

Due to the metric flexible grid system, the platforms can be adapted precisely to suit the building dimensions and boundary conditions.

Safe means for climbing up and down – easily integrated in the system.



PERI UP Flex Modular Scaffolding

Requirement-specific solutions through combination with PERI steel components

The PERI product range also includes numerous steel components which can be combined as required with PERI UP. Optimized shoring structures and working platforms can be designed especially with system components taken from the VARIOKIT Engineering Construction Kit. Through the detailed and comprehensive planning, interface problems during the planning process and on the jobsite are eliminated. In addition, formal procedures for users is much easier and less time-consuming as PERI also provides verifiable statics on request.

Through the worldwide PERI rental park network, solutions are not least extremely cost-effective because the standardized system components can be rented according to project-specific requirements each time. Thus, the scope of tasks for the scaffold is extended to additional areas without requiring any further investment.



For the demolition work required for the revolving restaurant on the Henninger Turm, PERI UP Flex served both as 16 m high protection scaffold as well as a working platform. Cantilever-mounted RCS Climbing Rails formed a stable assembly level at a height of 100 m.





For this refurbishment project, PERI UP Flex modular scaffolding has been complemented with components taken from the VARIOKIT Engineering Construction Kit to create a very safe PERI system solution.

PERI UP Flex Modular Scaffolding

Access – Staircase Alu 75

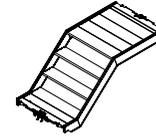
PERI UP Staircase Alu 75 can be used free-standing and as offset units up to heights of 90.00 m.

The assembly procedure is simple and fast due to the high-strength aluminum flights of stairs with widths of 75 cm. The permissible load is 2.00 kN/m².

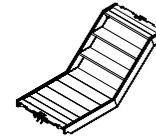


Through the addition of stairway units on the front, all floor levels can be reached.

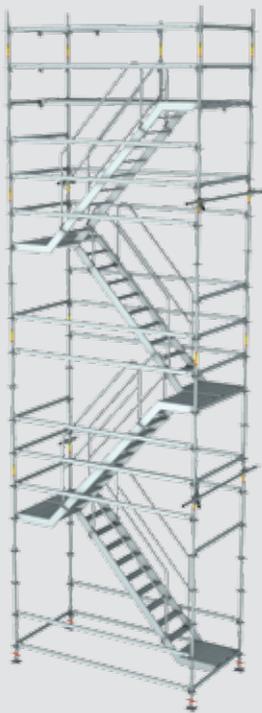
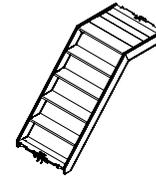
Staircase Alu 75
UAS 75 x 150/50T



Staircase Alu 75
UAS 75 x 150/50S



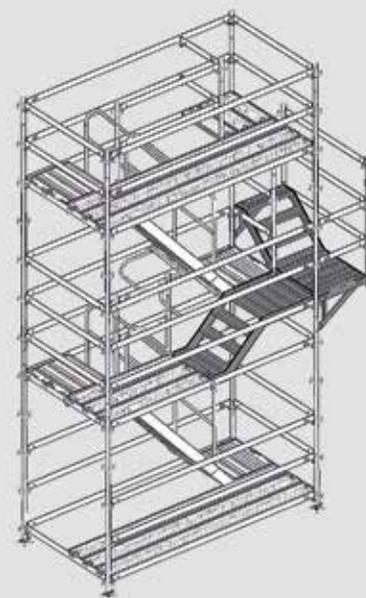
Staircase Alu 75
UAS 75 x 150/100



The stair tower with alternating staircase units provides greater headroom and shorter walking distances.



The stair tower with staircases in the same direction is particularly advantageous during assembly operations and offers additional working levels.



Height adaptations are carried out with the 50 cm or 100 cm high staircase units on laterally-mounted console brackets. For intermediate heights, the staircases can also be installed in the middle of a scaffold bay.



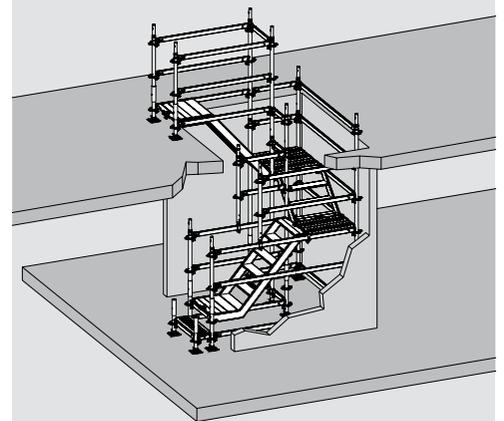
Height adjustments to building openings are carried out independently of the floor heights by means of brackets and short flights of stairs (1.50 m long, 50 cm/100 cm high).

Stairwell staircases for narrow spaces

With the stairwell staircases, compact access means can be provided on the inside of those buildings with small areas and narrow geometries. At the same time, the stairs serve as working platforms for carrying out further work on the sides of the walls. With standard components, access can be created to all floors in height increments of 25 cm. Standard configurations are available for the common floor height of 2.75 m.



Short flights of stairs with 75 cm widths offer maximum adaptability also for small areas and narrow geometries.

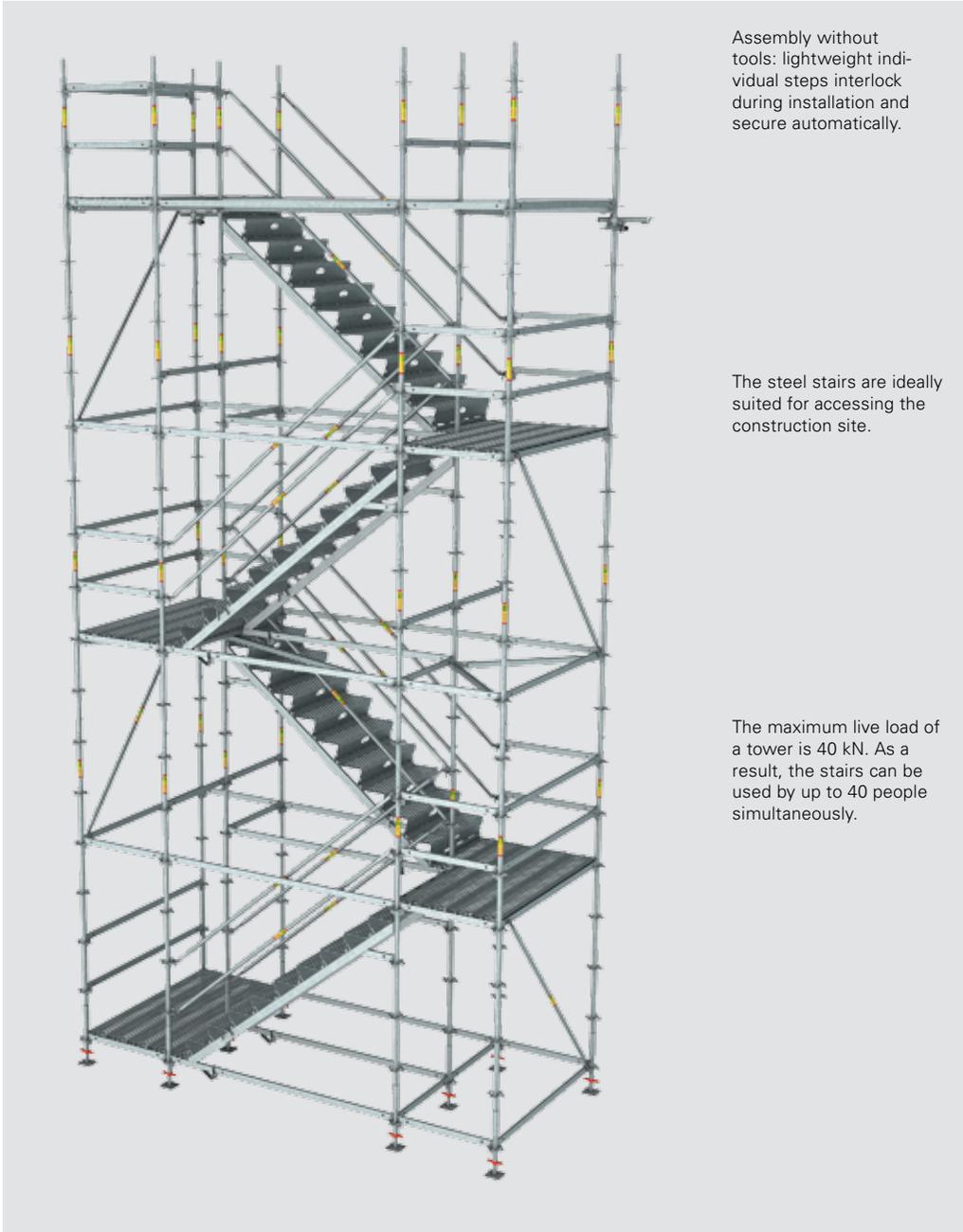


Standard stair configuration for a 2.75 m floor height with clear dimensions between the walls of 2.10 m x 2.20 m.

PERI UP Flex Modular Scaffolding

Access – Staircase Steel 100, 125





Assembly without tools: lightweight individual steps interlock during installation and secure automatically.

The steel stairs are ideally suited for accessing the construction site.

The maximum live load of a tower is 40 kN. As a result, the stairs can be used by up to 40 people simultaneously.

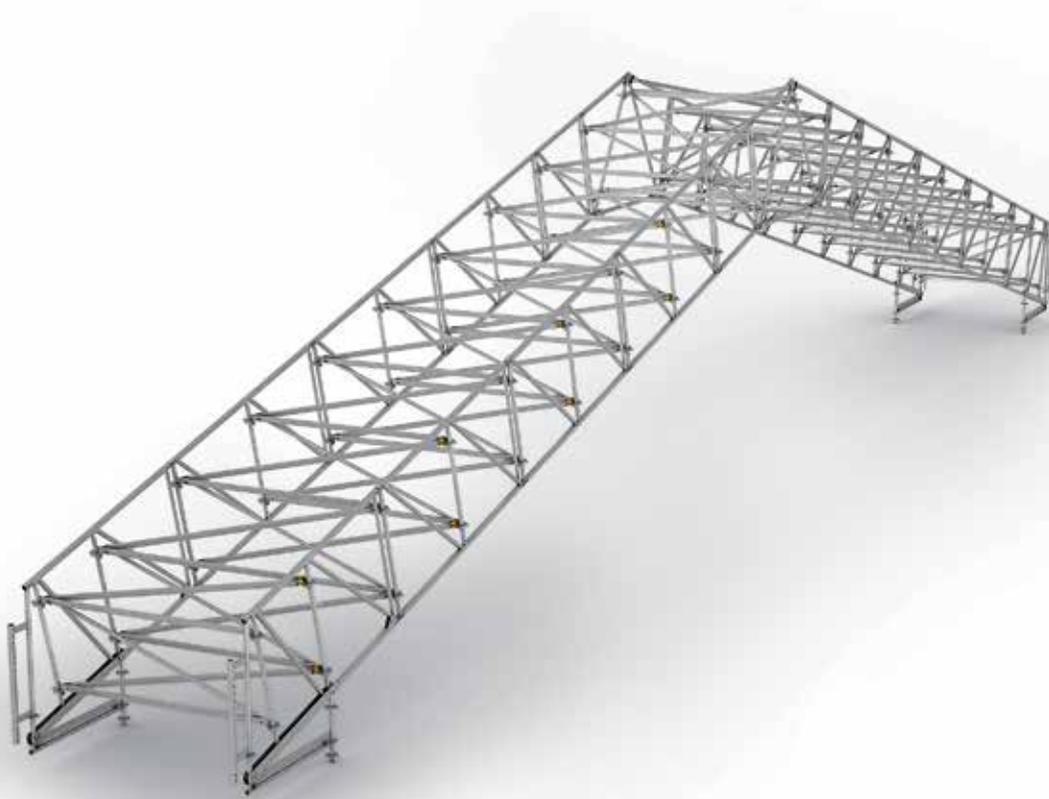


For construction sites with high load and accessibility requirements: the PERI UP Staircase Steel 100, 125 is erected as a 10-leg tower with landing widths of 100 cm, 125 cm or 150 cm. In connection with the step widths of 100 cm or 125 cm, the site stair provides easy and convenient access – with space enough to pass.

With a permissible load of 3.00 kN/m², the stair tower can be erected up to a height of 50 m. Assembly is simple and fast. The stringers are mounted first followed by the steps which interlock during installation. The top step secures all the others.

PERI UP Flex Modular Scaffolding

Weather protection roofs with the LGS Lattice Girder System



With the PERI UP LGS Weather Protection Roof, temporary and protective roofing facilities can be quickly and easily realized. The system is used for roof refurbishment, extension work, bridge and motorway construction sites or at jobsites during the colder winter months.

The lattice girder system can easily be adapted to suit a very wide range of building geometries. Standard components are supplemented by ridge elements, ridge bars and support elements. For the frequently used roof pitch of 15°, standard components are available. Other pitches can be achieved with the addition of a small number of project-specific components for the supports and ridge bars.

With these possibilities, the amount of scaffolding needed along the facade for supporting the roof can be significantly reduced. In addition, the anchorage required along the building is simplified because there is no need to cantilever the scaffold above the eaves.

The roof segments can be pre-assembled on the ground, subsequently they are lifted by crane to their final position.

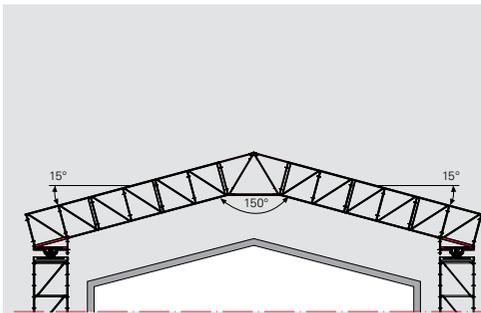
Walkways along the girders ensure safe access during the assembly of the individual segments. The use of personal protection equipment against falling is not required.



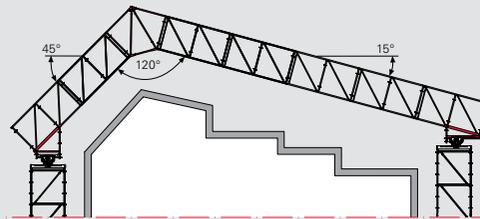


The Keder track and tarpaulin create very lightweight roofs which can be moved segment by segment by crane also in the case of very large spans of up to 40.00 m, and provide the building with immediate protection against rain, cold or strong sunlight.

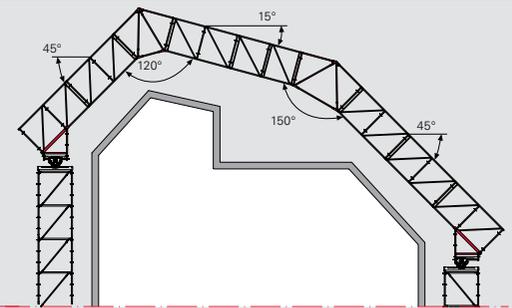
LGS provides a high level of safety both during assembly as well as use. As an option, the roof can be designed as a movable version.



For buildings with flat roofs or small roof pitches, a weather protection roof can be erected using standard components.



Using 45° supports, non-symmetrical weather protection roofs and steeper roof forms can also be realised.



This weather protection roof with multiple pitches shows that even the most difficult types of roof can be optimally enclosed. The side scaffold can stop at the eaves.

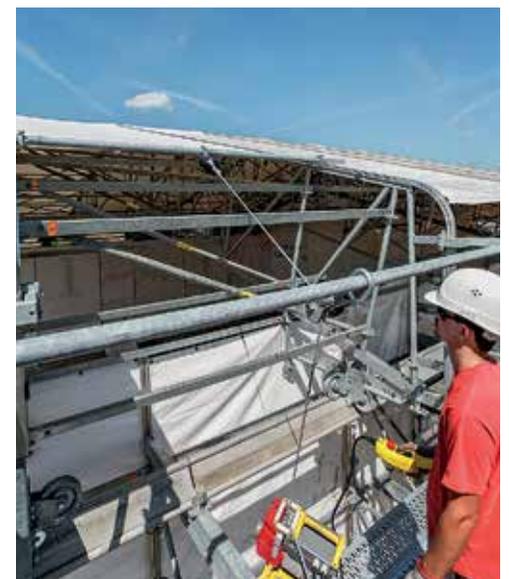
Smooth-running rollers support the uniform rolling up procedure and fast dismantling of the Keder tarpaulin across the entire field width.



The roof elements can be moved in the longitudinal direction by means of wheels so that, for example, materials can be lifted in by crane.



For retracting the tarpaulin, a solution with an electric motor can be used.

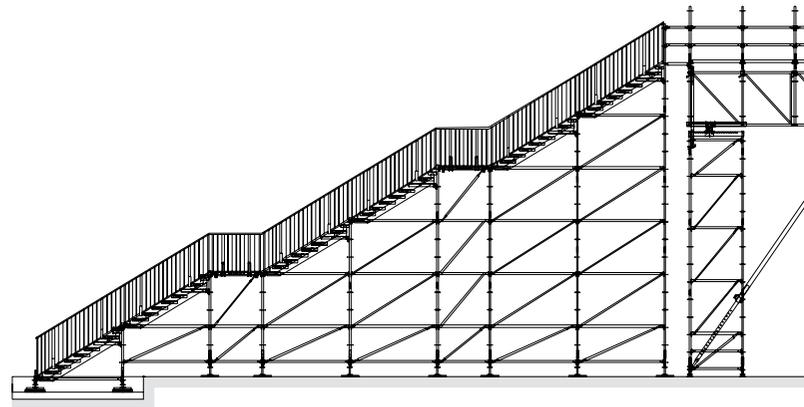


PERI UP Flex Modular Scaffolding

Temporary pedestrian bridges with the LGS Lattice Girder System

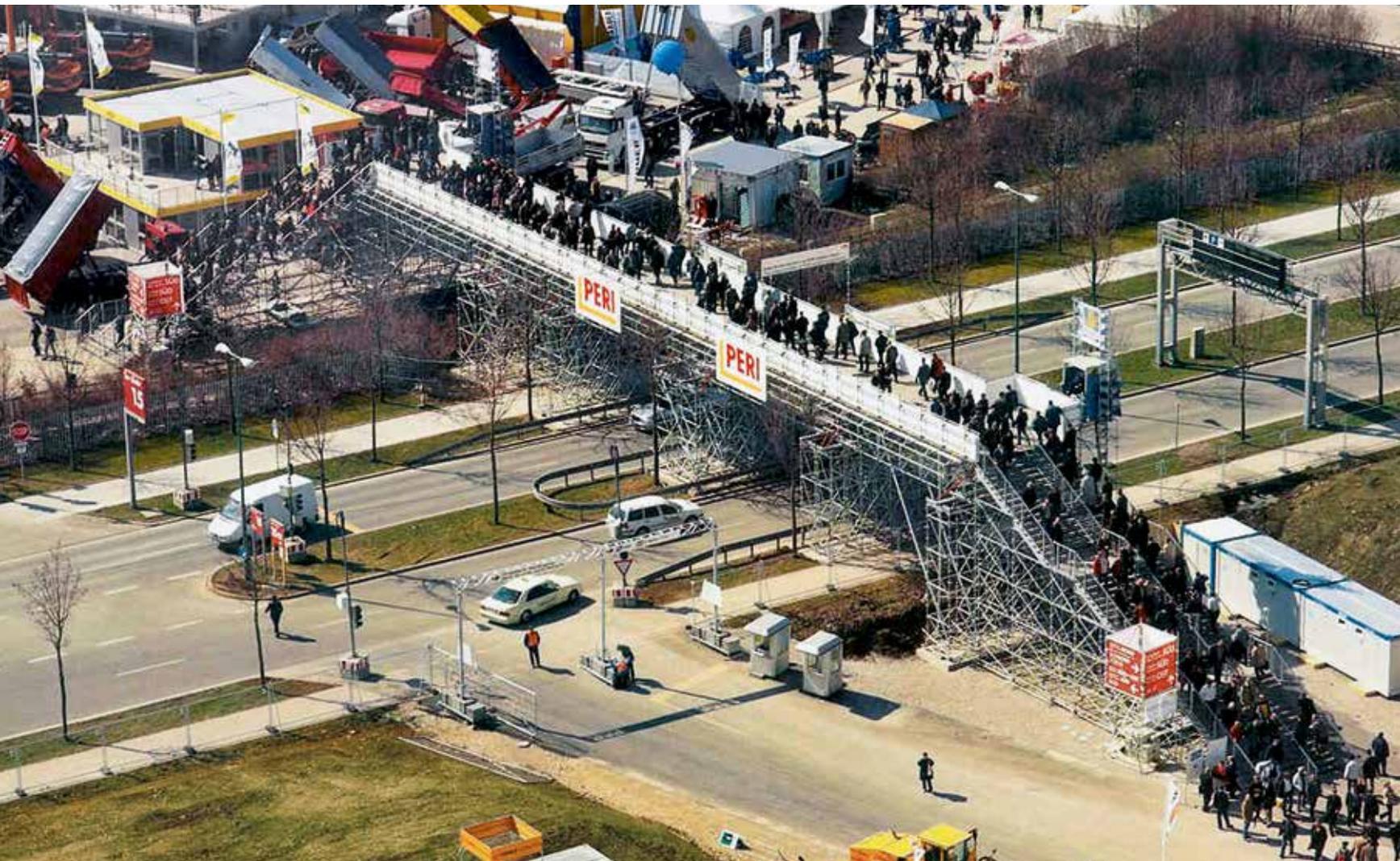
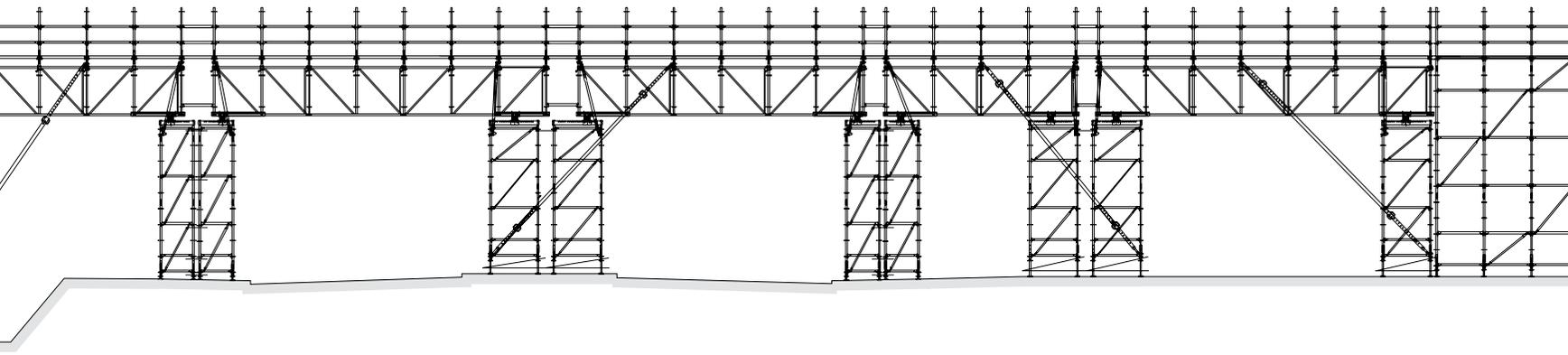
Due to its high bending and load-bearing capacity as well as fast and simple assembly with system components, the PERI UP LGS lattice girder system is particularly well-suited for cost-effective construction of temporary pedestrian bridges.

It is used in places where pedestrian traffic has to be diverted owing to building, rail or road works. The system fulfils the requirements regarding guardrail loading and geometries for use in public areas and is also suitable for large spans with loads of up to 5.00 kN/m². Non-slip plywood panels are used as decking. Designed for accommodating loads of up to 7.50 kN/m², the PERI UP Public staircase system provides safe access at all times.



LGS as a pedestrian bridge fulfils the requirements regarding guardrail loading and geometries for use in public areas.

bauma 2004, New Munich Trade Fair Centre: multiple span bridge for connecting two open air areas.



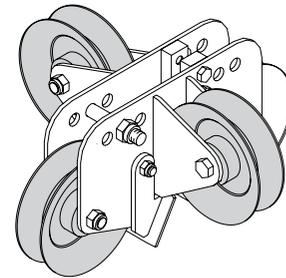
PERI UP Flex Modular Scaffolding

Working platforms with the LGS Lattice Girder System



With the LGS lattice girder system, safe working platforms can be realised at great heights. At the same time, the system provides sufficient space for storing materials. In addition, the area underneath the platforms is protected due to the installation of system decking along with dirt and dust-proof sheeting. As a result, the area under the platform can be used independent of construction work operations.

Scaffold towers from the PERI UP Flex modular scaffolding form the support structure underneath the platforms whereby the use of Rosett nodes fixed to the girder elements makes intersections and adjustments much easier. Different types of support open up a wide range of application possibilities.



The URW Wheel has four castors. This allows the working platform to be moved along the URT Aluminium Rails in both longitudinal and transverse directions.



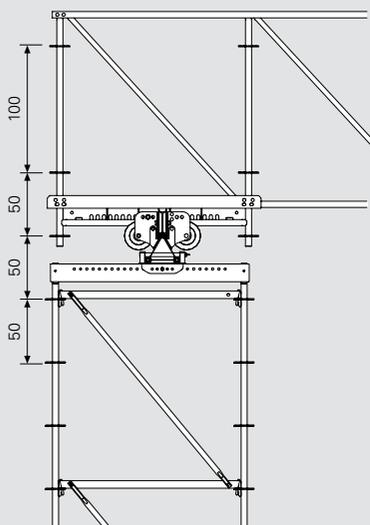
Working platforms in a church dome in Italy for carrying out refurbishment work.



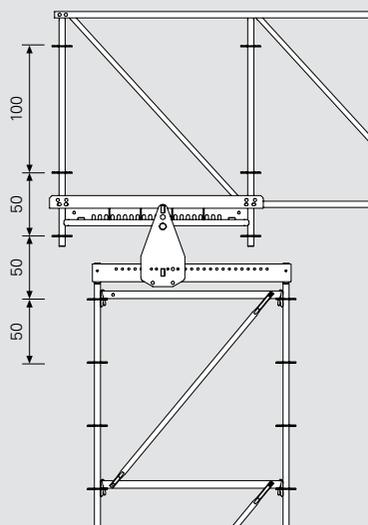
In addition to safe working areas, this LGS working platform for the renovation of the steel roof also provided protection for pedestrians against falling objects.



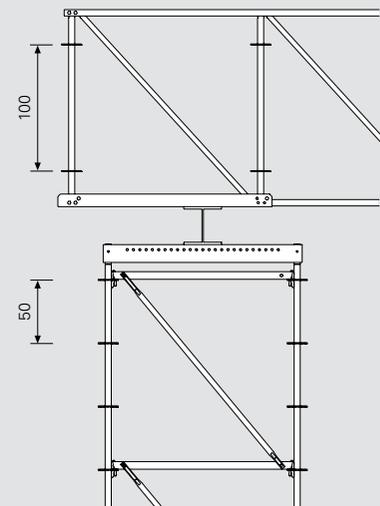
Movable support with wheels on aluminium rails: the upper part is completely independent of the lower part. As a result, optimal adjustments to loads and spans are possible.



Fixed or movable support directly on the scaffold sub-structure: the grid dimensions of the modular scaffold are maintained along the whole length of the LGS.



Fixed or mobile support on steel girders: a cost-effective solution with project-specific steel profile supports. The 50 cm grid of the sub-structure is discontinued.



PERI UP Flex Modular Scaffolding

Facade Scaffolding

A further application of the PERI UP Flex is facade scaffolding.

For this, decking with a width of 37.5 cm is particularly suitable as a 75 cm wide standard scaffold bay can be easily and quickly be covered with only two decks.

The flexibility of the PERI UP Flex scaffolding allows a range of widths which are adapted to suit the respective requirements of the user. With few additional components such as console brackets or strengthened ledgers, complicated facade geometries can also be easily scaffolded.

The installation direction of the decking can be changed accordingly which results in gap-free working areas without any discontinuities – even with complicated building geometries.

PERI UP provides end-to-end decking - without any tripping hazards.





The scaffolding width is freely selectable and can be adapted to meet a wide range of requirements.

Circular structures can also be easily scaffolded with PERI UP Flex.



PERI UP with UDG Decking and UHD Ledgers

Particularly safe as PERI UP T 72 / T 104 frame scaffolding,
extremely versatile as PERI UP Rosett modular scaffolding





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Applications

56 Facade Scaffolding

58 **PERI UP Rosett Modular Scaffolding**

Applications

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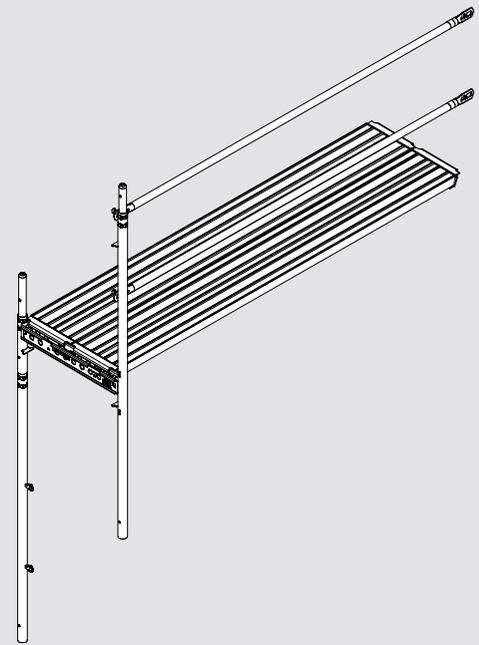
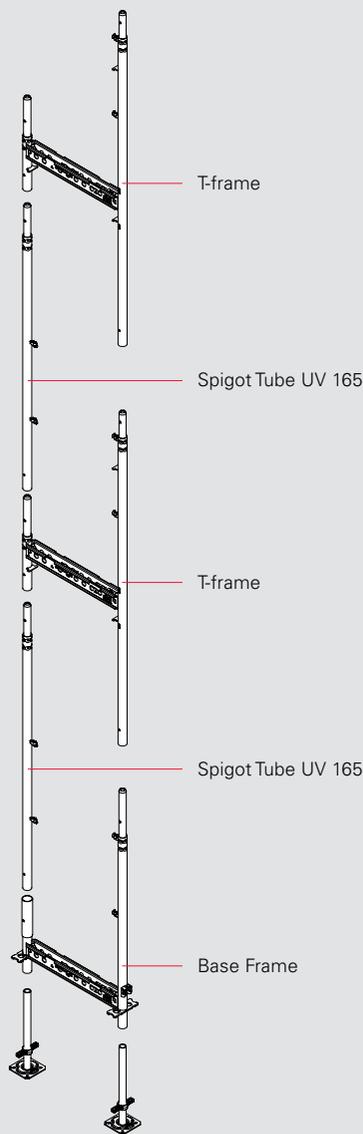
PERI UPT 72 / T 104 Frame Scaffolding

System details

The UDS-UHD deck-ledger variant is particularly safe and efficient to use, together with the T-frame, in facade scaffolding operations.

Frame scaffolding is characterized by its open frame design with T-shaped frames and the integrated protection against lifting in the decking. These detailed solutions allow scaffolders to install frames and guardrails at the same time from one scaffold level. Furthermore, scaffolders can work safely and quickly on every assembly level through the integrated collective anti-fall safeguards in the system – without any rope protection.

The T-frames are available with widths of 72 cm and 104 cm. As a result, a large range of applications in everyday facade scaffolding operations can be covered.



The open frame design consists of lightweight and easy-to-handle individual components for fast and fatigue-free working. The T-Frame UVT 72/200, for example, only weighs 13.7 kg.



With the integrated lock against lifting, the deck is immediately secured after being placed in position and moved sideways.



Safe assembly without tools: the guardrails can be mounted easily and quickly – on the inside as well as outside.

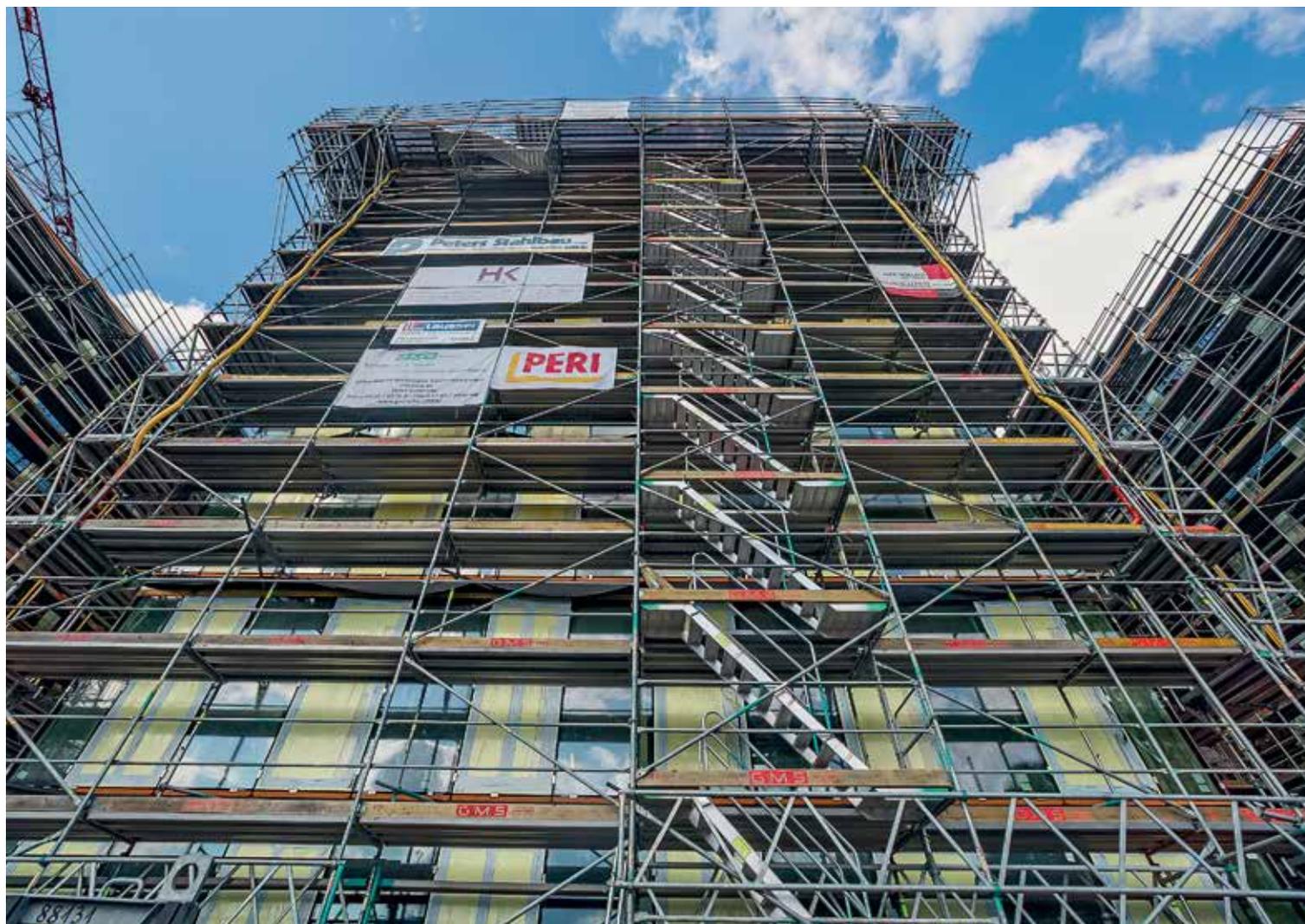


The scaffolding decks can be easily removed and re-installed – access openings can therefore be realized at any time.



PERI UPT 72 / T 104 Frame Scaffolding

Facade Scaffolding



PERI UPT 72

System width 72 cm
Decking area width 64 cm
Load Classes 1 to 4

PERI UPT 104

System width 104 cm
Decking area width 96 cm
Load Classes 1 to 6



The PERI UPT 72 / T 104 frame scaffolding fulfils all scaffolding tasks which can be technically and cost-effectively realised with frame scaffolds. In addition, the system provides the user with an extraordinarily high level of safety which makes the harness protection required in many countries unnecessary.

The guardrail in advance for the next level is assembled together with the T-frame from the lower, already secured scaffolding level. The scaffolder is therefore in a safe position when entering the next level. This is the basis for fast and safe working procedures.

The high load-bearing capacity of the PERI UPT 72 / T 104 frame scaffolding allows large bay sizes for all scaffold groups, and the work to be carried out.

The standard anchor arrangement for PERI UP follows an 8 m offset pattern. Only PERI UP has received official approval to extend this pattern to the edges of the scaffolding.

The high frame stability and load-bearing capacity of the UVT T-Frame allows many different variations: inside console brackets on every level, additional outside console brackets, protection roofs, nets and tarpaulins.

Work sequence for assembly: at first, a UVTT-Frame is installed and then the UPG Guardrail is attached.



The guardrail is subsequently connected to the next T-frame and inserted.



Finally, the UDS Steel Deck is mounted from below by the scaffolder in a safe position.



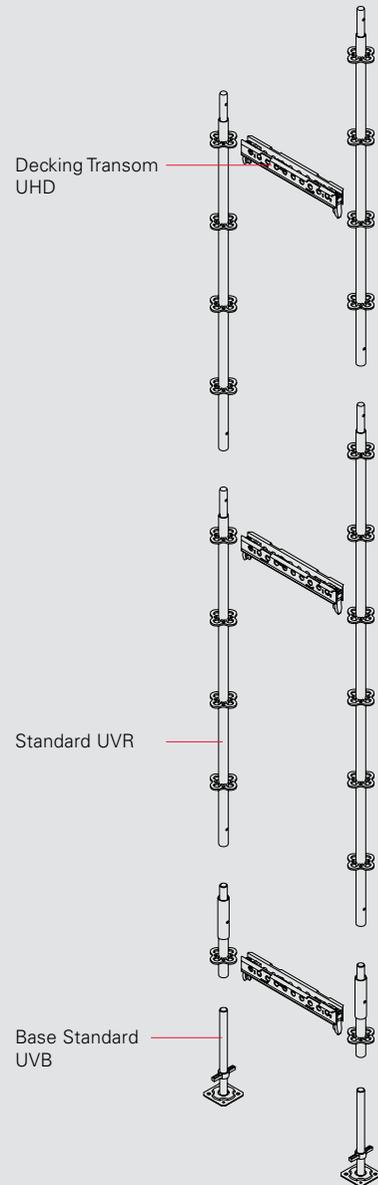
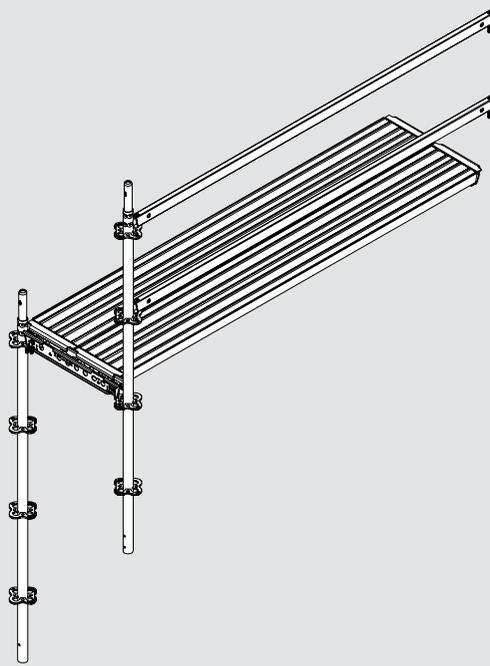
PERI UP Rosett Modular Scaffolding

System details

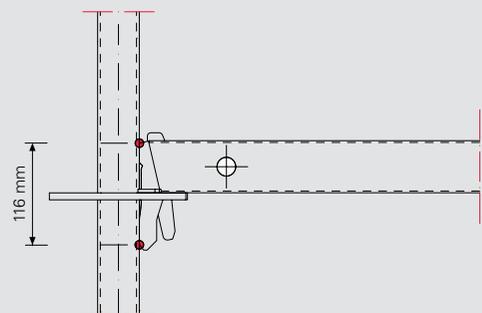
The PERI UP Rosett working scaffold can be optimally adapted to match to the form of complex building facades. As a result, complex geometries can also be cost-effectively scaffolded, e.g. old buildings with bay windows and cantilevers.

Facade elements can be quickly and safely installed at any point. The Rosett nodes on the standards facilitate easy and safe assembly whilst the steel decks have a particularly high load-bearing capacity.

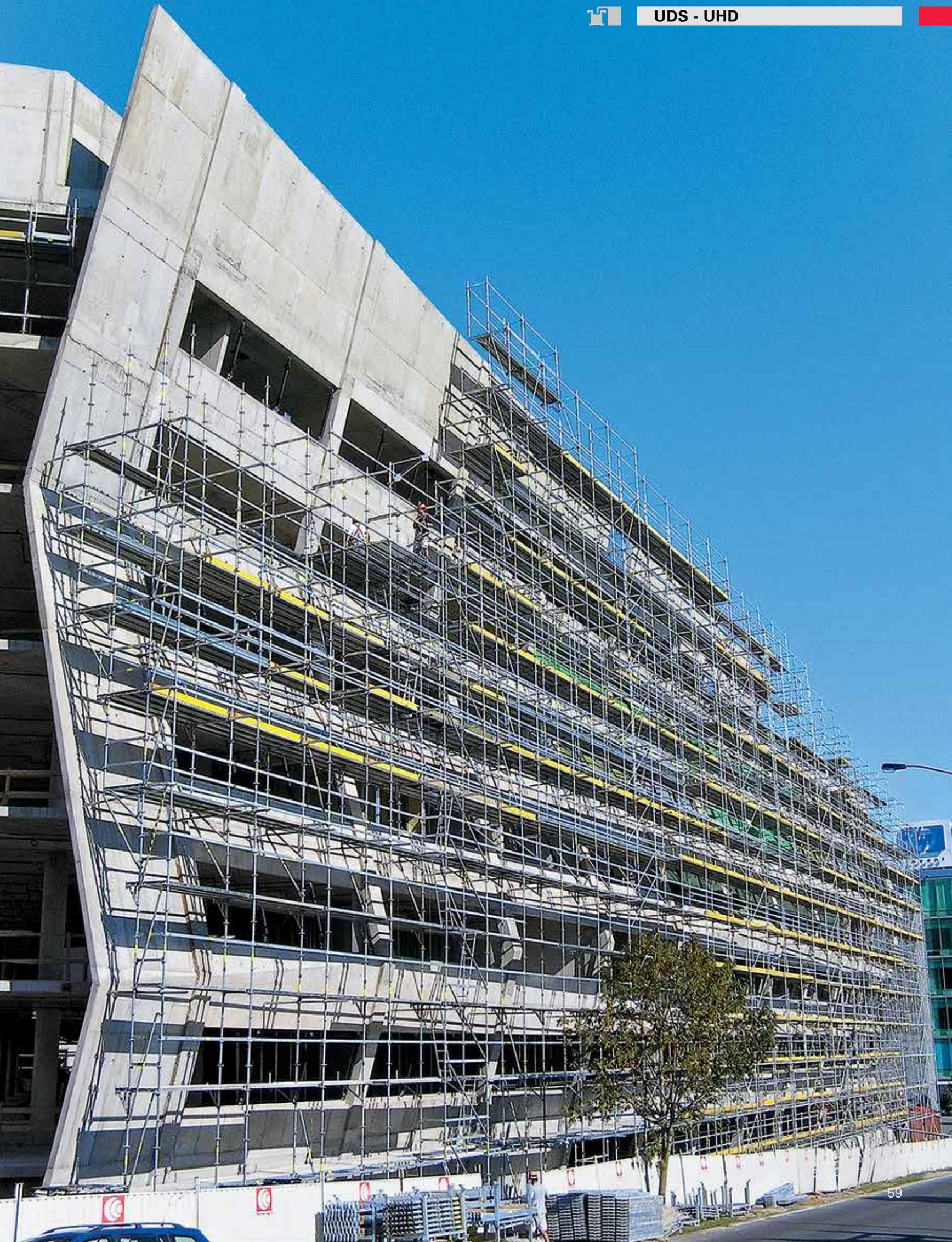
PERI UP Rosett allows scaffolding operations with standard components. The Rosett nodes at spacings of 50 cm also provide connection possibilities in all directions. An almost unlimited application range results from the use of the UDS Steel Decks with the Rosett standards and UHD Decking Transoms. Thus, all bay lengths and widths up to 400 cm can be realized.



With the integrated lock against lifting, the deck is immediately secured after being placed in position and moved sideways.



High rigidity through the large spacing between contact points of 116 mm.



PERI UP Rosett Modular Scaffolding

Facade Scaffolding



The Gravity Lock facilitates fast erection of the modular scaffolding: by inserting the wedge head into the Rosett, the wedge drops by force of gravity into the hole, and then locks.



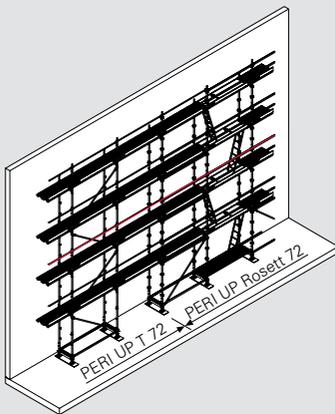
The Rosett on the standard allows for connections up to 45°. The nodes at spacings of 50 cm also provide connection possibilities in all directions.



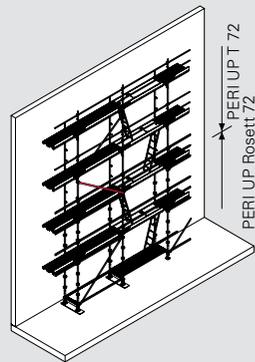
Combinations of frame and modular scaffolding for complex facades

The perfectly matched system and component dimensions allow any combination of frame scaffolding with modular scaffolding. The integrated protection against lifting provides access ways of equal height and without any obstacles.

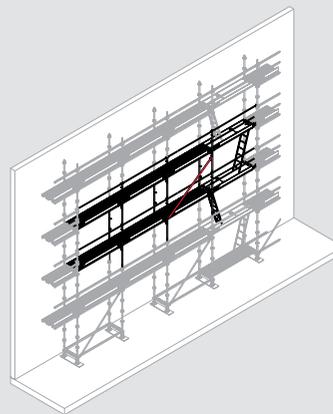
The requirements regarding working safety also remain fulfilled: the guardrail heights fully comply with regulations and toe boards can be fitted from end to end.



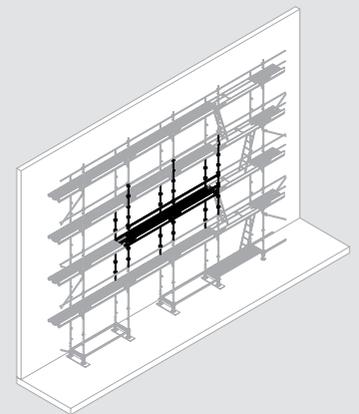
Frame scaffolding and modular scaffolding can be combined next to each other with end-to-end guardrails.



With a combination one above the other, coupler braces are to be arranged in the transition level. The Rosett only requires diagonal bracing in the lowest level.



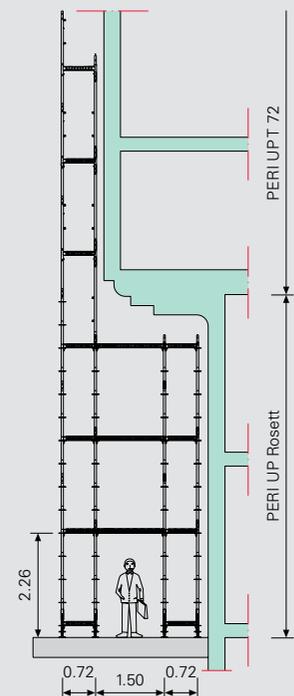
In the areas of PERI UP Rosett modular scaffolding, scaffolding frames can be integrated. Bracing takes place by means of face braces.



If elements of the modular scaffolding are integrated in the frame scaffolding, the ledgers provide the bracing in the area of the modular scaffolding.



The working scaffold for the 2.20 m long cantilevered bay and the required pedestrian access were realised with modular scaffolding; in the upper area, PERI UP T 72 ensured short erection times.

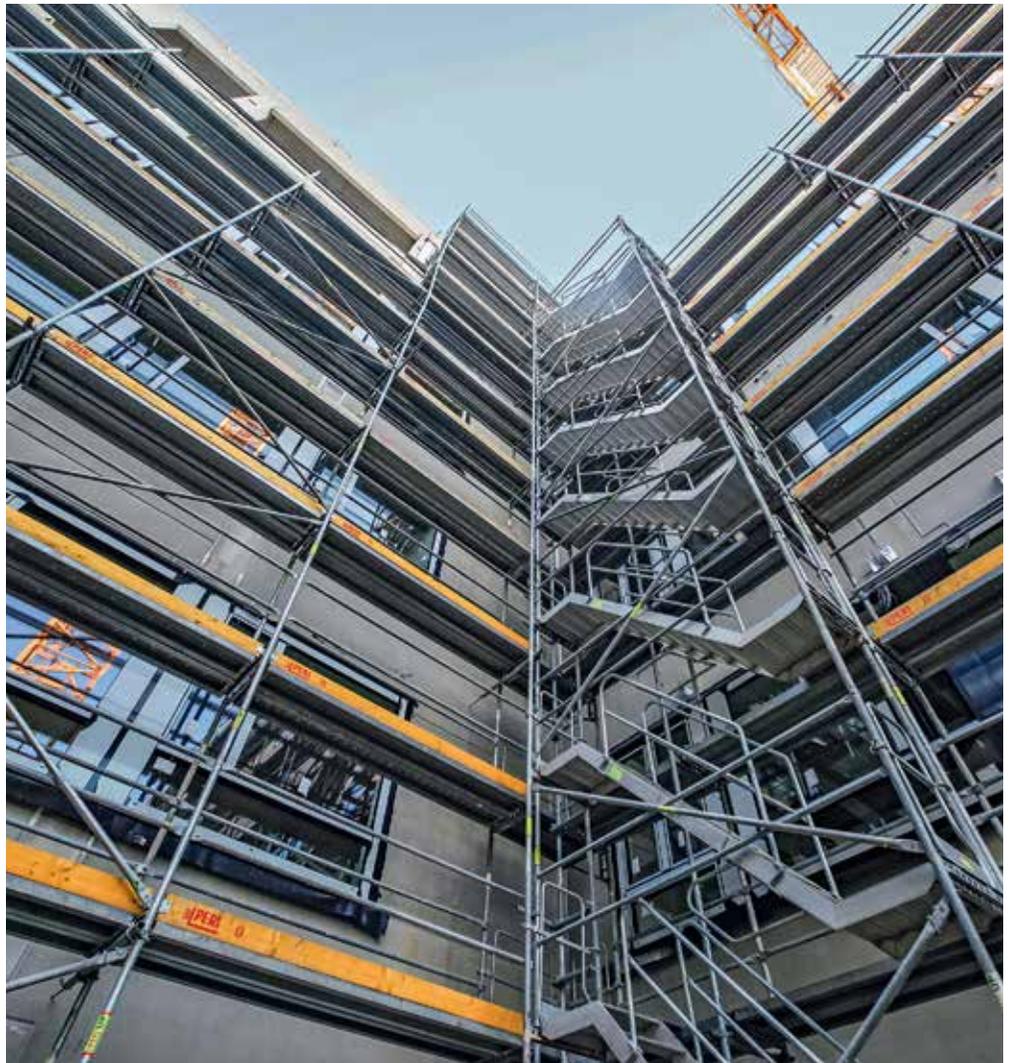


PERI UP Rosett Modular Scaffolding

Access – Staircase Alu 64

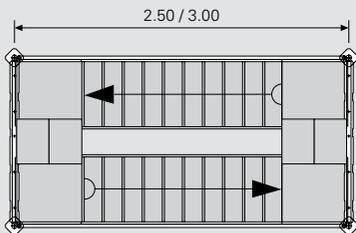
PERI UP Staircase Alu 75 can be used free-standing and as offset units up to heights of 90.00 m. With the height grid arrangement of 2.00 m, the stairs are ideally suited as front-positioned stairways for facade scaffolding. Each working level can be reached without requiring any height adjustments.

In addition, the stairways together with the PERI UP Rosett modular scaffolding can also be used as independent staircase towers. The staircase unit only weighs 24 kg which means it can be quickly assembled.

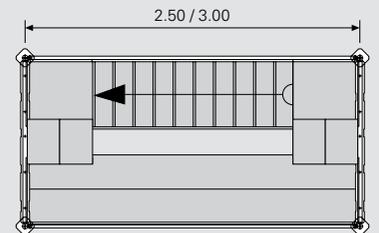


Staircase Alu 64 as front-positioned stairways for facade scaffolding.

Alternating staircase units under a PERI RCS Rail Climbing System with entrances into the building



Stair tower with alternating staircase units provides large head clearance and shorter walking distances for site personnel between levels.



Stair tower with staircase units in the same direction is the preferred type for installation work and, apart from providing access, also offers work platforms.



The modular design of the PERI UP Rosett stair towers accelerates planning for the access points.

PERI UP Rosett Modular Scaffolding

Public Stairways – PERI UP Public

For temporary stairs used in public areas, special attention is paid for ensuring the safety of the users. Existing regulations are frequently tightened through additional requirements placed on the event organiser.

PERI UP Public meets the following requirements: the stair system has been designed for live loads up to 7.50 kN/m² and the guardrails for loads up to 2.00 kN/m to fulfil the highest safety regulations. In addition, the geometrical requirements with regard to the ratio of rise and tread, safety barriers and climbing over guardrails are also met, likewise vandal-proof requirements.

With a low number of individual components, a wide range of structures can be realized: single continuous staircases with widths of 150 cm, 200 cm or 250 cm; linked continuous staircases of any width as a single continuous staircase sequence; dog-legged staircases as well as staircase towers with and without stair wells.

The steel decking can be installed on both sides of the stair stringers so that stairways of any width can be erected.

A free-standing public staircase with a viewing platform at a height of 15 m.



Construction as a stair tower with intermediate landings.



Solution for a trade fair: a stairway leading to a pedestrian bridge complete with separate and areas of different widths for climbing up and down.



PERI Public as a stair tower inside a church which serves as an emergency stairway in case the electrically-operated elevator breaks down.



For major public events, access facilities have to be provided for large crowds. For this, linked continuous staircases with separate access points through inner guardrails are used.



Examples of completed projects



68	Building Construction
80	Cultural Buildings
92	Transport Engineering
100	Industrial Structures
114	Building Redevelopment
128	Combined solutions comprised of formwork and scaffolding



The following pages show examples of all areas of scaffolding construction. Although they may provide ideas, they must not be used as instructions for implementation.

Central Railway Station, Wiesbaden, Germany

Mobile platforms for shed roof renovation during on-going daily operations



Rainer Morawietz, Project Manager
Metin Kizmaz, Site Supervisor

“This here is a project that falls outside of any standard scaffold frame undertaking. In spite of the uniqueness of the PERI solution with the mobile platforms, everything worked smoothly.”

Contractor

ARGE Instandsetzung Hallendach
Hauptbahnhof Wiesbaden:
Ed. Züblin AG / Eiffel Germany
Stahltechnologie GmbH

Scaffold Contractor

Gerüstbau Paul GmbH, Frankfurt a. M.

Field Service

PERI GmbH Germany, Düsseldorf,
Frankfurt and Weissenhorn Offices

On the basis of the PERI solution featuring transversely and longitudinally movable working and safety platforms, refurbishment work for the glass roofing on the five-span train shed was carried out very quickly and without significant interference to rail operations and passenger movements throughout the station. Thanks to the mutually supportive cooperation from the planning phase onwards between the ARGE partners, scaffolding contractor and PERI engineers, all specified deadlines were met. The use of standardized, rentable system components from the extensive scaffolding and formwork product ranges also played an important role here.

The 17.50 m to 25.50 m wide glass-steel roof constructions of the five listed, 195 m long platform halls were replaced section by section. Normal station operations remained virtually unaffected during the

entire refurbishment work as the railway tracks in the section to be renovated were covered by a PERI protective roof construction.

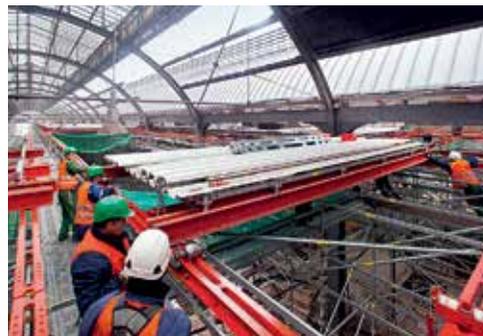
Mobile platform units minimized the time required for moving to the next phase. For the planning of the PERI UP load-carrying system, not only were the rail tracks to be kept open but suitable walkways for pedestrians with sufficient width of passage also had to be taken into consideration. In addition to the vertical loads, the scaffold sub-structure also carried all horizontal loads from the platform. Anchoring to the steel components which were to be refurbished was not possible due to structural reasons. Safe access was provided by 75 cm wide aluminium and 1.00 m wide steel stairs respectively of the PERI UP scaffolding system.

Bridging the retail outlets and kiosks was realized using system components. Shear frames were formed that were adapted to suit the local conditions. Integrated HDT Main Beams taken from the HD 200 Heavy-Duty System carried the loads – even from large spans of up to 10 metres – and reliably transferred these into the PERI UP supporting structure. For accommodating corresponding load concentrations, the scaffold legs could be bundled together by means of short 25 cm ledgers.

The 190 m long protective roof construction straddled the rail tracks with spans ranging between 7.50 m and 12.50 m – this meant that the refurbishment work on the hall roofs could be carried out without affecting train schedules and passenger movements.

Manoeuvring at a height of 7 m: moving the platforms both transversely and longitudinally was carried out on rails whilst being secured on the sides at all times. The units moved sideways on roller blocks from the newly renovated hall into the next ...

... where they were easily moved by hand in a longitudinal direction by means of a trolley on steel walers to the next place of operations.

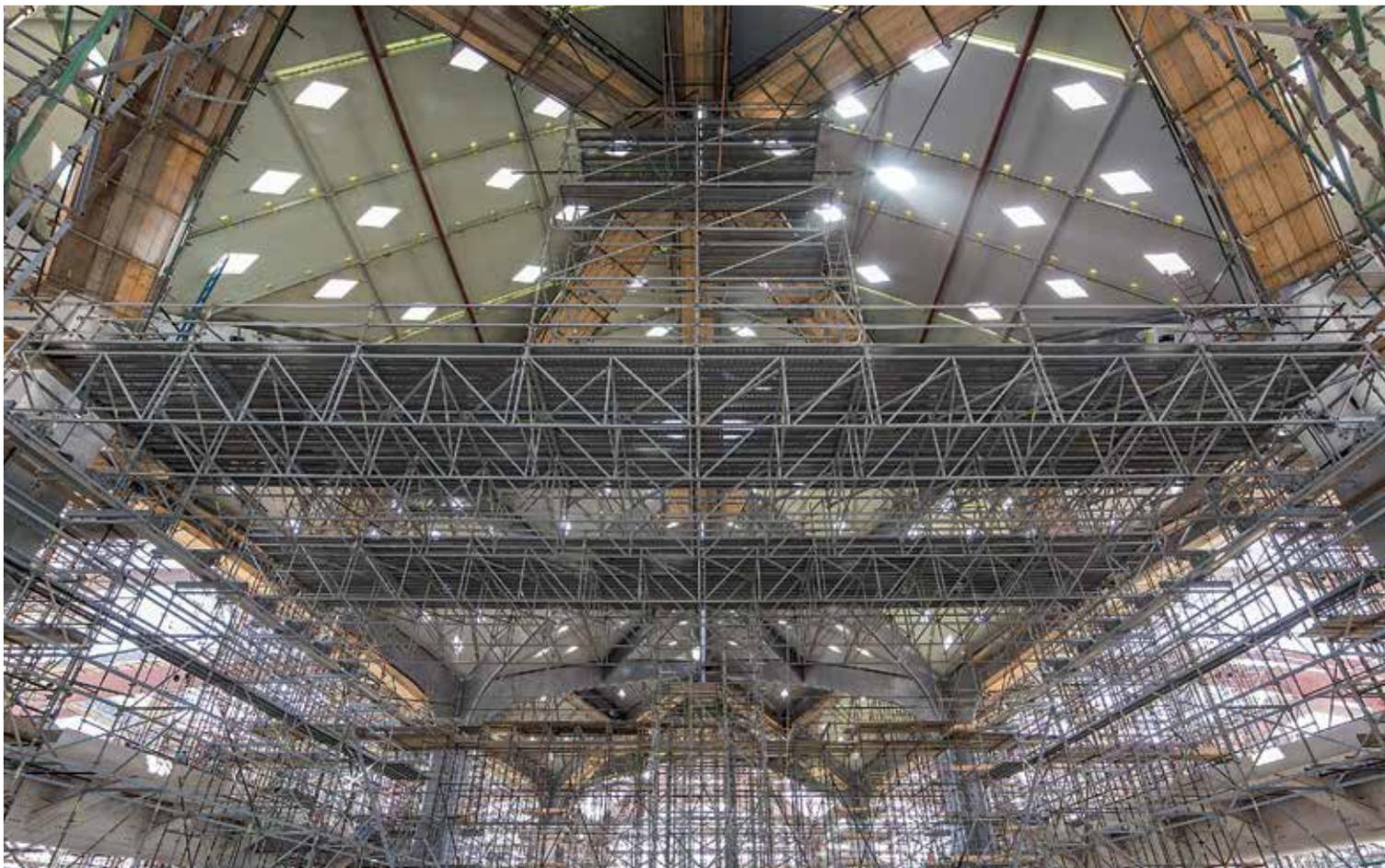


A total of 66 platforms with 3.00 m standard widths could be moved by hand without any mechanical support to the next section.



Haramain High-Speed Rail Link Phase 1, KAEC Station, Saudi Arabia

Wide-spanned platforms for safe working conditions



The Haramain high-speed rail link connects the Muslim holy cities while reaching a total length of around 450 km. Integrated in the project is a separate line to the King Abdulaziz International Airport (KAIA). The double-track, electrified line primarily serves to ensure the fast and safe transport of pilgrims whereby up to 160.000 passengers will be transported per day in the future. Operator of the rail link is the Saudi Railway Organization.

Phase 1 featured a wide range of excavation work as well as several stations – including the King Abdullah Economic City transit station complete with restaurants, mosques, parking facilities and various retail areas.

One particular challenge was the construction of the station roofs with large spans and the special arched architecture. For the

work required on the roof, large-sized safe working platforms had to be installed at heights of over 18 m. Top priority was ensuring the safety of the many teams working on the construction site, because a wide range of building work was being carried out in parallel which included, among other things, all mechanical and electrical work for train operations.

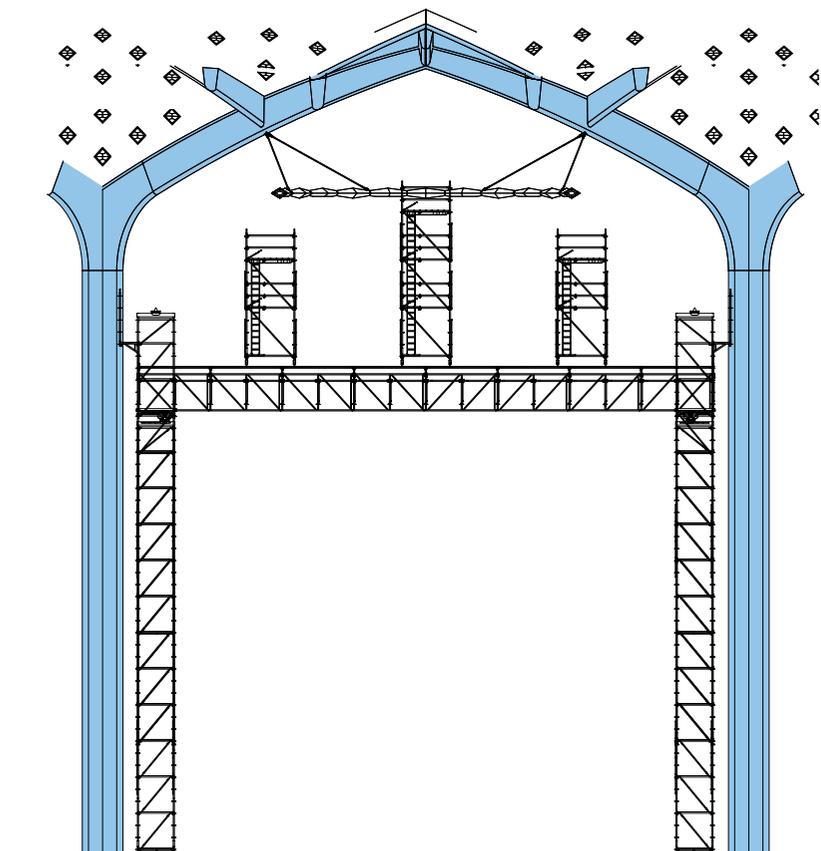
For this, PERI engineers developed a mobile solution on the basis of the LGS Lattice Girder System. With the scaffolding system, lattice girder supporting structures with 28 m spans were realized. Due to the low weight of the individual components, larger units could be pre-assembled on the ground by hand and then lifted into the final position with the crane. The over 18 m high supporting construction included integrated access to all working areas and was erected using system components taken from

the PERI UP Flex modular scaffolding system. Thanks to the integrated moving devices, the platforms were easily shifted to the next work section by hand in each case.

The circumferential anti-fall protection and continuous guardrails ensured safe working conditions. In addition, the system decking provided completely closed surface areas so that no objects could fall to the ground and workers under the working platforms were protected at all times. Safe working operations and easy handling due to the low component weights accelerated all processes on the jobsite. The fact that the entire scaffolding solution could be realized with rentable PERI UP system components additionally enhanced the cost-effectiveness of the solution.



On the platforms, smaller working scaffolds were assembled on the basis of the PERI UP Flex modular scaffolding which allowed access to all areas of the roof.



Contractor
El-Seif Engineering & Contracting Co.
Construction Site Support
PERI Saudi Arabia



Jeremy Thorpe
Project Manager

“The PERI system is particularly flexible, and there are no constraints as with conventional scaffolding systems. As a result, the costs for the scaffold construction were significantly reduced. PERI UP is very light and also durable – at the same time, assembly and dismantling is very simple as well as the moving procedure.”

Technology Centre, Falkenberg School, Sweden

Protective roof, load-bearing system and facade scaffolding rolled into one



Kjell Andersson
Site Manager

“PERI UP was the only system that provided us with the possibility to be able to realize the complete enclosure as well as accommodating the gantry crane with only one scaffold construction.”

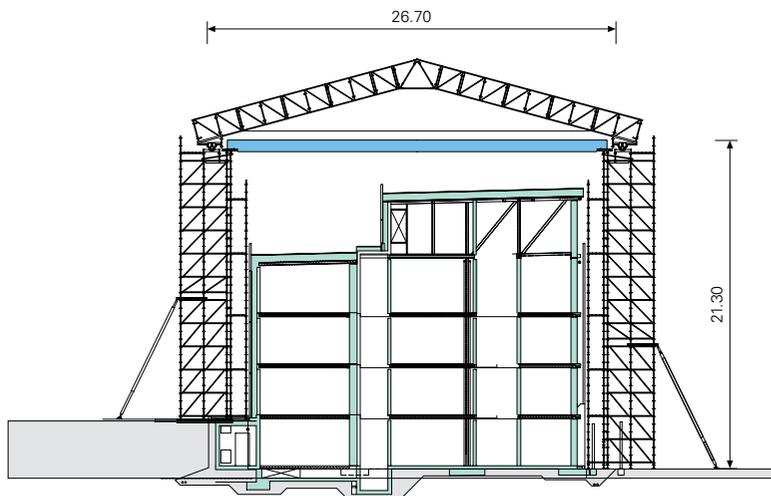
Contractor

Tage & Söner, Halmstad

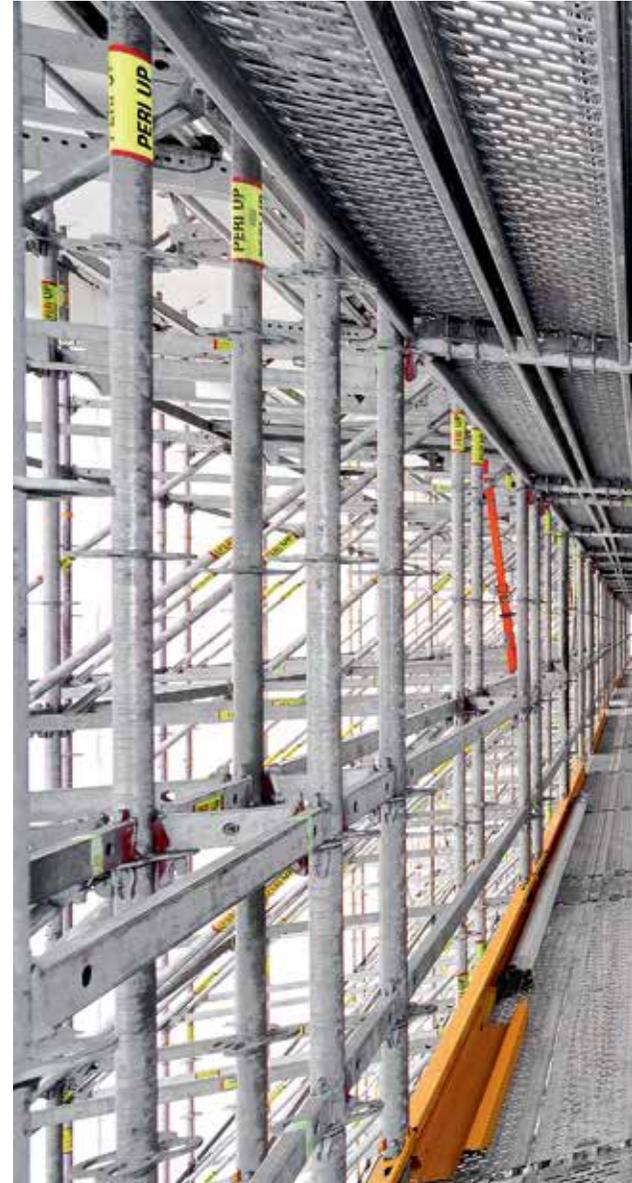
Field Service

PERIform Sverige AB, Halmstad

PERI GmbH Germany, Weissenhorn



The PERI UP scaffold solution served as the housing, for accommodating the gantry crane as well as a working scaffold for the insulation work on the external facade – with integrated access technology.



Due to the flexible adaptability of the PERI UP modular scaffolding in combination with system components taken from the PERI programme, all requirements regarding the enclosure, accommodating the gantry crane and working scaffold for the insulation work could be fulfilled with only one scaffold construction.

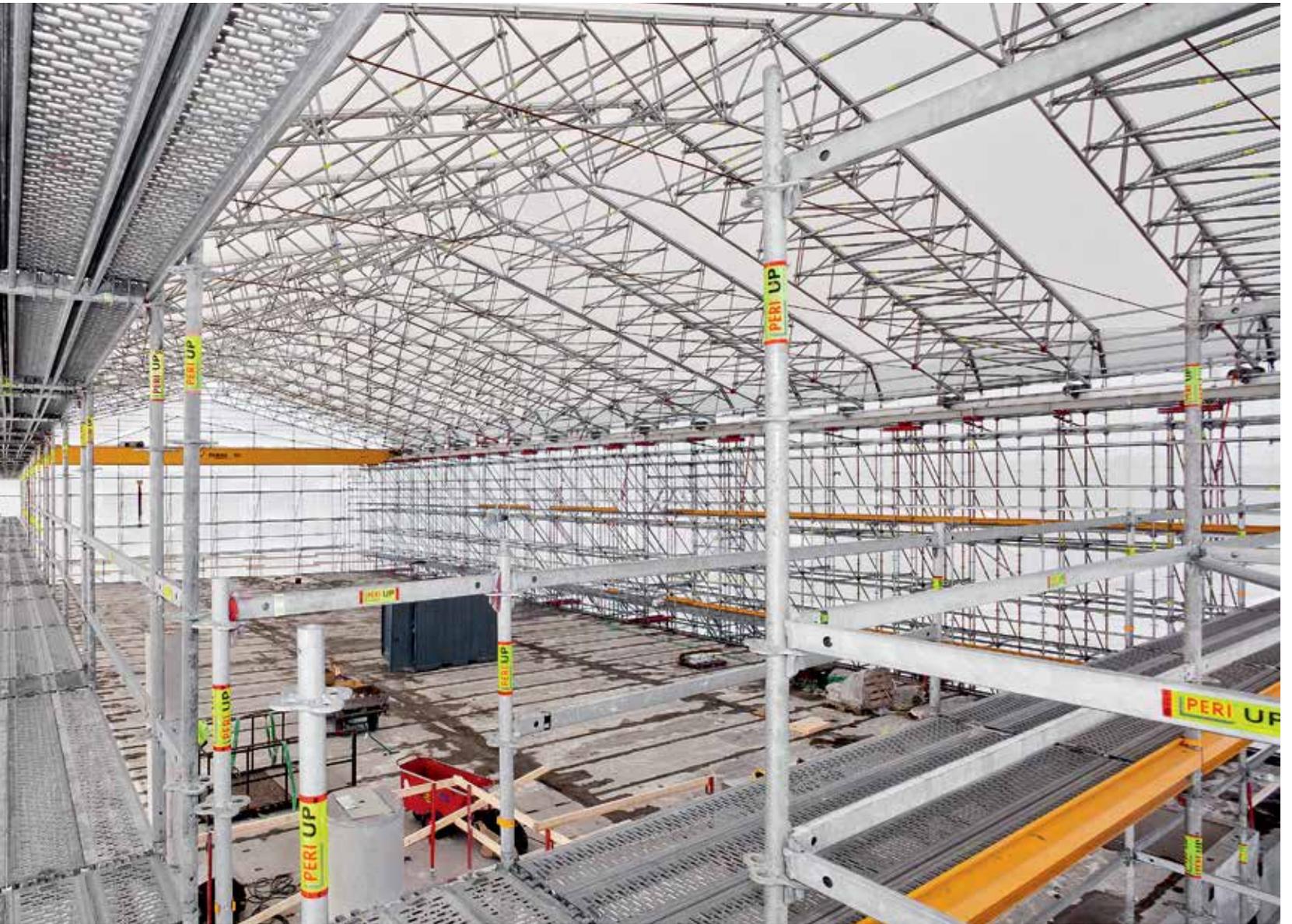
The four-story NTC building (NTC = Naturvetenskapligt och Tekniskt Centrum) has an area of 3.500 m², and was designed and constructed as a passive house. Maximum use is made of solar and wind energy

on the facade and roof whilst the extensive thermal protection measures also demanded the highest quality of construction work.

With the help of the LGS Weather Protection Roof and the enclosure on the basis of the PERI UP Flex modular scaffolding system, construction work throughout was provided with full protection against external weather conditions. In addition, an important element of the PERI solution was the integration of a gantry crane in the scaffold construction. Furthermore, the entire material transport took place in the protected

area: wide access points on the longitudinal sides allowed easy truck deliveries, RCS Climbing Rails served here as bridging girders.

Accommodating and transferring the loads from the crane track into the scaffold was carried out via SRU steel walers. In order to adapt the load-bearing system to handle the load concentrations, legs were bundled together by means of 25 cm ledgers. RS 1400 Push-Pull Props from the PERI product portfolio stabilized the scaffold construction at spacings of 6 m.



The weather protection roof on the basis of the LGS Lattice Girder System had a span of 26.70 m.

PERI engineers took into account the integration of a gantry crane with a 10 t lifting capacity in their scaffold concept.

The PERI complete housing construction was 51 m long, 34 m wide and 26 m high – ensuring high quality of execution of all constructional measures.



“The Bow”, Calgary, Canada

Crescent-shaped scaffolding: PERI UP at its best



The direction of the decks can be changed within a scaffold bay at any point which increases the flexibility of the system.



The staircase meets high load and accessibility requirements – with a permissible load of 3.0 kN/m² and 1.00 m wide stairways.



The Rosetts allow connections of up to 45° so that the scaffolding can be optimally adjusted to match the crescent-shaped atrium.

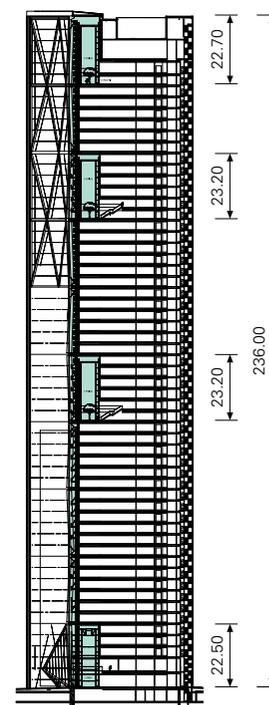
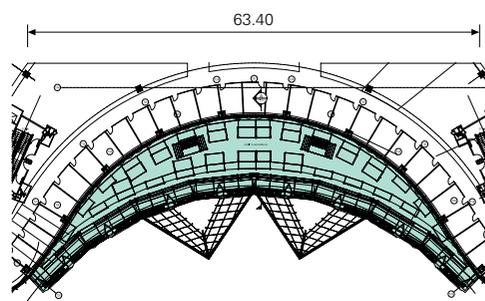
The 236 m high office tower, “The Bow”, is shaped like a crescent and the most striking feature of the building is the diagonal arrangement of the steel support structure. A well thought-out PERI UP scaffolding concept provided safe access and generously-sized working platforms for all subsequent sub-contractor work on the shell construction.

“The Bow” is the headquarters of the EnCana Corporation, a company operating in the oil and gas industry. Not only does the office tower feature an extraordinary design but also the building concept which was tailored to meet the needs of the employees. Shape and orientation of the building have also been ideally adapted to suit the local climatic conditions: a glass atrium extends in a south-westerly direction over the entire building height whilst an intelligent energy concept ensures optimum utilization of solar energy and minimum energy consumption.

For painting as well as mounting of the fire protection cladding, insulation and installation of the piping system, the PERI UP scaffold solution fulfilled a wide range of requirements regarding working area dimensions and potential loads for the work scaffolding, shoring and stairs. Installation of platforms at distances of 2.50 m over the

entire height of the building was requested. One of the most important requirements to be fulfilled for all sub-contractors was to ensure that the working platforms were as close as possible to the complex steel structure. Here, the main beams ascended at an angle of 76° whilst the front of the building is curved in the form of a crescent.

PERI UP Flex could be used extremely versatilely. The metric grid dimensions along with the 25 cm and 37.5 cm decking widths provided maximum flexibility and the Rosett nodes allowed connecting possibilities in all directions. This flexibility and high load-bearing capacity with only a small number of diagonals made the scaffold solution quick and cost-effective. For work on the steel construction, the diagonally-positioned profiles had to be accessible from all sides. With bracket cantilevers and the use of corner plates for the inside corners, the working areas could be adapted with maximum effect to match the steel components. In addition, adapting to the complex structure was achieved by changing the direction of the decking: the span direction of the decks could be changed within a scaffold bay at any point – several times if required.





High level of safety for all work carried out by the sub-contractors: with PERI UP Flex, working platforms could be adapted to suit to the complex, curved steel structure.



Duncan McMillan
Senior Construction Manager

“PERI UP fulfilled all the very high project requirements in terms of access technology, safety and efficiency. We are extremely pleased with the support we received from the PERI team.”

Contractor
Ledcor Construction Company, Calgary
Architect
Foster & Partner, London
Field Service
PERI Formwork Systems, Inc. Canada, Calgary

CIS/Interporto di Nola Service Centre, Naples, Italy

Flexible shoring for a complicated structural form

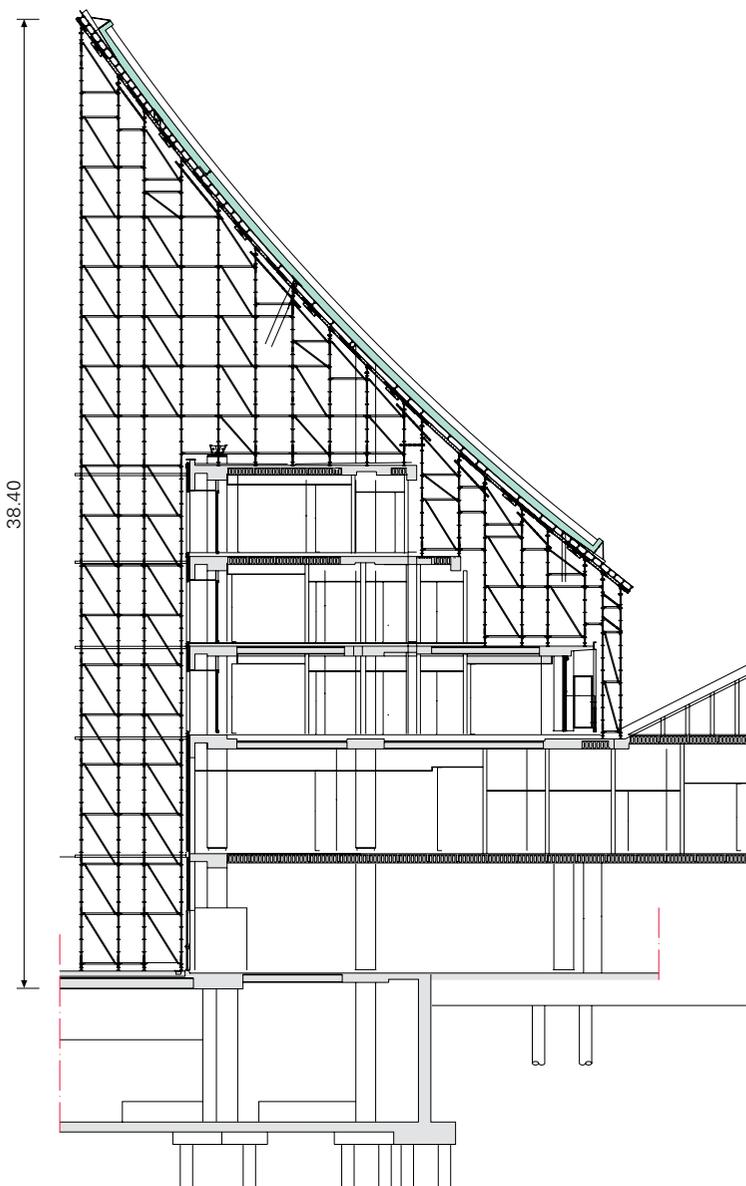
The shoring towers comprised of PERI UP Rosett with grid dimensions of mostly 2.00 m x 1.50 m and were connected by means of system parts to form a spatial load-bearing construction. These were of varying heights reaching up to 38 m in the centre.

The modular structure of the PERI UP system allowed assembly on different erection area surfaces. Both vertical and inclined reinforced concrete columns could then be easily accommodated without any difficulty. The continuously changing angle of inclination, and adapting the load-bearing columns with appropriate auxiliary support on the slab underside, were already taken into consideration during the planning phase.

Due to the accurately designed formwork and easy to install individual components, site crews were able to assemble the scaffolding and formwork within a very short time. Neatly-arranged storage with PERI storage pallets ensured fast material access and saved space on the construction site. For crane-independent dismantling in particular, fast working operations could be achieved with the lightweight PERI UP system components.

For shuttering the floor slabs in the lower levels, lightweight aluminium SKYDECK panel slab formwork with its drophead system was selected to ensure fast striking. The panel grid of the SKYDECK system was used as a design element for the visible

slab surfaces. For forming the massive reinforced concrete walls with a range of different heights, TRIO panel formwork with only a minimum of individual components proved to be particularly advantageous.



**Geom.
Oronzo Rampino**
Site Manager

“The PERI UP scaffolding system could be installed quickly and safely even at large heights. The system’s high degree of adaptability allowed us to erect both shoring and slab formwork in the shortest possible time in spite of the complicated building geometry.”

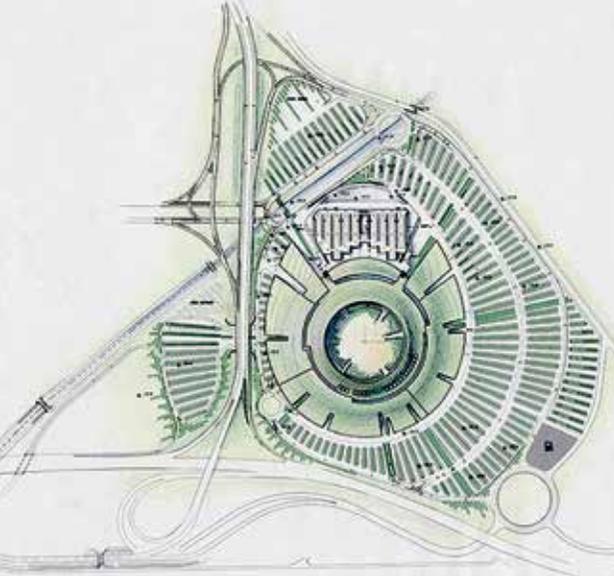
Contractor
Vesuvio S.c.a.r.l., Nola
Field Service
PERI Rome, Italy

The plan shows a ring-shaped building complex dominated by an unusual roof structure rising to a height of 41 m. This climbs with constantly changing inclinations of between 10° and 55° to the “edge of the crater.” The twisting reinforced concrete slab which is found on all sides has a thickness between 30 cm and 40 cm.

Architect Renzo Piano was inspired by the form of the nearby volcano, the world famous Vesuvius. Numerous restaurants, cinemas and conference halls as well as a shopping centre and a hotel, are located around the centrally-positioned "crater" which has a diameter of 160 m.

Through the modular assembly, complicated geometries could also be cost-effectively scaffolded and existing columns could be accommodated without any problems. Well-organised storage ensured fast access to materials and reduced stacking and transportation volumes.

The lightweight individual components could be quickly and easily assembled. In particular, when dismantling without any crane support this was a big advantage and ensured fast construction progress.



New Surgery Clinic, Ulm, Germany

Easy-to-assemble, extremely high load-bearing shoring constructions





The PERI UP Rosett shoring system solution served for temporarily transferring the loads of the main building complex over a height of 16 m via the base construction.



190 m long, 170 m wide and 25 m high – 150 highly-motivated construction workers and a customised PERI formwork and scaffolding solution ensured that the

structural work was completed on time. The topping-out ceremony was held in April 2010.

The new University of Ulm clinical centre consists of a finger-like base construction on which a three-storey building is arranged like a magistrale.

On a total area of 30.000 m², the complex has a total of 235 beds and 17 operating theatres.

Supplementing the comprehensive formwork solution comprised of TRIO, RAPID, FTF and SKYDECK for walls, columns and slabs, was the 16-leg and more PERI UP shoring towers which ensured fast construction progress. These temporarily transferred the loads of the 165 m long main building at heights of between 6.80 m and 16.05 m safely downwards.

Up to the point when the final storey was completed and the building's inherent stability had been reached, over 30 kN/m² of surface loads had to be taken into consideration. For this, PERI engineers planned corresponding shoring towers complete with additional frames. In addition, the braced shoring towers were extended to 1.50 m base widths in each case with respective additional frames – and optimally adapted to the existing geometry and expected loads by means of 25, 50 cm and 75 cm ledgers.



Dirk Brandt
General Foreman

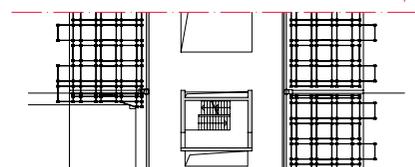
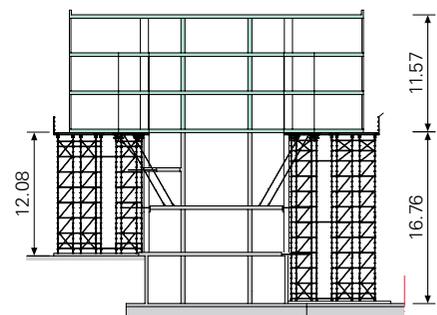
“After a short briefing by the PERI supervisor, the PERI UP shoring towers could be assembled in no time at all. It was also an advantage regarding the handling and work preparation that we only had one partner for both the formwork and scaffolding operations.”

Completely pre-assembled on the erection area, the 16-leg shoring towers were then transported to the respective place of work by crane.



Contractor
BAM Deutschland AG, Stuttgart
Field Service
PERI Weissenhorn, Germany

For adapting to the various ground contact areas and the range of loads resulting from the different construction stages, the modular PERI UP scaffolding system provided the necessary flexibility.



Henninger Turm, Frankfurt am Main, Germany

Safe demolition operations with the PERI modular design principle





PERI UP safety scaffolding ensured problem-free demolition of the 50 year old grain silo of the Henninger Brewery in Frankfurt-Sachsenhausen. For many years, the 120 m high Henninger Turm was the tallest building in the city but the famous Frankfurt landmark finally had to make way for a new building.



The tower was gradually taken down in a carefully planned operation. For the demolition work at the top involving the revolving restaurant known as the "Fässchen" ("Barrel"), PERI UP Flex served as 16 m high safety and working scaffolding at the same time. Here, cantilevered RCS climbing rails formed a very stable erection area.



A total of 20 scaffold units each 2.50 m long and featuring 2 rows were assembled on the ground by the scaffolding team and lifted in position by means of a mobile crane. Due to SRU steel walers already installed longitudinally under each of the 10 base units, the scaffold could be mounted quickly and safely on the RCS erection area at a height of around 100 m. The intermediate sections were subsequently placed in position and the safety scaffolding extended to reach its final height of 16 m.



Karl-Heinz Metzger
Project Manager

"PERI provided us with a customized solution on the basis of ideally matching scaffolding and formwork components according to the modular design principle. Due to scaffolding assembly and dismantling operations taking place mostly on the ground, the risk potential and negative impact on the demolition work was minimized."

Scaffold Contractor

Gerüstbau Paul GmbH,
Frankfurt a. M., Germany

Field Service

PERI Weissenhorn, Germany

Frankfurt Skyline

Six of the 18 high-rise buildings which could be visited during the Frankfurt Sky-scraper Festival were realized using PERI formwork and scaffolding solutions.

This impressive panorama provided the background for the workers tasked with the demolition of the famous Henninger Turm.



Toskana Thermal Baths, Bad Orb, Germany

Thermal bath and roof formed to perfection



Roland Herkert
Project Manager –
Roof Construction

“The 3D scaffold planning provided by the PERI engineers, which had been agreed on beforehand by everyone involved, ensured that afterwards everything went extremely well on site. PERI UP is an incredibly flexible scaffolding system which optimally pre-determined the complex geometry of the roof and thereby the bearing points and platforms.”

The Toskana Thermal Bath complex in Bad Orb in the Spessart region of Germany features an architectural highlight in the form of an unusual, 2,300 m² roof landscape. This spans the spa facility like a wave. Each of the 700 – up to 4 m long – laminated timber ribs is unique because every piece is different and only fits in a certain position.

Parallel to the structural work, an 11,000 m³ PERI UP birdcage scaffold provided safe working platforms and accurately defined bearing points for the precisely-dimensioned roof assembly. The shoring and working scaffold was based on 3 m grid dimensions which proved to be extremely flexible through the use of 25 cm wide UDI decking and could be divided into virtually any bay length.

Through the realisation of unusual roof constructions, the PERI UP Rosett modular scaffolding system has proved its flexibility and versatility time and time again. Its metric grid dimensions allow perfect adjustment to the geometrical and structural requirements in each case. In addition, scaffold assembly is easy and safe – in particular, due to the low individual weights and the self-securing ledger connections.



During the detailed planning of the PERI UP birdcage scaffold, the subsequent roof geometry and the continuously changing erection areas were taken into consideration.

Contractor
Industriebau Wernigerode GmbH, Wernigerode, Germany
Roof Construction
Hess Wohnwerk GmbH & Co. KG, Kleinheubach, Germany
Field Service
PERI Berlin, Frankfurt and Weissenhorn, Germany



The very unusual timber roof construction spans the thermal bath complex, complete with an 800 m² expanse of water, like a wave and rests on only eight bearing points. Its assembly, with the help of PERI UP shoring and working scaffold, took place approximately at the same time as the structural and finishing work.

The fact that Industriebau Wernigerode had already used PERI formwork systems for the building shell proved to have a positive effect on the construction progress. As a result, the formwork and scaffolding solutions could be perfectly matched without any problems, along with achieving substantial synergies.



**Jens Meyer and
Olaf Bergmann**
Supervisors

“The PERI systems as well as the engineering and logistics are extremely flexible.”

Edificio Ágora, Valencia, Spain

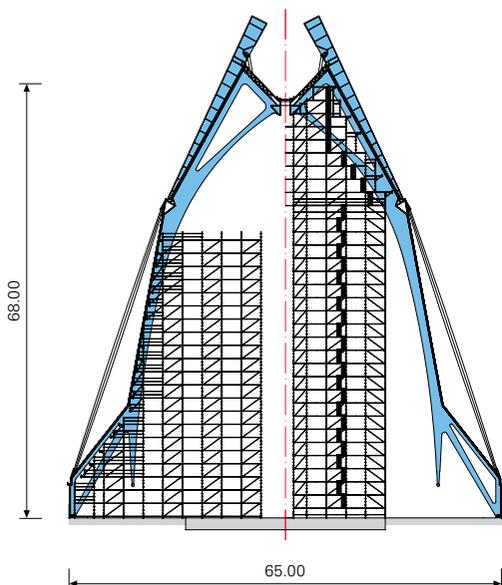
Elegant sculpture in flexible scaffolding



Carlos Gil
Project Manager

“The PERI scaffold solution adapted perfectly to the complex geometry and construction progress. Through this, all operational steps could be safely carried out – which also led to substantial time savings.”

Based on a grid dimension of 3.00 m by 2.00 m, the metric basic grid provided optimal adjustment options for the height, width and depth as well as the construction progress. Due to the possibility of varying the bay lengths, the platforms could also be positioned between the steel fins through to the outside of the eventual building shell.



49 vaulted steel fins are arranged according to an elliptical floor plan and span a gigantic interior measuring 100 m long, 65 m wide and 68 m high. For assembly work of the individual working activities, a PERI UP scaffold construction was used which could be continuously adapted to suit the different requirements regarding the working platforms and access means. Thus, all working operations for the steel supporting structure, steel-glass facade through to the installation of the lighting technology could be carried out quickly and safely. With a planned construction time of only 13

months, a particularly fast solution was required.

For assembling the load-bearing building structure, PERI UP birdcage scaffold enclosed the individual steel ribs on all sides and the height of the scaffold increased in step with the construction progress. Cantilevered scaffolding units between the individual steel ribs were assembled using UBK node diagonals and UCB brackets. Reinforced UHV ledgers were used in a number of areas to support the rising standards which meant the shape



The PERI UP Flex modular scaffolding provided working platforms and access for all construction activities. The complex building construction and the utilization for a wide range of activities determined the degree of difficulty for this project.



Flexibility, high load-bearing capacity and wide cantilevers with, nevertheless, a minimum number of diagonals, made the PERI UP solution both quick and cost-effective.

The PERI UP birdcage scaffold reached a height of almost 70 m in the inner area.

Assembly of the steel construction called for access to the fins on all sides. With help of the UDI industrial decking, PERI UP working levels could be optimally adapted to suit the complex form of the structure.



of the scaffold could be perfectly adapted to the complex building structure. For subsequent working activities, scaffold use was limited to the inside area: the wide cantilevers were reduced in size to a large extent so that external facade, insulation and the curtain wall construction could be installed.

PERI UP stairs provided safe access to the working areas and, through the use of UDI industrial decking, working platforms and access ways were installed throughout without leaving any gaps. Even in complete-

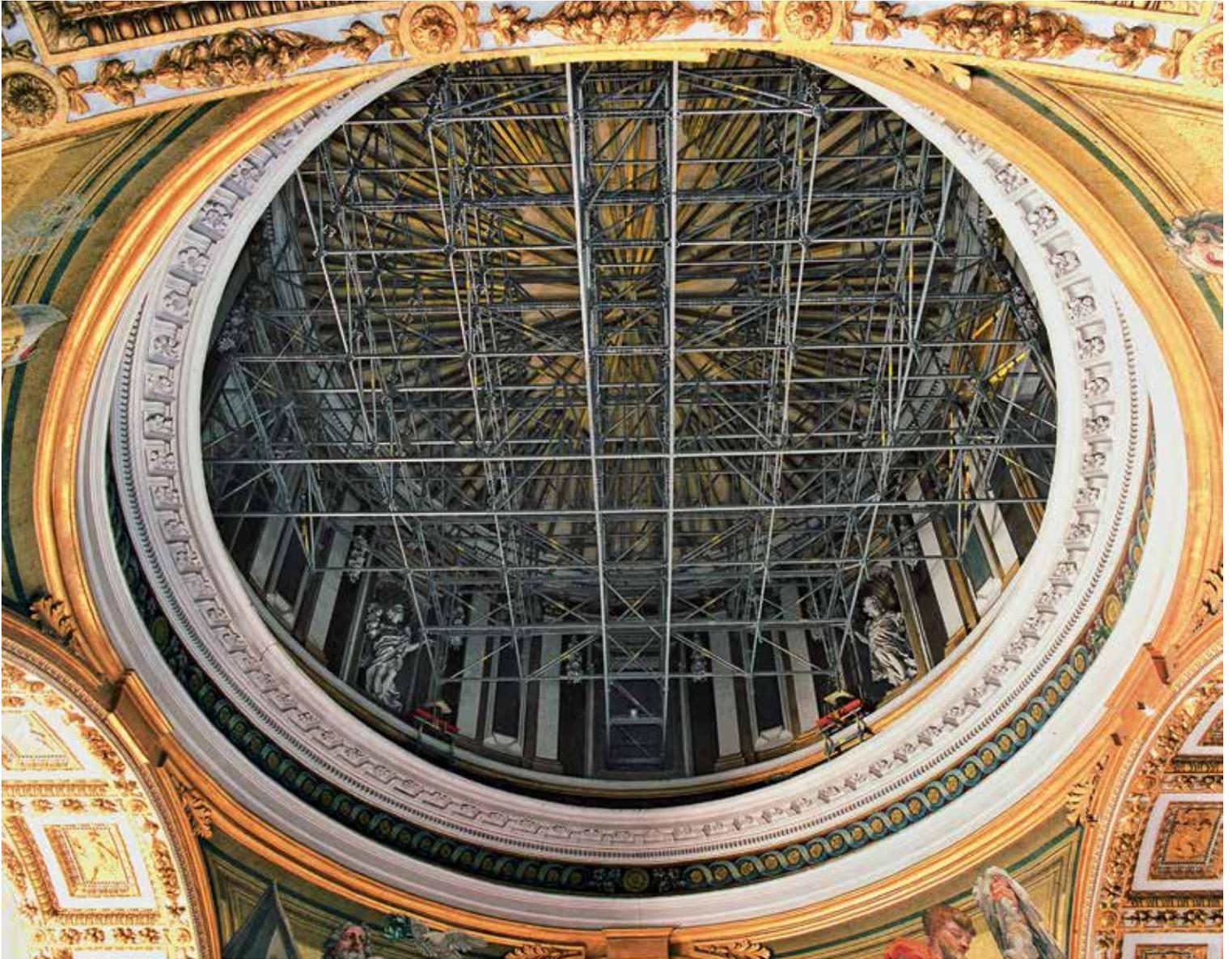
ly assembled scaffold sections, decks could also be subsequently removed and re-installed without any problems – a big advantage regarding continuous adaption of the scaffold. The low weight of the individual PERI UP system components and the fact that each system component could be handled by only one person, facilitated fast and energy-saving work operations. In addition, the high rigidity of the standard connections reduced the number of both bracing levels and required diagonals. This ensured short assembly times and fast modification phases which noticeably accelerated construction progress.

Contractor
U.T.E. Ágora, Valencia
Augescón S. L., Corvera de Asturias

Lindner AG, Arnstorf
Architect
Santiago Calatrava
Field Service
PERI Valencia, Spain

St. Peter's Basilica, Rome, Italy

Uninterrupted church services during dome restoration



Visible at a great distance, the 130 m high dome of St. Peter's Basilica dominates the skyline of Rome. It is situated directly over the Papal Altar and the tomb of the apostle, St. Paul. Mosaics on a gold background from the 16th century cover the entire dome and represent the kingdom of heaven.



Luigi Vivian
Purchasing Manager

“It was tremendously difficult to adapt the platform to the geometry of the building at this height. The system had to be flexible but also easy to install. After carrying out a detailed review, we were convinced that the PERI UP solution fulfilled all requirements.”

The mosaics on the St. Pius Dome had to undergo extensive restoration. While the work was being carried out, free and unhindered access for all visitors had to be guaranteed.

Using PERI UP Rosett, a 124 m² working platform was created within one week which seemed to float over the space below at a height of 28 m. This provided the best working conditions above for the restoration work and ensured safe and undisturbed activities in the church down below. The restoration team was able to access the platform from the outside of the dome via large window openings.

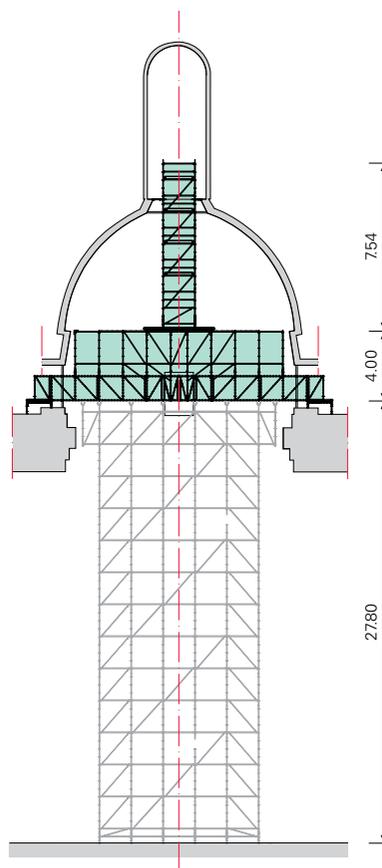
For the platform, PERI engineers designed an efficient solution using self-supporting LGS lattice girders with spans of over 17.50 m. The skylights of the four large windows on the elliptical-shaped dome could be used as points of support. The combination of LGS

girders and PERI UP Rosett standard components formed the basic structure of the platform. From here, followed the assembly with UBK node braces in the form of a cantilevered construction. Above the working platform, PERI UP Rosett scaffold units provided safe access right up to the lantern in the dome. Equipped with decks complete with integrated ladders, climbing up and down was extremely easy.

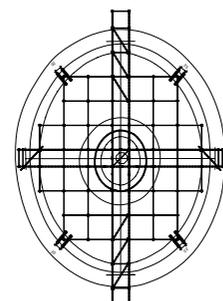
For the erection of the working platform, assembly of temporary falsework was first carried out which served as an interim storage facility and means of access until the final positioning of the platform. Due to the high PERI UP Rosett node rigidity, additional anchorage or support for the church building itself was not required.

Client
Astaldi S.p.A., Rome
Field Service
PERI Basiano, Italy

PERI UP ladder access was available from the working platform, positioned at a height of 28 m, up to the lantern in the dome.



The scaffold tower – here shaded in grey – served the cantilevered working platform only as assembly support and was dismantled immediately after completion of the platform.



Hotel Marques de Riscal, Elciego, Spain

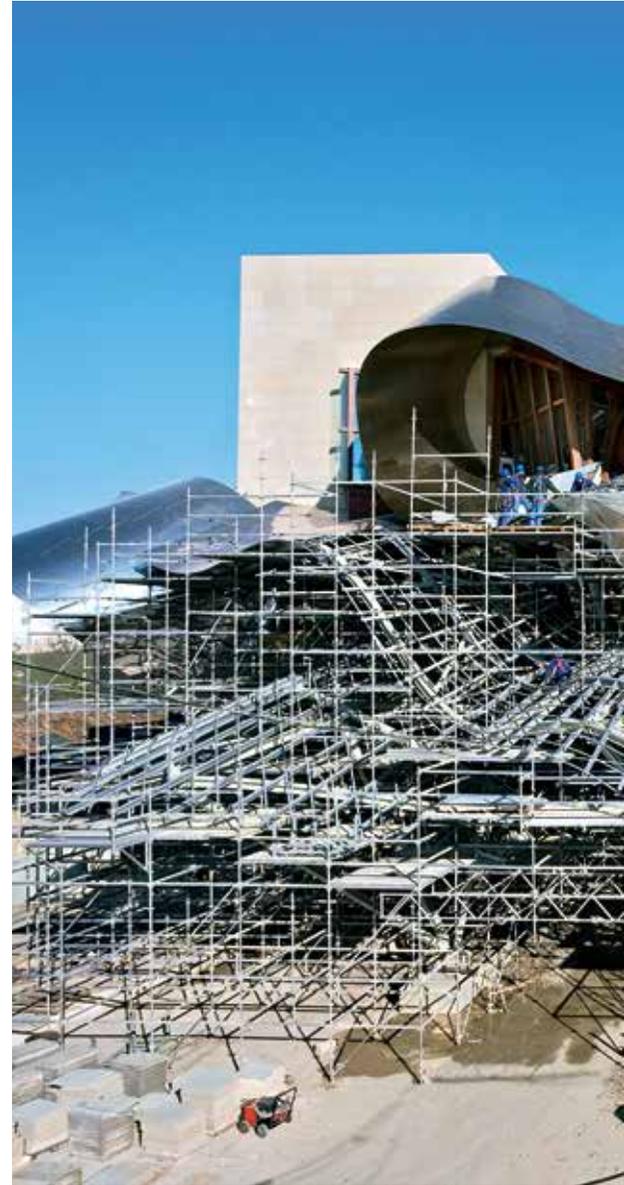
Optimal adjustment to very unusual building geometry

Architect, Frank O. Gehry, designed this luxury hotel complex for the renowned "Marques de Riscal" brand in the Rioja wine-growing area. It is comprised of several cuboids which are pushed into one another. The dominant feature is a bold roof structure with an almost free-floating titanium skin that optically accentuates this most extraordinary construction.

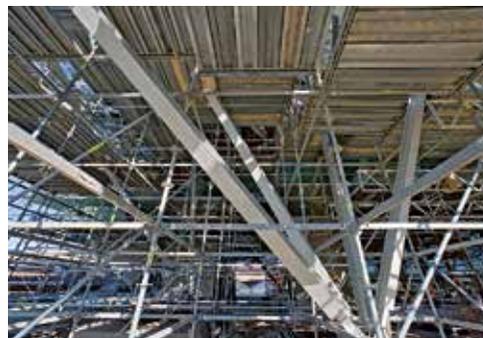
From the construction of the foundations right up to the assembly of the 1,800 m² titanium roof area, PERI supplied the formwork for the walls and slabs, shoring systems as well as safe working platforms. Due to the centralised planning and processing of all formwork and scaffolding assignments, the systems could be optimally co-ordinated which led to extremely efficient construction progress. At the same time, the all-round utilisation of the PERI UP Rosett modular scaffolding system provided considerable on-site advantages: as shoring for formwork operations and afterwards as working scaffold for the roof assembly, all scaffolding tasks could be carried out cost-effectively with a single system.

The almost 55 m x 20 m twisting reinforced concrete slab was built as one single casting segment without any concrete joints. SRZ steel walers, as well as GT 24 formwork girders, formed the slab formwork for the up to 1.30 m thick bridge-like slab cross-section. Articulated couplings also provided friction-locked connections between the steel walers positioned at the vaulted transitional areas between the varying slab thicknesses. For supporting the formwork and transferring concreting loads, a stable, spatial shoring construction was assembled using PERI UP Rosett.

As the assembly of the props and steel girders for the roof construction progressed, erection of the spatially-arranged PERI UP Rosett working scaffold also kept pace. In spite of the irregularly curved and twisted roof surfaces, problem-free assembly of the modular scaffold system could be carried out. When putting down and stacking the standards, the special shape of the scaffold node prevented the equipment from rolling away and thus causing damage to the expensive roof surface.



SRZ steel walers and GT 24 lattice girders as sub-construction for forming the massive and twisting reinforced concrete slab. PERI UP Rosett was used as shoring.



On the basis of a 2 x 2 m scaffold grid, the PERI UP decking provided safe and load-bearing working areas for assembly crews at all heights.



The PERI UP Rosett modular scaffolding allowed optimal adjustment to the complicated building geometry.

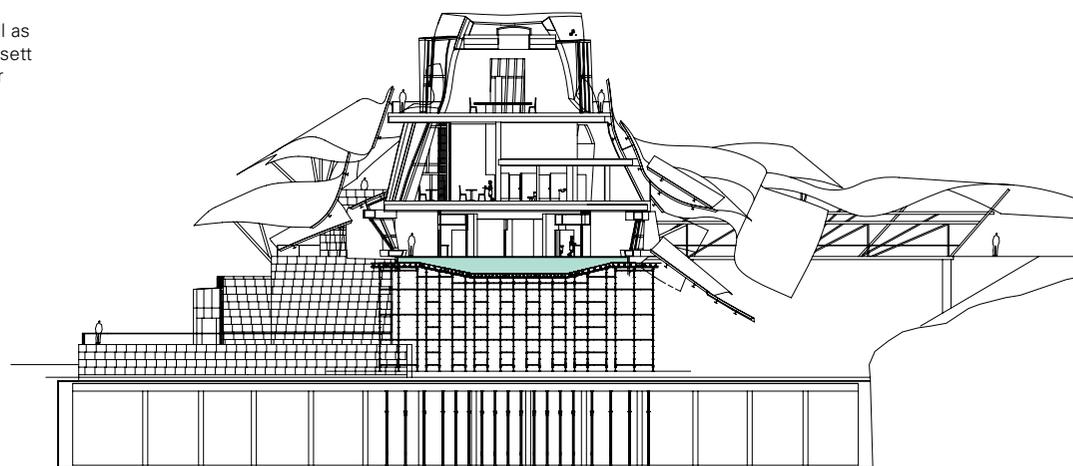


Aitor Pablo Gorran
Site Manager

“When realising this complex project, PERI proved itself to be a very competent partner. Within the shortest possible time, we received workable solutions. Also, the supply of large quantities of required formwork and scaffolding systems took place at very short notice. PERI UP Rosett modular scaffolding allowed optimal adjustment to the complicated building geometry.”

Contractor
Ferrovia, Madrid (Shell), Uman S. Coop., Barakaldo
(Roof and Facade)
Field Service
PERI Madrid, Spain

A three-dimensional erection plan as well as the modular structure of the PERI UP Rosett scaffolding system provided the basis for problem-free assembly work.



Rock Face Stabilisation, Cara del Moro, Alicante, Spain

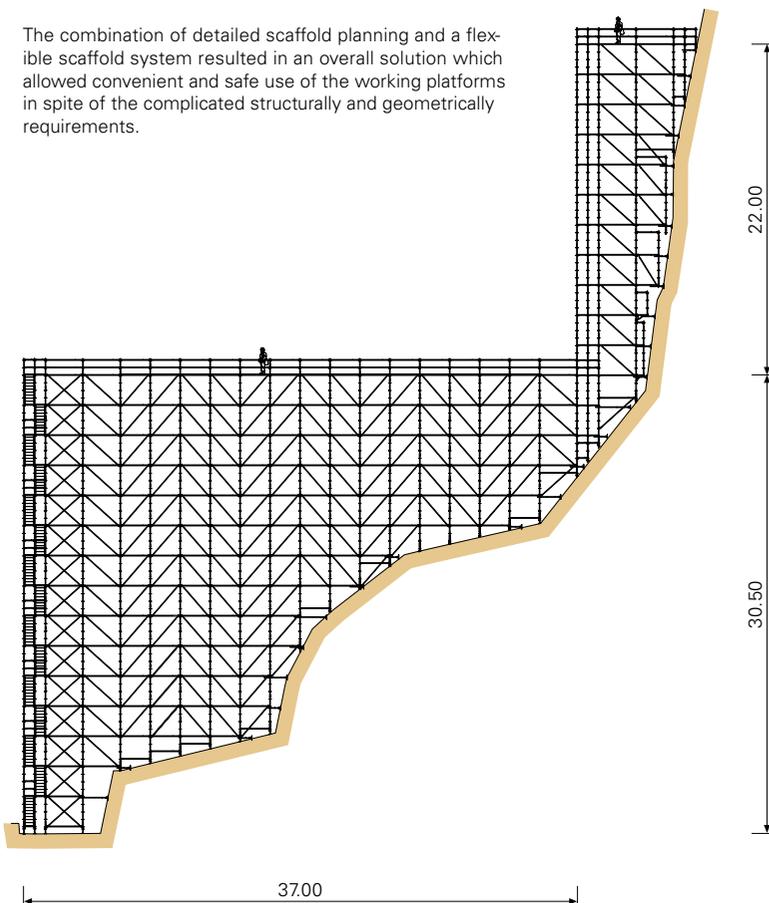
Perfect adaptation provides maximum safety levels

Erosion at an advanced stage on Mount Benacantil and the associated risk of falling rocks meant that extensive stabilization measures were required. For this, PERI planned and supplied a scaffold solution with working platforms which allowed for safe working conditions to all areas. An important consideration was that for scaffold bracing purposes, the cliff itself could not be used for transferring loads, e.g. via rock anchors.

The PERI UP scaffold construction had an impressive overall height of 70 m which included the access to the castle. A 35 m long and up to 6 m wide intermediate level at a height of 30 m served, on the one hand, as easy and convenient access to the

rock and, on the other, as a stable platform for storing materials. Transferring the vertical and horizontal loads took place using ledger braces and corresponding scaffold widenings in a lateral direction which was supplemented by RS 1000 push-pull props taken from the PERI formwork programme. The working platforms for the injection work nestled up against the cliff face which was to be renovated. While the sub-structure was based as far as possible on a 2.50 m x 2.50 m basic grid, PERI UP allowed for 50 cm and 75 cm horizontal adjustments to be made to match the natural geometry. Particularly advantageous and safe was the fact that the UDI industrial decking continued this adaptability with completely closed surface areas.

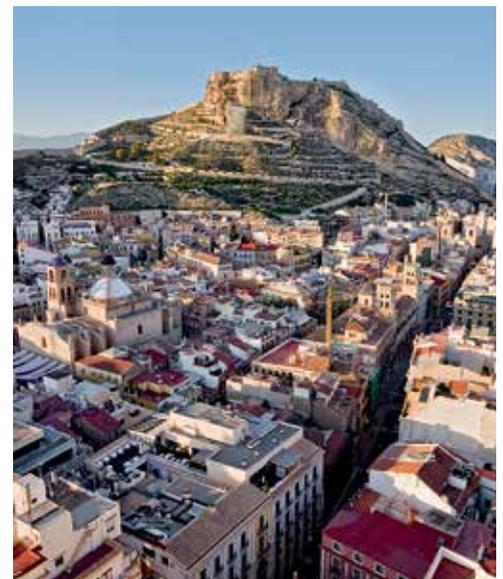
The combination of detailed scaffold planning and a flexible scaffold system resulted in an overall solution which allowed convenient and safe use of the working platforms in spite of the complicated structurally and geometrically requirements.



Miguel Barranco
Site Manager

“It was clear to me that the project’s success depended directly on a good, flexible and reliable technical solution which, in fact, the PERI UP scaffolding system provided us.”

Mount Benacantil rises 166 m over the Spanish port of Alicante. As the rock has an uncanny resemblance to the form of a human face, it is also called the “The Moor’s Face” (Cara del Moro). The medieval fortress of Alicante, the Castle of Santa Bárbara stands on the top – one of the largest castle complexes in Europe.



Contractor
Geocisa, Madrid
Field Service
PERI Valencia, Spain



The PERI UP stair towers also allowed direct access to the castle buildings.



Through the PERI UP metric grid arrangement, scaffold bays could be perfectly adapted to the natural features. Additional safety was provided by the end-to-end guardrails and closed surface areas with flexible UDI decking.



PERI UP Flex provided safe assembly platforms at all heights as well as convenient stair access.



Aristóteles Parra
Project Manager

“With the help of the PERI UP scaffold solution, assembly work on the steel arched bridge could be carried out faster and much safer.”

Quicker and safer assembly of steel arched bridges

For assembling the steel arched bridge, PERI UP served as shoring and working scaffold at the same time. In addition, an important element of the scaffolding structure was the load-bearing capacity and load transfer into the sub-structure using system components.

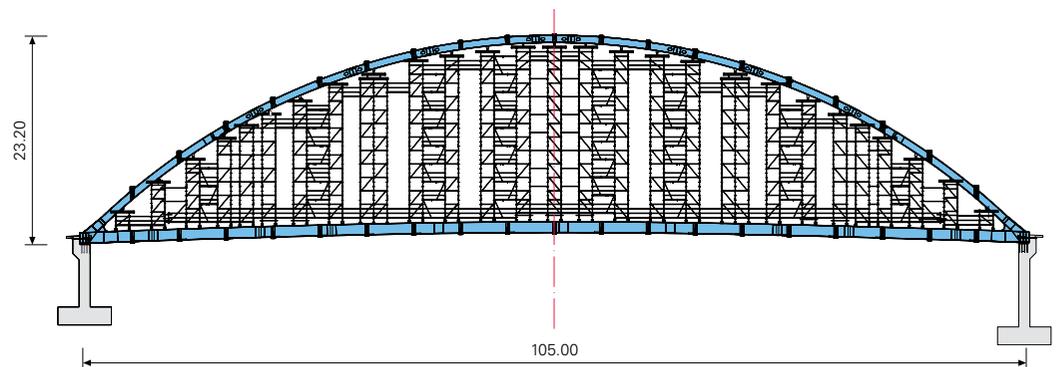
Two 105 m long steel arched bridges connect the northern district to the city centre of the Peruvian capital. These were positioned to the left and right of the 50-year old existing bridge in order to better manage the high volume of traffic through the expansion to 10 lanes as well as being able to accelerate the public transport system as a whole.

PERI engineers created an assembly scaffold on the basis of the PERI UP scaffolding system. This served as a temporary, up to 20 m high support structure for the steel segments as well as a working platform for the final assembly. Each arch consisted of 11 steel segments and had a total weight of 100 t. A big advantage for the design of the shoring towers and working levels was the high load-bearing capacity and, in particular, the adaptability of the PERI UP Flex. Furthermore, system components from the PERI product portfolio supplemented the scaffolding structure: through the use of GT 24 formwork girders and SRU steel walers, the load distribution was also systematized. As an integral part of the PERI imple-

mentation planning and static calculations, the stability of the structure could be extensively verified which led to shorter set-up times. The high flexibility of the PERI UP system enhanced safety conditions for the steel erectors and accelerated their work procedures. The different working levels were continuously connected in a longitudinal direction by means of system steel decks with side protection ensured through the use of ledgers. Due to the system grid of 25 cm or 50 cm, all adjustments can be carried out without any time-consuming tube and coupler connections; in particular, the self-securing ledger assembly with the Gravity Lock also increased the level of working safety for the scaffold assemblers.

Contractor
COSEI Consorcio, Fiansa
Field Service
PERI Peruana SAC, Lima

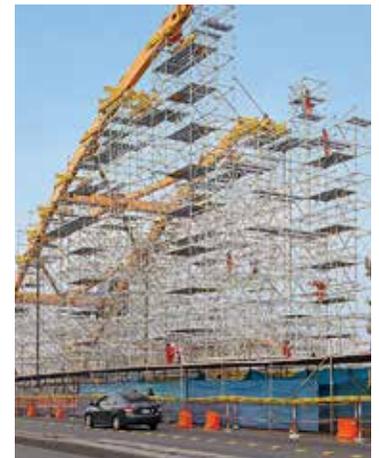
Assembly of the 11 steel arched segments required temporary support and working levels with heights of up to 20 m.



The PERI UP Flex modular scaffolding precisely matched the bridge geometry thanks to the system-integrated flexibility – without any time-consuming tube and coupler assembly.



Through the combination of PERI UP and system components of the formwork programme, loads could be reliably transferred.



Scaffolding and bridge assembly went hand in hand – with fast working speeds and maximum level of safety.

Wümme Bridge, Ritterhude, Germany

LGS Lattice Girder System

Mobile working platforms with 20 m spans

The 110 m long crossing over the River Wümme is in the form of a steel composite bridge. With two vehicle lanes along with footpaths and cycle paths on both sides, the bridge cross-section has a width of almost 20 m.

For shuttering and striking operations as well as for drainage, corrosion protection and inspection work, the construction team used two mobile working platforms on the basis of the LGS lattice girder system. A pontoon solution was not considered due to the forever-changing current conditions and

3 m tidal range; in addition, the complete underside of the bridge was accessible at all times with the help of the LGS platform – above the surface of the water and edge sections on the river banks.

The superstructure was widened for the realization of a viewing platform in the centre of the bridge. In order to cover this area as well, the scaffolding solution developed by the PERI engineers featured a mobile transverse platform which could be supported between the LGS platforms.

Contractor
Schälerbau Berlin,
Branch Office of August Reiners
Bauunternehmung GmbH, Bremen

Field Service
PERI Berlin and Weissenhorn, Germany



The 22 m long and 3 m wide platform could easily be moved by hand to the next section.



For their project solution, PERI engineers combined PERI UP modular scaffolding with LGS lattice girders – as well as system components from the PERI rental park.

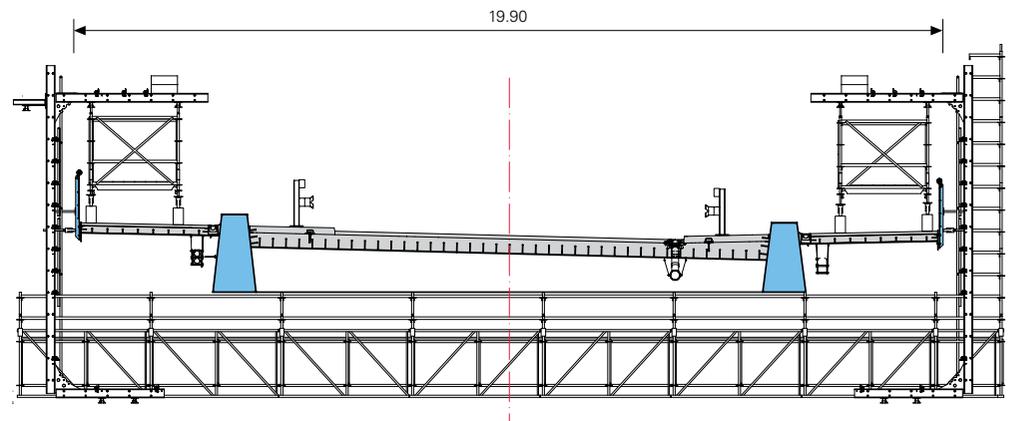


The LGS lattice girder solution featured spans of over 20 m, and was coordinated with the local Waterways and Shipping Authority. It accelerated work operations under the bridge and made it independent of current conditions and water level.

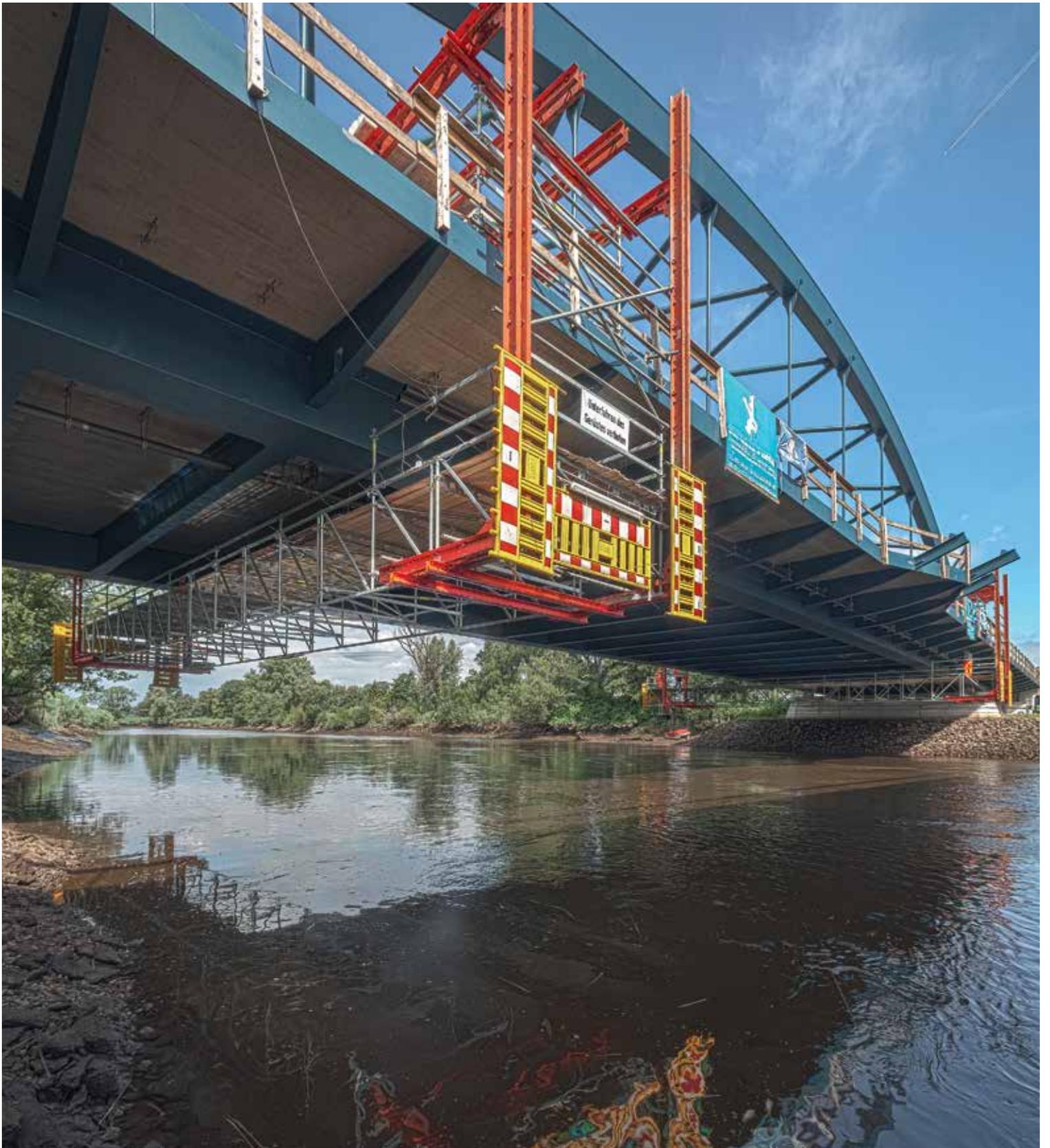


Alexander Krölls
Site Manager

“For such a bridge project, the PERI scaffolding solution is highly recommended because, through this, we remain independent of all external boundary conditions.”



Modular system for large spans and high loads: LGS lattice girders connected to PERI UP Flex standard components allows safe and efficient solutions as well as a wide range of application possibilities.



State Garden Show, Villingen Schwenningen, Germany

Temporary pedestrian bridge connects exhibition areas



The twin-flight PERI UP Public stair access on the north side of the pedestrian bridge was pivoted by approx. 45° in an eastward direction via an intermediate landing – according to the project requirements.

Community action: German army personnel, local fire-brigade and the THW (technical relief organisation) erected the PERI UP stair and bridge construction in only a few days – under the guidance of an experienced PERI supervisor.



Through the use of a temporary pedestrian bridge consisting of LGS truss girders and Public stairways, visitors to the garden show were able to access two areas without having to cross a very busy road. Together with the client and local authorities, various road crossing options were prepared during an early initial planning phase. Due to the planning expertise of the PERI engineers and the flexibility of the PERI UP modular construction system, an optimal scaffolding solution could therefore be reached for all those involved in the project.

The bridge superstructure consisted of two LGS truss segments which was easily and

Both 15 m long LGS bridge segments were pre-assembled on the ground ...



safely pre-assembled on the ground with UH ledgers and UBL ledger braces. A mobile crane placed the two units on the previously installed PERI UP support structure; subsequently, these were coupled together by means of short 25 cm ledgers and the surface area fitted with UDS steel decks. This minimized crane time and the duration of the required road closure.

The stairway access at both ends – including the required intermediate landings and corresponding to the valid safety regulations – was divided into two 1.50 m wide flights of stairs separated by guardrails. The complete width of the 15 m long and 3.25 m wide pedestrian footbridge could be fully utilised

Client

Landesgartenschau Villingen-Schwenningen 2010 GmbH

Field Service

PERI Weissenhorn, Germany

without intermediate railings. The road to be bridged had a clear width of 12 m between the two supports with 2.50 m for the parallel positioned pavements and cycle lanes underneath the stair sub-structure.



... and subsequently positioned on the support structure with the mobile crane. For this, the main road was only closed to traffic for a short time in the late evening.



Using the southern, stairway access which had already been installed, the steel decking for the pedestrian footbridge was fitted during the time the road was closed.



Public stairs and the LGS bridge fulfil the highest safety requirements – both structurally as well as geometrically.

Motorway Bridge near Grudziądz, Poland

Shortened construction time and high quality assured with the LGS Weather Protection Roof

The foreland bridge of the new Vistula river crossing was realized using the incremental launching method whereby the prefabrication of the individual repetitive bridge sections was carried out with stationary formwork. Two separate box girder profile superstructures, each 556 m long, were to be constructed in 25 cycles with standard cycle lengths of 24 m and then connected to each other using tension cables after the moving procedure had been completed.

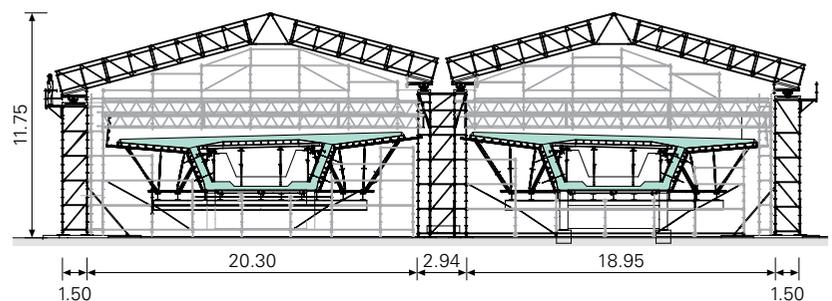
The temporary, largely rentable protection roof construction on the basis of the PERI UP modular scaffolding spanned the production area and allowed weather-independent fabrication of the individual sections for the superstructure. This was an important

feature because when operations started in November, temperatures reaching minus 25° C were expected. Altogether, the construction team used four roof constructions: two smaller, permanently installed tents served as reinforcement preparation; two movable protection roofs on basis of the LGS lattice girder system spanned the formwork and concreting area. With Keder tracks and sheeting, the scaffold constructions were very light and included translucent roofs. The solution in Grudziądz also featured side and gable sheeting. Overlapping of the sheeting at all joints ensured a tightly-fitting enclosure which at the same time could easily be opened. During extreme temperatures, the temporary tents were also heated.

In order to facilitate unhindered material installation and placing of concrete, the construction allowed the protection roofs to be moved – over the reinforcement tents. The lattice girder supports were equipped with rails and, with lengths of 55.50 m, were twice as long as the protection roofs. The smooth-running trolleys used allowed moving the roofs in the longitudinal direction while requiring only two to four persons – without the use of any aids.

Contractor
Skanska-NDI Joint Venture, Poland
Field Service
PERI Plochocin, Poland and PERI Weissenhorn, Germany

During the planning phase for the gable sides, the openings had to be taken into consideration for positioning the bridge sections using the incremental launching method.



For reinforcement and concreting operations, the weather protection roof was moved over the permanently installed reinforcement tent. All required materials could be lifted with the crane without any problems.



Roofing for the scaffold construction was realized by means of a Keder system. The retracted sheeting offered the best protection against wind and weather while the light transmission made permanent artificial lighting unnecessary.

Two movable LGS weather protection roofs spanned the two sets of incremental launching equipment used for the construction of the bridge superstructure. They provided sheltered working areas and guaranteed continuous work operations also in winter as well as best concrete quality.



Dariusz Daniluk
Site Manager

“PERI provided the most interesting concept in terms of technology and rentability. Weather-independent working conditions facilitated weekly cycles so that we gained 3 months construction time - without sacrificing any quality regarding concreting results.”



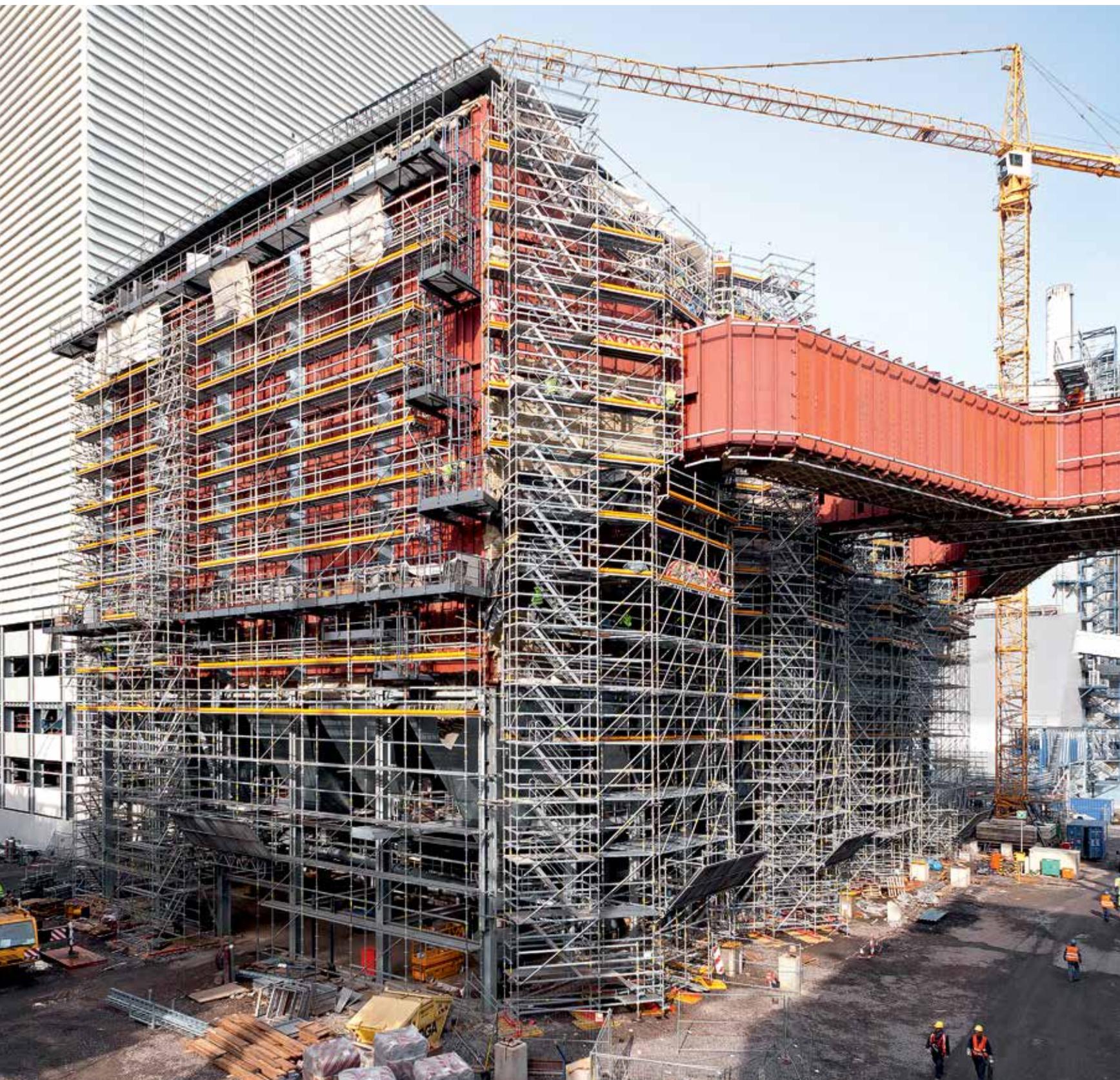
The LGS roof segments could easily be moved by hand and were also equipped with brakes. This ensured a fast moving procedure.



The URW wheel allowed moving to be carried out in a longitudinal direction, at the same time a horizontal sliding support was integrated at the level of the girder.

Westfalen Power Plant, Hamm, Germany

High level of safety for assembly and use





Zbigniew Zoń
Site Manager

“The PERI UP Flex system fulfils the three most important requirements in industrial construction: high level of working safety, optimal adaptability and fast scaffold assembly”



The PERI scaffolding solution took into account the existing steel structure along with the walkways which had already been installed.

During the assembly work as part of the new power plant development, PERI UP Flex proved to be extremely adaptable – and thus fulfilled the highest requirements regarding the working platforms which were to be installed. Given that the modular scaffold was mounted with the guardrail in advance, required safety levels for the scaffolding assembly team was provided to a very high degree.

With the two new D and E blocks, the Westfalen power plant increased its capacity by 1,600 MW. The high efficiency and extremely effective filter and purification facilities make the coal-fired power plant in Hamm the most modern in the world. As the upgrading plant was to be fully integrated into the existing site, all construction and installation work had to be carefully coordinated to match ongoing power plant operations.

On the two 64 m long and 35 m high electrostatic precipitators for flue gas desulphurization, access for the welding and insulation work was realized with the help of working platforms from the PERI UP Flex

modular scaffolding system. Thus, one externally-mounted working scaffold with integrated 75 cm flights of stairs was used for the final assembly of the eight inlet ducts. The scaffold solution could be optimally adjusted in a metric grid arrangement to suit the up to 4.50 m cantilevered funnel shape – suspended in part on a scaffold construction comprised of PERI UP system components.

The PERI UP system grid was particularly advantageous for the spatial scaffolding of the funnel filter: scaffold bays could be horizontally and vertically divided almost arbitrarily with the help of standard components. As a result, the bay lengths of the lower sections could be generously-dimensioned for easy access and with a minimum use of materials. In the area of those relevant components with geometrical adaptation, 300 cm scaffold bays, for example, were divided into three sections of 75 cm, 150 cm and 75 cm widths, so that construction could continue upwards with reduced bay widths.



With the PERI UP Flex system grid, the steel construction could be modified as well as achieving optimum adjustment to suit the filter funnel.



The insulation work on the 35 m high outer sides also required a safe working scaffold as well as stair access - adapted to match the steel construction. The modular scaffolding assembly was carried out extremely safely with the guardrail in advance which meant rope protection was not required.

Client
RWE Generation SE, Hamm
General Contractor Flue Gas Purification
Hitachi Power Europe GmbH, Duisburg
Insulation Work
Kaefer SA, Polaniec, Poland
Field Service
PERI Poland Sp. z o.o., Plochocin
PERI GmbH Germany, Weissenhorn

Dedusting System for Blast Furnace 9, ThyssenKrupp Steel Europe, Duisburg, Germany

Scaffolding and formwork: 2 systems – 1 grid dimension



After undergoing extensive modernization measures, blast furnace 9 has recently become operational again. Part of the overhaul operations included the re-insulation of the casting bay dust extraction facilities by the Leuna-based Interling GmbH's team of insulation experts. For this, PERI UP Flex modular scaffolding provided optimal working conditions for all insulation work as the high level of flexibility allowed virtually any adjustments to be made – this resulted in completely safe working platforms.

In the PERI scaffolding solution, integrated stair towers with 75 cm wide aluminum flights of stairs ensured safe and fast access to all levels. Inwardly cantilevered

scaffold bays could be easily and quickly assembled by means of UBK node braces.

Outwardly visible but fully integrated into the scaffolding solution was the load-bearing intermediate level consisting of VARIOKIT system components at a height of 12 m. As a result, the plant components positioned above the non-supporting flat roof could also be accessed. The loads from the up to 5 additional scaffolding levels were thus transferred to the outer scaffolding which likewise served as work scaffolding and shoring.



Heiko Neie
Supervisor:

“With PERI UP Flex, the most suitable grid dimensions can always be realized and it is 100% compatible with other PERI system components. And the integrated protection against lifting in the steel decks fully complies our high safety requirements.”

PERI UP Flex fulfils the highest requirements for workplace safety – both in the use as well as during scaffold assembly operations.

Through the uniform 12.50 cm grid dimensions and by means of standardized connecting means, PERI UP Flex allows virtually unlimited combination possibilities with VARIOKIT.



Scaffolding Contractor
Intering GmbH, Scaffolding Department, Leuna
Field Service
PERI Leipzig





Contractor
JSC Litana ir Ko, Gargzdai
Field Service
PERI UAB Litauen, Vilnius
PERI GmbH Germany, Weissenhorn

The waste collection bunker and steel hall of the modern waste incineration plant are 54 m high.



Dmitrij Cariov
Site Manager

“The PERI UP scaffolding solution with the LGS platform spanning more than 30 m met all our main requirements regarding reduced use of materials and comfortable working conditions. Designed as a mobile unit, this allowed all assembly work to be carried out safely as well as on schedule.”

Mobile working platform reduces time and material costs

The PERI scaffolding solution, complete with a movable working platform in a longitudinal direction, reduced material costs and saved time. The compatibility with rentable system components taken from the extensive PERI product range increased the cost-effectiveness and safety levels at the same time.

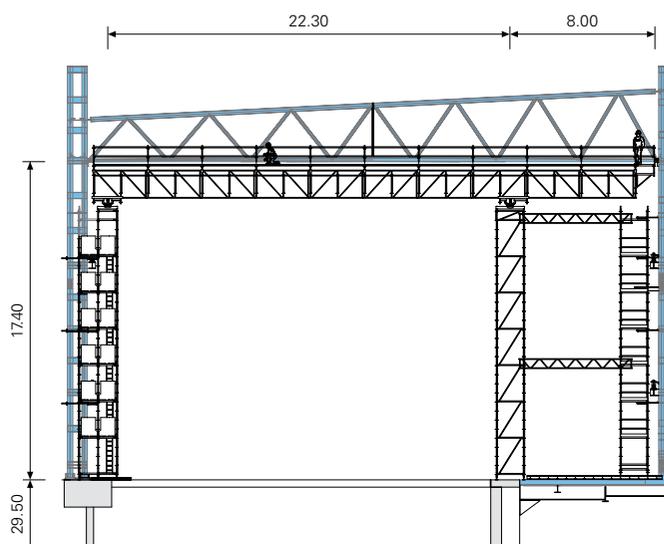
The waste incineration plant in Klaipeda is the first thermal waste utilization facility in the Baltic States and is regarded as a pilot project. With a 50 MW heat and 20 MW power output respectively, it covers almost half the urban thermal energy requirements. In addition, the recycling capacity of approx. 240,000 t/a household and industrial waste as well as biomass, makes a significant contribution for easing the burden on landfill sites in the region.

The steel hall above the waste collection bunker is almost 60 m long and 34 m wide. The concept developed by PERI engineers included a PERI UP Rosett working scaffold for the assembly of the wall elements. Furthermore, this also served as a 15 m high support for a working platform based on the LGS lattice girder system. This was 47 m above the bottom plate of the bunker so that the bunker roof frame construction could be completed.

The 31 m long and only 7.50 m wide platform with integrated wheel units was supported on aluminium rails and could be moved by hand in a longitudinal direction to the next section. Compared to a flat scaffolding construction, time and material requirements could therefore be significantly reduced. LGS girder segments were connected by means of 150 cm ledgers, which had been pre-assembled on the ground and then raised into position by crane. Due to the limited load-bearing capacities of the ground on one side of the hall, the platform

featured an 8 m cantilever on this side; as a result, the span between the rails was 22.30 m.

An important element of the PERI scaffolding solution were the system components taken from the extensive formwork portfolio. The use of SRU steel walers and RCS climbing rails in the scaffold sub-structure as well as anchors from the brace frame programme avoided any on-site temporary solutions and was also very cost-effective due to the rentable components.

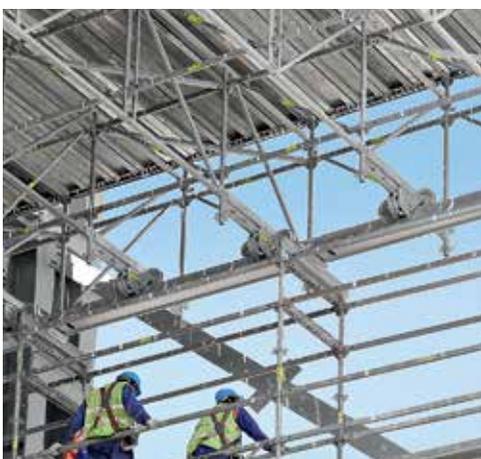


For moving the platform below the roof girders, the guardrails could be temporarily removed.

The working platform – based on the LGS lattice girder system – was supported on wheels and moved by hand to the place of assembly.

The scaffold sub-structure serves as support for the rails and as working scaffold for the wall-side indoor hall assembly.

With the help of rentable system components, such as the RCS climbing rails, large spans could be bridged.



Biocel Pulp Mill, Paskov, Czech Republic

Systematic adaptation for completely safe working conditions



Radim Sýkora
Managing Director

“The silos and the technical equipment with the countless number of pipes in particular presented an enormous challenge for the scaffolding work. With PERI UP, we managed to provide a scaffolding construction to the complete satisfaction of our customer.”

With the help of the PERI UP Flex modular scaffolding, the working platforms could be optimally adapted to suit the silo structural components – without anchors and pressure supports. As a result, all welding, coating and installation work could be carried out safely and according to the required level of quality.

The pulp mill in the Czech town of Paskov has expanded and modernized its production facilities. The special pulp produced there is an important raw material for further processing into high-quality cellulose fibre products. For this, five 13 m high circular steel tanks were erected which featured diameters of varying dimensions. PERI UP scaffolding provided safe and comfortable working conditions for the complex welding and coating work.

For a long-lasting coating, the surfaces were not under any circumstances to be soiled or brought into contact with any

foreign matter. Therefore, the scaffold construction was realized without anchors and pressure supports, and was also provided with temporary roofing. Due to its metric system grid, the PERI UP Flex modular scaffolding allowed bay lengths between 1.50 m and 3.00 m and bay widths of 0.75 m to 1.50 m to be combined with each other in 50 cm and 25 cm increments respectively. The adaptability provided by means of internal brackets and steel decking mounted in chess board fashion meant that all working areas were optimally accessible and a high level of safety was ensured when the scaffolding was used.

In addition, especially advantageous was the fact that individual decks could be removed at any time and installed in another position. As a result, the scaffolding could be subsequently self-adapted for any unforeseen technical installation work – without complex scaffold assembly and whilst maintaining the high level of safety.

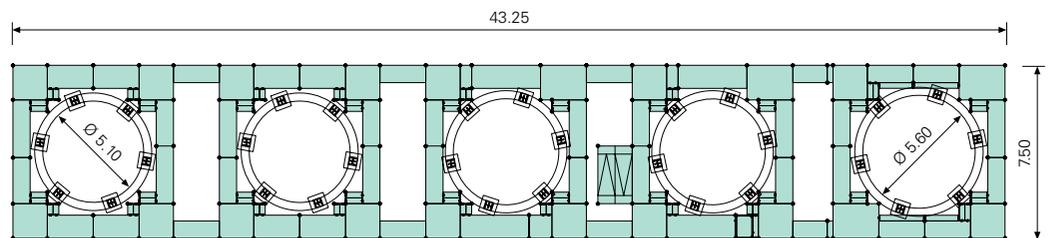
Scaffolding Contractor

Scaffmont s.r.o., Ostrava

Field Service

PERI spol. s r.o., Czech Republic, Jesenice and Prahy

Due to the logically structured PERI UP Flex system grid, the 43 m long scaffolding construction could be flexibly adapted to suit the different container diameters – without having to mount any time-consuming additional components.



Modular adaptation: ledgers could be installed in almost any combination and the decks mounted in a chess board fashion.

Completely safe working conditions: work could be carried out quickly and safely on completely covered working levels with non-slip surfaces.

Short distances: the access technology was integrated into the scaffolding construction – with the help of 75 cm wide aluminum stairways.





Mugardos LNG Regasification Terminal, La Coruña, Spain

Flexible and adaptable scaffolding for industrial structures

LNG stands for liquefied natural gas. The volume of the natural gas can be reduced through liquefaction to approximately two parts per thousand of the original state. Thus storage and transportation over long distances where pipelines do not exist is much more cost-effi-

cient. However, the insulation and installation technology required is both complex and expensive as the temperature difference between inside and outside can be anything up to 200°.





Pedro Gomes
Site Manager

“PERI UP is easily installed and can be adapted to suit a wide range of situations. Through the quick assembly process, we could save both time and money. For me, PERI UP is the best and safest scaffold system on the market.”

Contractor
TGE Gas Engineering GmbH, Mugarodos
Field Service
PERI La Coruña, Spain

In the north-west of Spain, TGE Gas Engineering was commissioned to erect two liquid gas tanks (LNG) with a total capacity of 150,000 m³ for the Reganosa utility company. The structures each have 80 m diameters and an overall height of more than 50 metres. PERI Spain provided a cost-effective formwork and scaffold solution for the structural work as well as the installation of an extensive range of technical equipment.

PERI UP Flex industrial scaffolding was used for the installation work as the system is extremely flexible, adaptable and multi-functional. For the exteriors of the containers, 8 m wide and 50 m high Rosett 75 facade scaffold provided safe working conditions allowing fast installation of the cable and wiring systems. On the inside, too, various facade scaffolding units and working platforms accelerated the required insulation work.

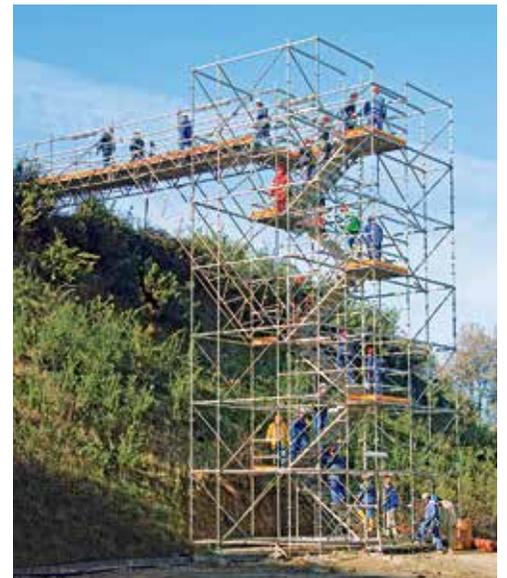
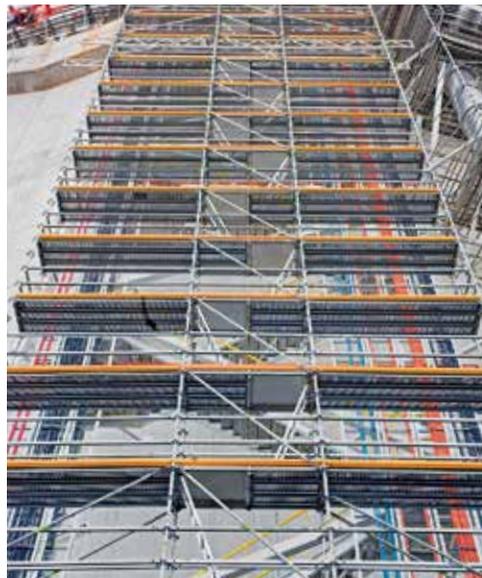
A free-standing stair tower with access bridge served as entrance to the construction site. With the PERI UP modular scaffolding system and only a minimum of supplementary components for the heavy-duty stairway, the 12 m difference in height could be cost-effectively bridged. The 1 m flight width along with the comfortable rise-to-tread ratio, ensured safe and quick access for site personnel. The stairs were designed for a permissible load of 3 kN/m².

PERI UP Flex industrial scaffolding combines the flexibility of time-consuming tube and coupler scaffold with the assembly advantages of system scaffolding. The 25 cm metric grid dimensions allow simple and easy adjustments to be carried out on complicated structural geometries. This means dangerous gaps in the decking are reduced to an absolute minimum and safety levels are considerably increased for installation and maintenance work.

The flexible and adaptable PERI UP Flex industrial scaffold could be used in a very wide range of applications.

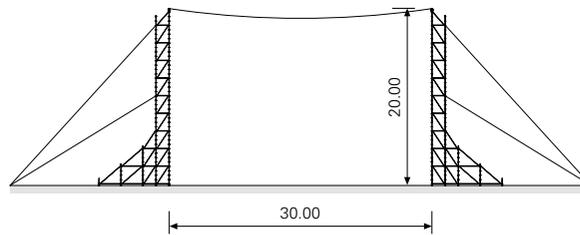


The continuous three-piece guardrail along with the highly visible yellow toe boards provided the required high level of safety.



380 KW Overhead Power Lines, Krümmel-Görres, Schwerin, Germany
Lightweight system components for a high level of protection





Franz-Joachim Stein
Managing Director and
Dieter Mandry
Site Manager

“Through the low individual weights of the PERI UP system components, we could assemble the safety scaffolding extremely quickly. With 7 men, we only needed 2 weeks for erecting both sets of safety scaffolding - including all bracing and nets.”

Near Schwerin, the cables of the 66 km long overhead power lines between the Görries (Schwerin) and Krümmel (near Hamburg) sub-stations had to be replaced. At the intersection point with other overhead lines, safety nets had to be installed at a height of around 20 m in order to protect the 110 KV lines running transversely underneath while replacement work was being carried out. The span of the integrated safety nets reached 30 m in each case while the length of the two sets of safety scaffolding measured 50 m.

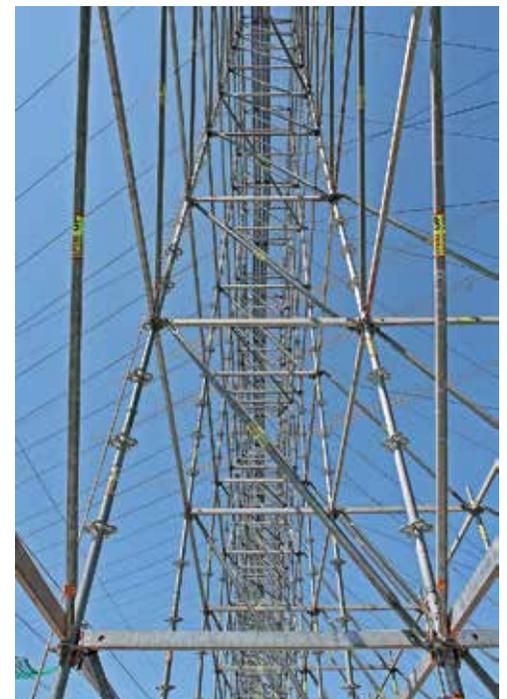
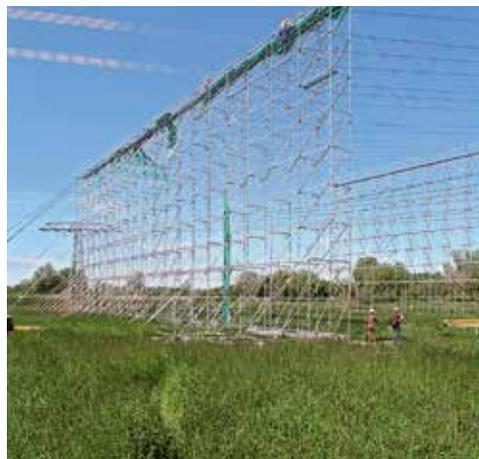
Two PERI UP scaffolding constructions assembled opposite each other held the supporting ropes of the nets. The highly tear-resistant paraflex ropes also served to brace the scaffolding and guaranteed the stability during all load situations. GT 24 Formwork Girders were positioned on the top head spindles and functioned as a support for the nets while also absorbing the impact of the power lines in an emergency.

The assembly of 3 m standards at the base ensured that in all of the following 2 m bays, the standards always increased the level of safety during erection due to their functioning as guardrail posts in advance. Working with personal protective equipment such as helmet and rope protection was matter of course for the experienced team of scaffolders.

Scaffolding Contractor
 Stein GmbH, Laatzen
Field Service
 PERI Weissenhorn, Germany

The second safety scaffolding was dismantled immediately after work was completed on the overhead power lines so that the materials were available for the next intersection area.

PERI UP Flex provides maximum flexibility and the high rigidity of the ledger connection guarantees a very high load-bearing capacity for the scaffold construction.



In particular, lightweight system components and simple, safe assembly played an important role for scaffolding operations without any crane support. The UDI Steel Decks were simply placed on the ledgers during scaffolding operations while the integrated lock against lifting ensured that the decks were immediately locked in position.

Waste Incineration Plant, Berlin, Germany

Versatile use of PERI UP for new and existing buildings

For construction of a new bunker as well as refurbishment of an existing bunker at the Ruhleben waste incineration facility in Berlin, PERI UP proved to be an extremely versatile solution – as a load-bearing scaffold for the structural work of the new waste and slag bunker along with a weather protection roof and assembly platform required for the extensive renovation work of the existing bunker roof while the plant was in operation.

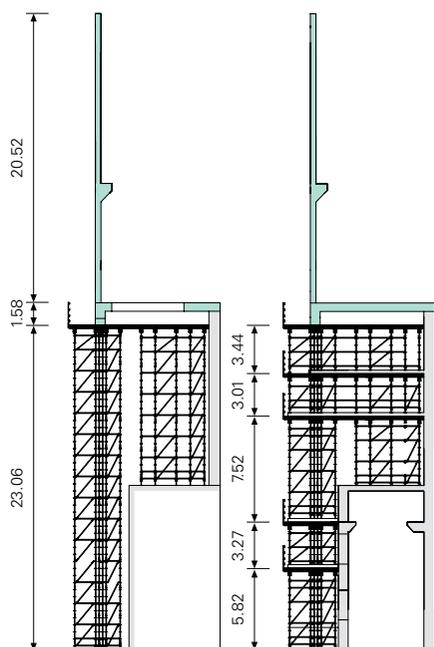
In the interwoven new structure, among other things, intermediate slabs were to be constructed at various levels and in several areas. For supporting the slab formwork, a spatial PERI UP supporting structure with heights of up to 22.50 m was used. Through the metric grid design, the scaffold could easily be adapted to suit the complex geometry as well as the transfer of a wide range of high loads; in addition, the ground contact areas on different levels required a large degree of flexibility from the scaffold system used.

The refurbishment work on the existing structure included replacing the floor slabs and reinforced concrete purlins above the waste collection bunker. In order not to limit

plant operations in any way and to carry out the required work without interruption nor risk of compromising quality standards, a temporary 27 m long LGS weather protection roof spanned each construction phase. In the course of the refurbishment work, this was moved forward on rails each time to the following section.

Three of a total of twelve roof segments respectively were equipped with a PERI UP platform which functioned both as working and, in particular, safety scaffold for construction operations. As a result, the roof structure and skylights could be replaced step-by-step as well as carrying out the re-coating of the remaining components – with maximum possible safety and only minimum disruption of daily plant operations.

In those areas of extreme loads, the legs were bundled together which meant that the shoring could be optimally adapted to meet site requirements. In some areas, up to 280 kN/m (resulting from a downstand beam and an approx. 20 m high wall) was to be transferred into the ground.

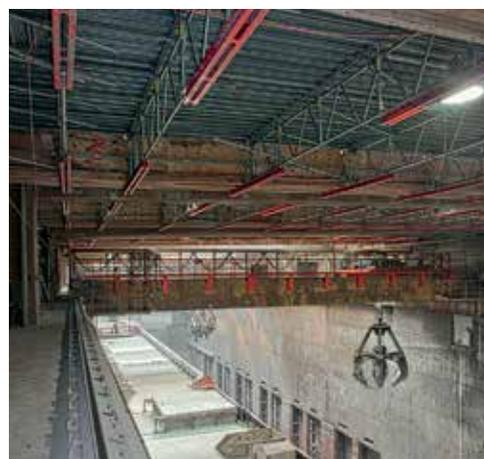
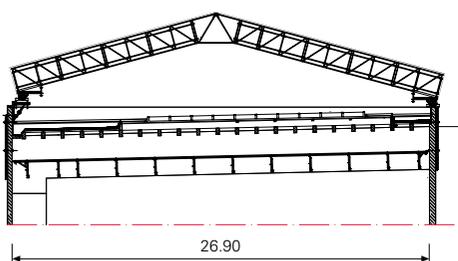


During the refurbishment of the 130 m long waste bunker roof, a temporary weather protection roof was installed. The 12 m wide roof was moved to the next construction phase on rails each time.





For fixing the rails to the existing parapet wall, a special construction on a PERI system basis was designed.



Malcom Robinson
 Supervisor for Structural Work
Frank Papajewski
 Site Manager
Joachim van Mark
 Supervisor for Roof and Truss Refurbishment

“Due to the PERI solution, we were able to maintain the tight construction schedule for the new building along with implementation of all relevant working safety requirements. The variable PERI UP grid dimensions allowed structural optimisation of the shoring – this reduced both material requirements as well as the time needed for assembly and dismantling. Although the existing geometry could be recognized in part only after demolition work had been completed due to lack of reliable documentation, PERI also developed practical and safe solutions for special areas within a very short time.”

Contractor
 Matthäi Bauunternehmung GmbH & Co. KG,
 Westerstede
Field Service
 PERI Oldenburg and Weissenhorn, Germany

A working platform served to access the roof trusses which were to be renovated underneath the weather protection roof. At the same time, this provided effective protection for the work to be carried out as well as daily power station operations below.



Harto Vallimägi
Site Manager

“With PERI UP, even the most complicated constructions are made accessible - this guarantees the safety for our construction site personnel.”



Tallinn Oceanographic Museum, Estonia

Dome restoration with spatially adapted shoring and working scaffold



Due to the metric PERI UP basic grid dimensions, shoring towers and stairways could be integrated into the birdcage scaffolding without any problems.



The PERI UP Rosett scaffold nodes offer a wide range of connecting possibilities and provide very rigid node connections with a high load-bearing capacity.



Optimal working conditions at a height of almost 20 m for carrying out the extensive refurbishment measures on the underside of the dome.

One of the cultural highlights of Tallinn is a historical domed structure dating from the time of the last Russian Czar which was converted into an attractive oceanographic museum. PERI UP was optimally adapted here to suit the geometry of the almost 100-year old reinforced concrete complex and was used for a wide range of applications on both the interior and exterior.

The reinforced concrete renovation work on the self-supporting shell-shaped construction complete with three impressive domes, without disturbing any intermediate supports, was extremely time-consuming and labour-intensive. The old reinforcement was exposed using an ultra-high pressure cleaning device, corrosion protection was then applied, followed by injection work along with replacement of any damaged reinforcing bars – all this in order to subsequently install an additional layer of reinforcement and a 50 mm thick shotcrete covering.

The domes had to be temporarily supported so that overall stability could be maintained; at the same time, the PERI UP scaffold system served as a spatially adapted working platform with integrated shoring and stair access. The detailed design of the birdcage

scaffold was based on metric grid dimensions of 3.00 m by 3.00 m. In order to be able to optimally work on all areas of the underside of each dome, the PERI scaffold solution featured stepped working levels in 50-cm increments – at heights of 11 m at the corners and 19.50 m at the centre of the dome. For exact geometrical adjustments in the edge sections, the substructure was sub-divided in each case into two 1.50 m wide fields. In addition, cantilevers were installed using standard node braces thus providing 1.50 m extended platforms at both ends.

The ring beams of the lanterns, the opening in the centre of the domes, were supported during the entire renovation operations with the help of PERI UP Rosett shoring towers. These had grid dimensions of 1.50 m by 1.50 m and carried up to 40 kN per leg –

Safe working conditions also for the outside work: with PERI UPT 72 frame scaffolding with internal guardrails and no additional components.



with heights of 21 m. Here, the shoring towers were fully integrated into the spatial working scaffold used for renovating the underside of the dome. In addition, a light-duty aluminium stairway with alternating staircase units was centrally positioned in the working scaffold which ensured safe and easy access.

For the refurbishing work on the outer sides of the domed structure, PERI UPT 72 facade scaffolding was used. This provided a twofold level of safety: during the assembly sequence featuring the guardrail in advance and utilization when fitting inside guardrails without any accessories – a big advantage as external walls were missing on the museum. Here, too, a stair tower provided safe access to the roof and, when necessary, to the respective scaffold levels.

PERI UPT 72 facade scaffolding complete with site access stair tower scaffold supplemented the comprehensive scaffold solution.



Contractor
Nordecon AS, Tallinn
Field Service
PERI AS Estonia, Saku vald

Production Hall Roof Refurbishment, Gerolzhofen, Germany

LGS Lattice Girder System: temporary weather protection roof with a span of almost 30 m

In order to minimize production downtime, only a few days were available for the roof refurbishment operations of the 90 m long hall. A temporary erected weather protection roof on the basis of the LGS lattice girder system ensured that the renovation work remained unaffected by external weather conditions, and that the production machinery was protected during the week-long construction operations.

For lifting in construction materials with the crane, individual roof sections could be opened at any time due to the use of Keder sheeting.

Not only did the construction crew have to maintain an extremely tight schedule for the refurbishment work, time was also at a premium for the planning, material provision and assembly of the protective roof construction.

In addition, PERI UP scaffold support was only possible on the southern longitudinal side of the production hall. Different assemblies in the northern section required a project-specific VARIOKIT support construction: coupled RCS climbing rails along a length of 90 m supported by brackets consisting of steel walers and spindles. The rentability made the system solution not only cost-effective but the quick availability in the rental park also allowed assembly operations to begin very early on.



The combination of the LGS weather protection roof with the VARIOKIT Engineering Construction Kit accelerated implementation of the execution solution and was also very cost-effective.



The ridge bars facilitate easy fixation of the roof inclination when lifting the LGS girder segments while connections are made largely without tools using bolts and cotter pins.



The 30 m long girder segments could be completely pre-assembled on the ground by hand and then lifted into position with the mobile crane.

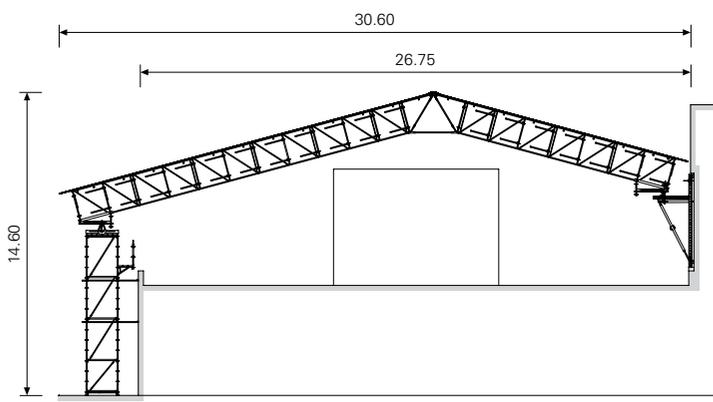


Contractor
Eugen Wahner GmbH, Sulzfeld
Field Service
PERI Nuremberg and Weissenhorn



Thorsten Wahner
Site Manager and
Managing Director:

“LGS assembly using ridge bars and rollers is utterly convincing. In addition, PERI engineers were able to demonstrate their expertise through the extremely fast planning service – particularly important as dimensioning, planning, static and assembly had to be accommodated in an extremely tight schedule.”



VARIOKIT system components transferred the roof loads at spacings of 7.50 m into the load-bearing sections within the aerated concrete wall.

Sceptic Tank, Wastewater Treatment Plant, Kassel, Germany

PERI UP in the balanced cantilever construction: minimum use of materials – maximum results

Two existing very old, run-down digestion towers were to be completely replaced by one new reinforced concrete construction. The 40 m high, egg-shaped container has a capacity of 7,500 m³. PERI UP working scaffold was used for installing the technical equipment as well as coating work in the head section.

Together with the PERI engineers, a scaffolding concept was developed which fulfilled the geometrical requirements as well as ensuring problem-free assembly and dismantling of the scaffolding. Furthermore, immediate access to material stocks in the PERI rental pool guaranteed fast availability of all system components.

For assembly operations, the site crane was available; the 6 m high scaffold units were pre-assembled on the ground and subsequently lifted into position through the opening in the head.

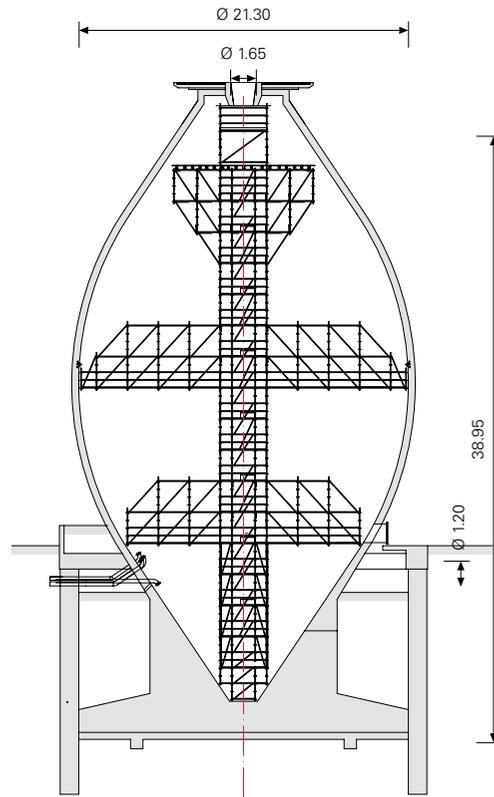
However, dismantling had to be done completely by hand without any crane support. For this, material usage was minimized and the corresponding maximum dimensions taken into consideration. In addition, the system-related weight advantages of the PERI UP modular scaffold components simplified and accelerated the scaffolding operations.



Thomas Fischbach
Supervisor

“Everything worked out fantastically with the PERI UP solution and thanks must also be given to the on-going site support we received. And through the balanced cantilever, the cantilevers could be realized by means of node braces without lattice girders.”

Contractor
Laudemann GmbH, Sontra
Field Service
PERI Franken and Weissenhorn



The four-sided platforms positioned half-way up – each with 9 m cantilevers – served, in addition to the scaffold bracing, in particular for assembling the bracing for the sludge digestion chamber.

Flexible in 25 cm increments: the centrally-arranged scaffold tower with 3.00 m x 3.00 m outer dimensions and a height of 34.50 m was realized as a 16-leg construction. This allowed access to the platforms via access decks with ladders while, at the same time, a 1.50 m core for assembling the sludge digestion chamber in the centre of the tower could be kept free.



Eaton Centre, Toronto, Canada

Modernizing with PERI UP without restriction of use



During the modernization of the Canadian shopping centre, the PERI UP scaffold solution made a very convincing case through its great adaptability – and provided both users and visitors with maximum safety. This was particularly important as the extensive refurbishing work was carried out during normal business hours.

The seven-storey Toronto Eaton Centre is home to over 230 shops, restaurants and service providers as well as an impressive glass gallery, and is one of the largest shopping malls in Canada. Over a period of two years, the shopping centre underwent extensive renovation and modernization. While escalators, elevators, floor coverings, balustrades and lighting were being replaced on several floors at one time, the mall nevertheless remained open for visitors as usual.

With the help of the PERI UP Rosett scaffold system, PERI's Canadian engineers created a project solution complete with working platforms and integrated access for subsequent work carried out by sub-con-

tractors. At the same time, protective roof structures ensured that visitors could move around the mall safely. Through the detailed scaffold and cycle planning with generously-dimensioned passageways along with large-sized advertising banners, a construction site atmosphere was scarcely felt in spite of the ongoing modernization measures. Bridging width and passage heights were optimally adapted to suit the use of the centre by the visitors as well as the geometry of the building.

Here, PERI UP Rosett provided several advantages: the modular scaffold could be flexibly adapted to the geometrical and static requirements – for maximum accessibility for the workmen. The ledger connections by means of the Gravity Lock, installation of the steel decks with integrated lock against lift off as well as the lattice girder bridging with the help of the starter tube also accelerated scaffold erection and ensured safe working conditions during assembly, modifications and dismantling. Furthermore, selected system components were used which, in addition to the static requirements, also met all aesthetic demands.

Refurbishing work took almost 2 years – however, the Toronto Eaton Centre was open for visitors during the entire project.



The publicly accessible areas were strictly separated from the working areas by means of advertising banners – and thus made safe for passers-by.



The PERI UP Rosett scaffold solution could be adapted to meet all geometrical and static requirements.



David Gerdun
Site Superintendent

“We have used PERI scaffolding systems in several projects in the past - the PERI scaffolding solution takes into account all site conditions. The adaptable modular scaffolding system along with the logistical support enabled us to achieve the strict safety, speed, convenience and aesthetic requirements of the project.”

Contractor
PCL Construction, Mississauga
Field Service
PERI Scaffolding Services Inc. Canada, Bolton

St. Vitus Cathedral, Prague, Czech Republic

Customized church scaffolding increases working safety



Required cantilevers could be realized with both scaffold brackets and system diagonals.



PERI UP Flex adapts perfectly to the complex geometry in 25 cm increments.



In order to preserve the historic structure of the St. Vitus Cathedral in Prague, on-going restoration and scaffolding work was required.

The restoration of the historic St. Vitus Cathedral in Prague called for an adaptable scaffolding system with working levels also designed to accommodate the storage and transport of large-sized blocks of stone.

St. Vitus Cathedral is situated entirely within the Prague Castle complex and is the most visited place of interest in the country with 1.5 million visitors a year. In order to preserve the historic structure of the Gothic-style cathedral which was built in 1344, ongoing and extensive restoration work was required.

The PERI UP Flex modular scaffolding system served as a flexible, adaptable working scaffold - as well as for material storage and support system for the almost 45 m high traction elevators. Thus, the working levels were 4.50 m wide in some areas in order to accommodate the large-sized and up to 600 kg stone blocks.

Through the 25 cm grid arrangement, PERI UP Flex can be adapted to suit almost any geometric shape, and the direction of the decking within a scaffold bay can also be turned at will. As a result, the distance between the working level and the structural element being worked on is minimized. This optimized the working conditions for the stonemasons and increased the level of safety.

During the scaffold planning phase, the cantilevered transition points to be mounted as well as the defined load transfer into the stable existing structure and on the access areas were taken into consideration. In addition, pedestrian tunnels were integrated into the scaffold construction which was covered with safety nets in order to protect the numerous crowds of visitors.



Róbert Šupej
Scaffolding Contractor

“We love to work with PERI UP because it is flexible and safe. This is a big advantage particularly for the work on the St. Vitus Cathedral in Prague.”

Restoration
Kamenosochařství Pánek, Říčany
Scaffolding Contractor
Šupej Scaffolding Contractors, Žilina/Slovakia
Field Service
PERI spol. s.r.o., Czech Republic, Jesenice and Praha



Burlington Canal Lift Bridge, Hamilton, Canada

PERI UP suspended scaffold for an historical steel bridge



Since 1962, the lift bridge on the west bank of Lake Ontario spans the Burlington Canal. The steel superstructure weighs a total of 2.200 t and can be raised

over 33 m. The navigation season usually runs from late March to late December so all scaffolding and repair work was limited to the 55-day winter shut-down period.

The historical steel bridge across the Burlington Canal had to be comprehensively refurbished and treated with anti-corrosives. The whole, 111 m long western side including the scaffolding work had to be done within only 55 days – at the same time, the eastern side remained open for public traffic.

The PERI solution with a suspended scaffold on the basis of the PERI UP Rosett modular scaffolding also made use of rentable PERI formwork system components for

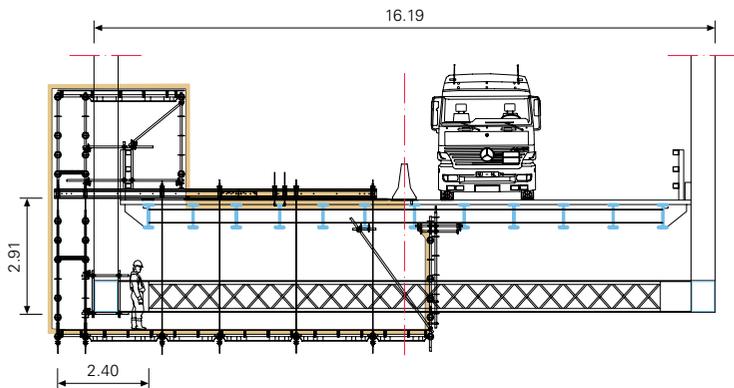
the cantilevered suspension – such as the MPB 24 aluminium beam. Taking into consideration the three-dimensional lattice frame of the bridge, the Canadian PERI design engineers provided a solution allowing for a quick and safe assembly process – and also made sure that the work area was completely contained so that any kind of water pollution could be excluded.



Jeff Butcher
Managing Director

“The PERI system and engineering design for our bridge project outperformed all other scaffolding systems. We were very impressed with the PERI suspended scaffold.”

Contractor
Dayson Industrial Services Inc., Hamilton
Field Service
PERI Toronto, Canada

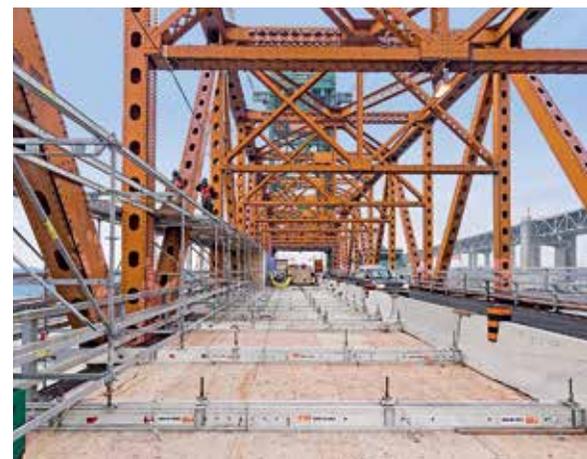


The detailed PERI planning of the scaffold suspensions took into account the numerous available bridge components.

The externally mounted scaffold bay provided perfect accessibility. Before the refurbishment work started, the complete working area was hermetically enclosed with plywood sheeting and tarpaulins so that any environmental hazards could be excluded.



The PERI UP suspended scaffold could be attached to the doubled up PERI MPB 24 aluminium beams – downwards via DW 15 tie rods and laterally with a cantilever of over 2 m.

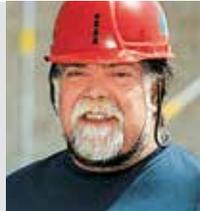


Cristo Rei Monument, Lisbon, Portugal

Fast assembly but still flexible with facade scaffolding

The highly visible 28 m high statue of Christ statue rests on an 81 m high base overlooking the Rio Tejo river. The complete surface of this 109 m high monument was to be scaffolded for cleaning and restoration work. Apart from the complex geometry of the structure, high wind forces could be expected due to the close proximity of the coast. In addition, the scaffolding was to be used as rentable advertising space for the duration of the project.

PERI's Portuguese engineers submitted a comprehensive contract package which included the delivery of materials, detailed planning as well as an accurate logistical schedule. This enabled all project requirements to be completely fulfilled.



Henrique Santos
Project Manager

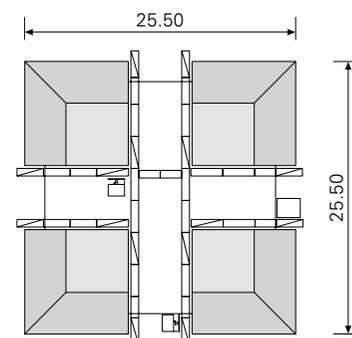
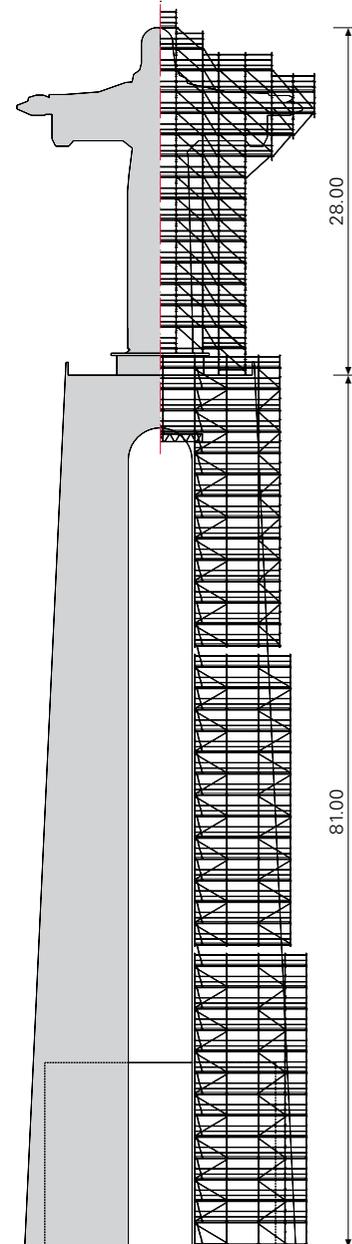
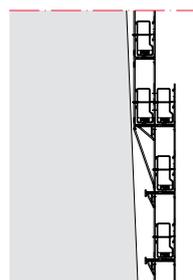
"Two points in particular convince me of the benefits of PERI UP: the quick assembly times that can be achieved and the high level of safety which is provided by the system's construction."

Client
Santuário de Cristo Rei, Almada, Lisbon
Field Service
PERI Lisbon, Portugal

Work could be safely carried out on the spacious and geometrically adapted working platforms of the PERI UP Rosett scaffold which was erected up to the head of the statue at a height of over 100 m.

1.50 m - 3.00 m bay lengths were arranged to scaffold the face of each leg of the base.

Cost-effective adaption with facade scaffolding: UCB console brackets allowed a step-type increase in height in the sections with each containing up to seven scaffold levels.



PERI engineers designed the facade scaffolding to handle the unusual load conditions created by the advertising space: the effects of the wind were felt from both the front and rear.



Motorway Bridge T4, Paradisia-Tsakona, Greece

Supporting system solution – individually adapted



Nikolaos Donas
Site Manager

“PERI convinced us with the best technical and most cost-effective formwork and scaffolding concept. Together with the PERI engineers, we were able to select the optimal system in each case – adapted to match the complex project requirements. Apart from technical support in the planning and during the construction phase, I would particularly like to highlight the on-site project support as well as the provision of materials in accordance with the construction schedule.”



Bundled 42-leg VARIOKIT heavy-duty shoring towers carried the extremely high loads in the area of the steel arch connections.



By halving the 150-cm basic grid using 75 cm long ledgers, PERI UP could be optimally adapted to accommodate the load concentrations.



PERI engineers combined two modular construction systems to form a comprehensive load-bearing concept with heights of up to 20 m.

A huge inclined pier supports the motorway bridge on the Greek peninsula of Peloponnese. A team of Greek and German PERI engineers supported the site management team with project-specific system solutions.

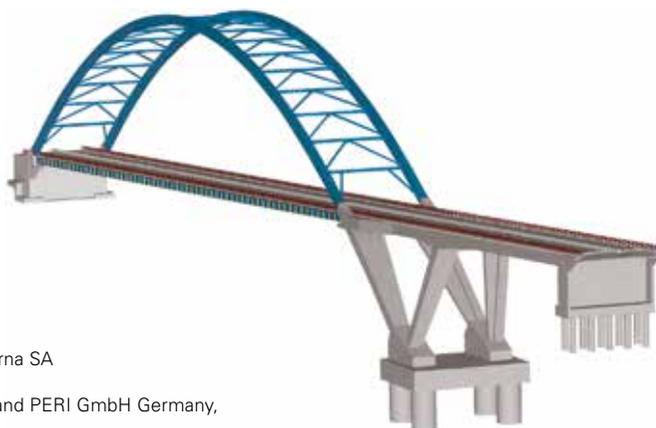
The 160 km long A7 motorway connects the towns of Kalamata and Corinth. The principle element used to close the gap between Paradisia and Tsakona is a 390 m long arched bridge. Two-thirds of the 22 m wide bridge superstructure is suspended on a steel arch and was constructed using the steel composite construction method. For the northern bridge section, a pre-stressed concrete superstructure variant was selected which features a twin-cell hollow box cross-section.

Supporting element of the bridge is a huge, almost 30 m high inclined twin-pillar pier with an asymmetrical V-shape. On the one hand, this serves as an intermediate support for the in-situ concreted carriageway and, on the other, as support and starter section for the steel arch.

PERI developed a comprehensive formwork and scaffolding solution – for constructing the pier structure and reinforced concrete superstructure as well as providing temporary support for the bridge during the entire building project. Essentially, two modular construction systems were combined with each other in order to transfer the high loads safely into the ground. With help of PERI UP Flex, a spatial load-bearing structure for the piers and superstructure form-

work was formed, gradually increasing up to the total support height of over 20 m to the rear and upwards respectively. Using 25, 50 and 75-cm long ledgers, the 150-cm basic grid could be adapted extremely flexibly here to suit the geometric and static requirements. This allowed the polygonal 32° to 36° shallow-pitched inclined piers on both sides of the bridge to be constructed in eight segments, each 4.50 m long.

Trusses consisting of rentable VARIOKIT standard elements supported the obliquely-positioned VARIO GT 24 girder formwork and transferred the formwork and concreting loads of the inclined piers safely into the scaffolding. In addition, the VARIOKIT modular construction system formed the basis for the heavy-duty shoring. In the connecting area between the cast-in-place bridge and steel arch, two 17 m high, 42-leg heavy-duty shoring towers were used to accommodate the high loads – until the inherent load-bearing capacity was reached. Due to the long utilization period, each tower was designed to carry loads of 1,200 t as well as high earthquake and horizontal loads. For load concentrations, four standard towers respectively, each with 2.00 m by 2.00 m axis dimensions, could be bundled by means of 37.5 cm additional frames – using only rentable system components and type-tested connection means.



Contractor
 ARGE Alpine Bau G.m./Terna SA
Field Service
 PERI Hellas Ltd., Athens and PERI GmbH Germany,
 Weissenhorn

Bridge over the Golden Horn, Istanbul, Turkey

Efficient forming and shoring with modular construction systems



The combination of detailed planning work, continuous site supervision and optimized system use was the basis for ensuring fast construction progress and excellent quality of execution.

The bridge over the Golden Horn (Turkish: Haliç) connects the historical, millennia-old Istanbul with the modern, European-influenced districts of the city. It is an integral part of the urban transport system expansion programme in an effort to cope with the increase in traffic volumes: two 950 m long subway tracks cross over the famous Bosphorus Straights. The new connection is

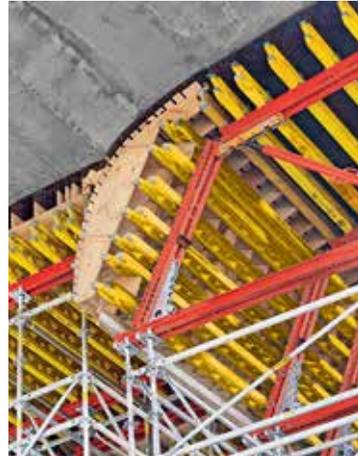
a combination of cable-stayed and swing bridges as well as a 450 m foreland bridge

The construction of the single-webbed T-beam cross-section superstructures in the foreland areas was realized on PERI UP falsework. Web and cantilever formwork were formed with variable frame construction units comprising of VARIOKIT system components due to the continuously changing cross-section. With the help of CNC-milled formwork units prepared at the PERI formwork assembly hall, the distinctive form of the bridge underside could be realized through curvatures in the transverse and longitudinal directions.

Framework units on the basis of the PERI UP Rosett Flex modular scaffolding formed the supporting structure for transferring the vertical and horizontal loads. The supporting heights of between 1 m and 14 m could be flexibly realized whilst the framework unit width was maintained at a constant 2.00 m. In the area of the piers, the carriageway slab is up to 2.50 m thick: here, the shoring tower width was halved with the legs bundled in 50 cm x 100 cm grid dimensions. The bay lengths of 25 cm to 2.50 m in the direction of the frames could also be adapted to suit the web and cantilever thicknesses - in 25 cm increments by means of system ledgers without any additional effort.



Optimized load transfer: superstructure formwork and falsework for the foreland bridges based on the flexible VARIOKIT and PERI UP modular construction systems.



The VARIOKIT framework units transferred the loads into the shoring while the curvatures in the transverse and longitudinal directions were formed with formwork units.



With the help of the PERI UP Flex modular scaffolding system, obstructions could easily be accommodated.

Contractor

Astaldi – Gülermak J.V.

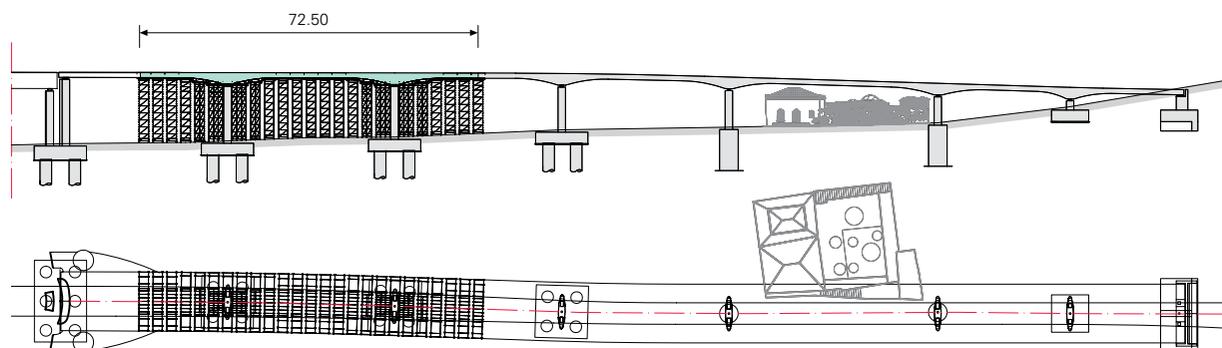
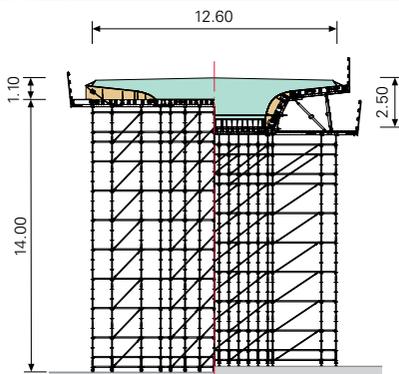
Field Service

PERI Kalıp ve İskeleleri San. ve Tic. Ltd.Şti Turkey, Istanbul



Alper Uzman, Deputy Project Manager
S. Ulaş Akı, Supervisor

“Selecting PERI as our partner was definitely the right decision: from the beginning onwards, we worked out a range of optimal solutions together. Through an easy and simple adjustment of VARIOKIT and PERI UP to suit the variable geometry, productivity could be increased as well as achieving safe construction progress.”



The thickness of the massive bridge superstructure changed continuously from 1.10 m to 2.50 m. Superstructure formwork and framework units could be easily adapted to suit the varying geometries and loads.

Parco della Musica e della Cultura, Florence, Italy

Problem-free construction progress with formwork and scaffolding from one source



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Società Consortile Parco della Musica a.r.l.
Field Service
PERI S.p.A. Italy, Basiano Office



Mauro Mezzaroma
Technical Director

“With PERI, we chose a trustworthy partner due to the proposed technical solutions as well as the comprehensive range of systems and products. During the construction work when we were under constant time pressure, the formwork and scaffolding systems used ensured fast and therefore cost-effective construction progress.”

The complicated structural architecture required achieving an optimal combination of the formwork and scaffolding to be used. Through the compatibility of the system, load transfer is optimized, building work simplified as well as accelerating the construction progress.

The music and cultural park features an opera house with 1,800 seats, a concert hall for 1,100 music lovers and a theatre for audiences up to 2,000. Generously-sized free areas and boulevards as well as an underground car park with 700 parking bays supplement the unique building ensemble. The short construction period for the concrete shell of only 18 months required a high level of commitment from the personnel: a team of around 300 workers worked in multiple shifts which often included nights. For this, the construction team required large quantities of materials that were delivered to the jobsite just-in-time from the PERI rental park.

In particular, the planning and provision of the complete solution from one source was decisive in ensuring the successful implementation of the project. The shoring solutions were completely compatible with the formwork systems which facilitated an opti-

mized transfer of loads. Interface problems were kept to an absolute minimum, errors in the execution were avoided and productivity was maximized. Furthermore, formal procedures for the building contractor were much easier and less time-consuming as PERI engineers also coordinated and provided the static for both the shoring and formwork.

The implementation was technically extremely challenging. For example, the entrance foyer of the large opera house cantilevered for more than 16 m at a height of 20 m – over a total length of 46 m. Here,

PERI UP Rosett modular scaffolding was used as working scaffold as well as shoring. The metric basic grid and the use of short ledgers allowed the bay sizes to be optimally sub-divided in both width and depth in 25 cm increments. Furthermore, the massive, up to 1.20 m thick structural components of the stage tower – 15 m above the centrally-positioned stage – resulted in very high temporary loads, combined with high demands placed on the load-carrying construction with regard to geometrical adaptation. For this, PERI UP shoring was combined with the MULTIPROP system.



The 1,800-seat opera house (shown in the foreground) is characterized by a complex design featuring inclined and curved levels.



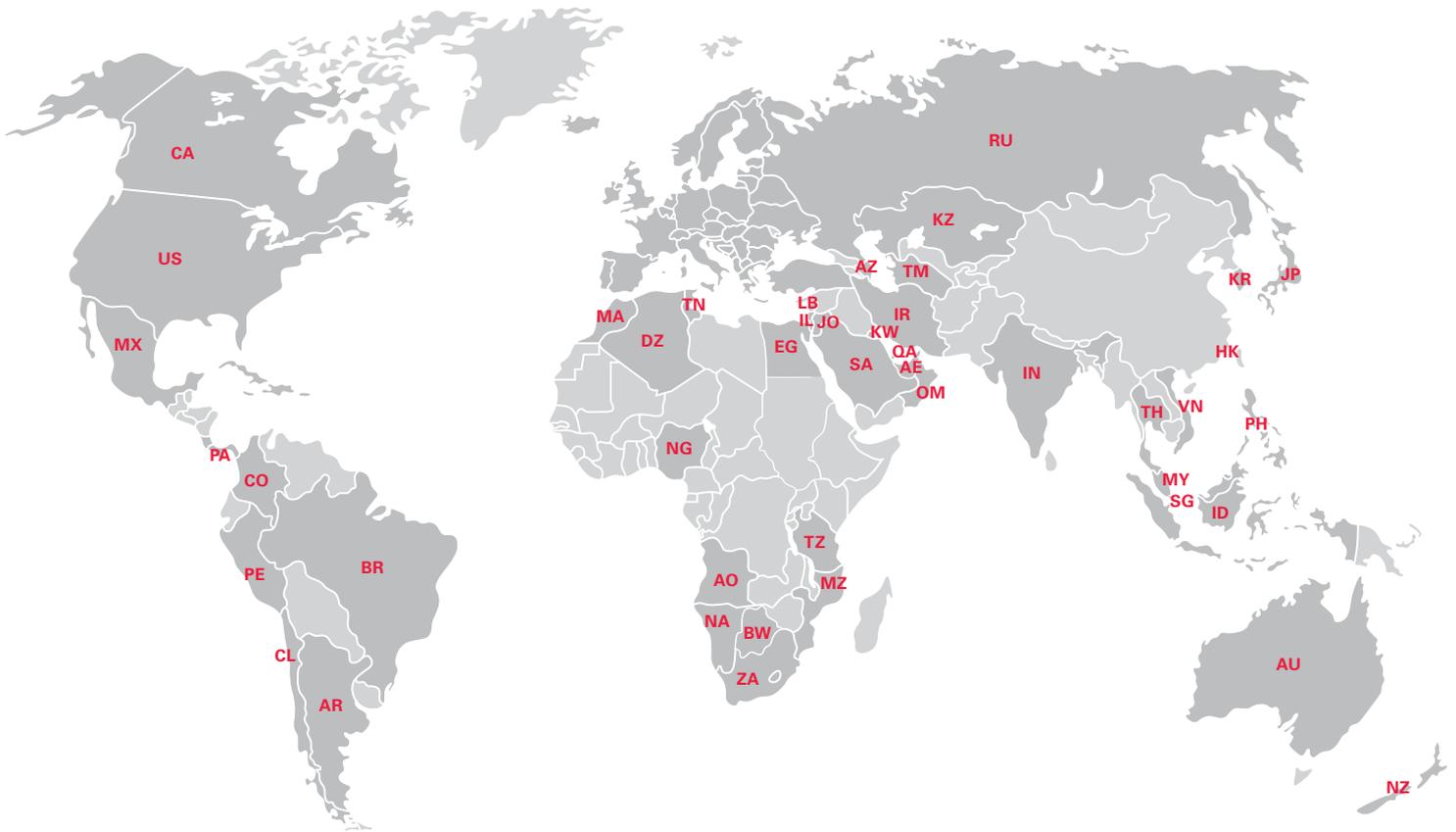
The MULTIPROP system carried the formwork and concreting loads of the 1.20 m thick walls of the stage tower at a height of 15 m.



A steel framework construction supports the slab above the auditorium parquet. PERI UP, MULTIPROP as well as units comprised of SLS spindles and SRU walers were ideally combined as a load-carrying system providing temporary assembly support.



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