

Handbook

Formwork Scaffolding Engineering





Our customers

Worldwide, residential and industrial buildings, bridges and tunnels as well as cultural sites are being realized on a daily basis. During the construction and upkeep of all structures, construction site personnel are often exposed to difficult conditions. At the same time, they are responsible for the quality, safety and durability regarding the execution. And it is thanks only to their day-to-day commitment and experience that projects are successfully realized in spite of extremely tight schedules and high cost pressures. We at PERI make every effort to support our customers in the best possible way.



Our Company



Systems and Services



Reference Projects





Your added value is what drives us

You can safely rely on PERI!

Dear Readers,

For nearly 50 years, PERI has been active on the market and has always been a pioneer in formwork and scaffolding technology. What has made us so successful is that in everything we do, we always think first and foremost of the benefits for our customers. A cooperation based on partnership and trust is a fundamental value in our company, which therefore also forms the basis of our customer relationships.

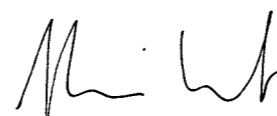
We are committed to bringing formwork and scaffolding systems as well as components to the market that make our customers quicker, more efficient and safer in their day-to-day work. Furthermore, we provide engineering and value-added services whereby we offer our customers support during their projects concerning all processes and work procedures in formwork and scaffolding operations. From the first solution idea through to the final material return delivery: PERI is always available to provide you with advice and practical help.

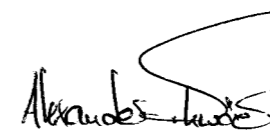
We are constantly developing and improving, always on the lookout for advantageous, new materials and unconventional solutions. Even established and proven products are subject to analysis and assessment again and again because we are constantly working to make them even better and more practical. We frequently work closely with our customers who in turn contribute ideas and requirements from daily working operations. Through our worldwide contacts to users from very different cultures, industries and business areas, numerous innovations and product improvements are developed – and not only in the area of physical products but also in the form of digital services.

Parallel to this, we work hard in the background in order to ensure the availability of all PERI products worldwide as well as increasing the flexibility of our customers – by expanding existing and realizing new production facilities together with investing in our worldwide rental parks. For us, this is also part of providing the best possible service to the customers.

In this handbook, you will find an overview of our current product and service portfolio. In addition, we present a number of outstanding reference projects that have been realized with our systems, our services and with our support.

We hope you enjoy the read and every success in your work!


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Alexander Schwörer


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Partnership-based solutions

Always keeping in mind the benefits for our customers

At the core of our company is the development and production of formwork and scaffolding systems. Designed to handle the tough day-to-day working environment, PERI products must demonstrate real benefits on a daily basis. We see ourselves not only as efficient providers of high-quality formwork and scaffolding technology. Instead, keeping a close eye on the business of our customers, their benefits and added value is our top priority in everything we do.

We see ourselves in the role as the provider of ideas and support in order to develop the best solution together with our customers for meeting the individual requirements in each case. Thus, we provide our customers with an advantage regarding market opportunities, flexibility and competitiveness with the aim of exerting a positive influence on their business development over the long term.

Behind all of this are values that have been key in our family-run company since its founding and have firmly established themselves in the guiding principles: the open and respectful behaviour towards each other, recognizing customer benefits as a potential for success along with the pursuit of excellence – all of this is *modus operandi* at PERI worldwide.

“PERI products and services form the basis of our performance spectrum. Together with our values and self-perception, the best solution for our customers is determined.”



At home in Weissenhorn

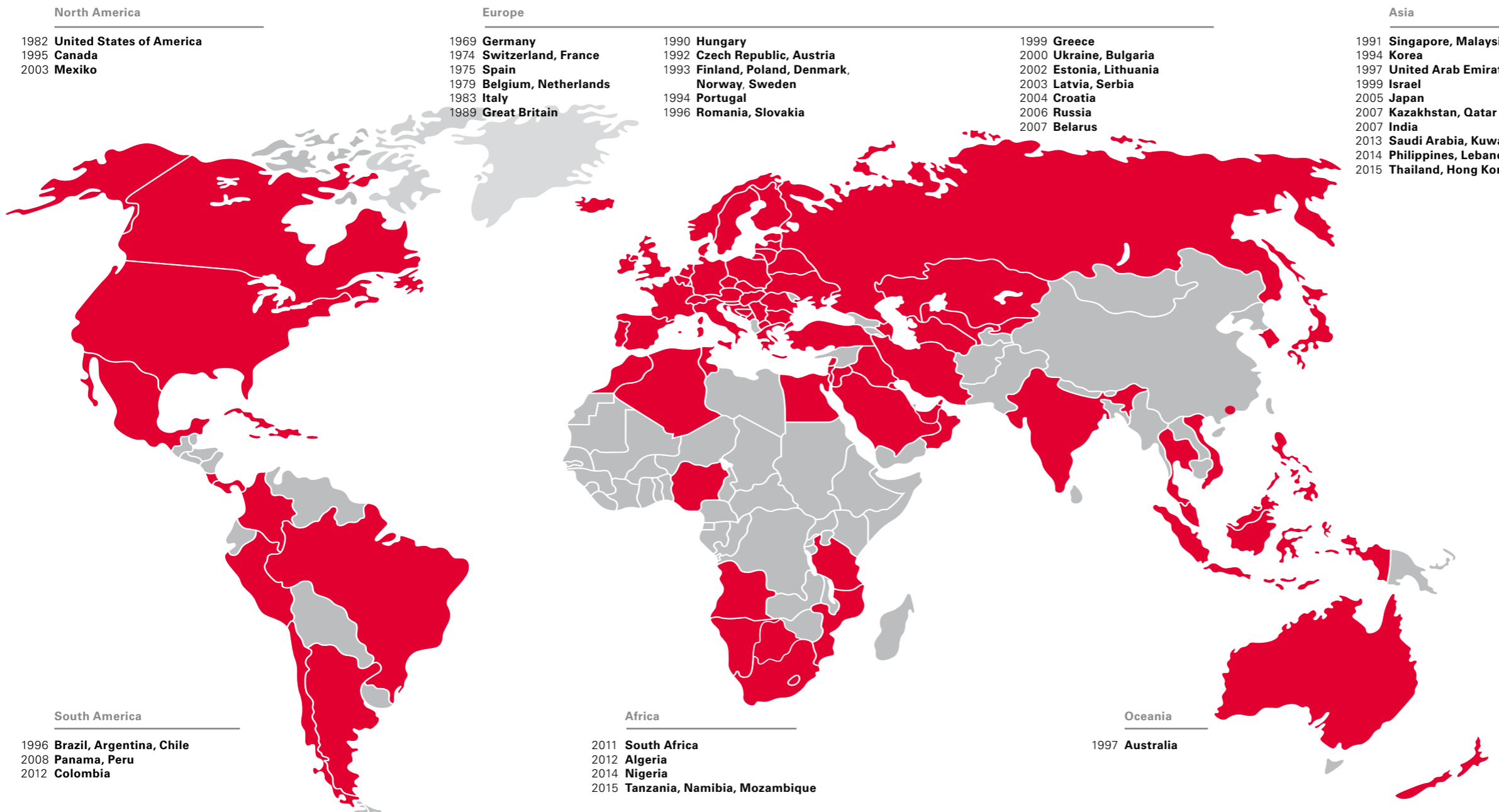
Origin and headquarters of all our activities



Since its founding in 1969, the headquarters in Weissenhorn, located to the south of Ulm, has constantly been expanded. Here, the vast majority of the PERI systems are still manufactured.

On-Site Worldwide

Close proximity to our customers and their projects



We actively practise and pursue the close proximity to our customers. Today, we are represented by over 60 subsidiaries on all continents; many countries also have several branches and additional sales offices. In more than 120 efficiently run rental parks worldwide, we provide the required formwork and scaffolding materials in order to be able to supply your projects and to cover peak demands. And we still continue to expand.

Valuable insights result from the many years of international activity along with the different regional requirements regarding construction methods and procedures, material and equipment use as well as labour costs. We bundle this detailed know-how in order to develop appropriate products and services. Thus, global knowledge and a worldwide competitive edge is created from local knowledge and understanding. And all our customers around the world benefit from this. This forms the basis of our performance leadership.



“Our international management stands for in-depth expertise. With the knowledge and understanding of local requirements, the right formwork and scaffolding systems are developed to meet all needs worldwide.”

Our recipe for success for almost 50 years

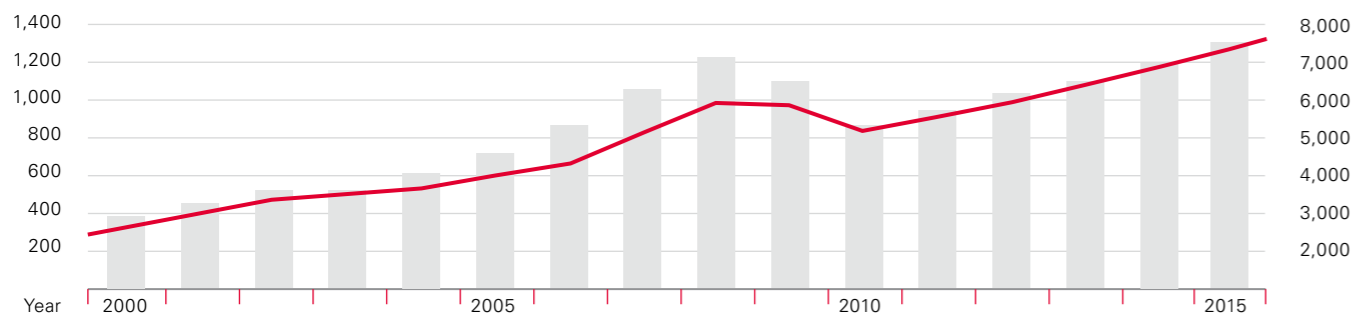
Innovation, internationalization and committed employees

Continuous and steady growth based on our own strength is our maxim for the further development of our company. This is why we are constantly working on expanding our range of services as well as production capacities. Through the expansion of existing sites and establishment of additional country subsidiaries and locations, we are strengthening our local presence worldwide. Our goal is to be even closer to our customers around the globe in the future and to be able to serve them even better and faster.

Our employees around the world, their performance and competence are our company's true capital. Their high motivation and special PERI team spirit, strong customer-oriented approach and their daily focus on actual customer requirements are the elements that has made us so successful since PERI was founded.

€ Turnover in millions

Number of employees 



“Our success factors are tremendous innovative strength and internationalization at an early stage. Behind this are around 7,700 employees who are committed in providing the best individual solution for the benefit of our customers.”

Our most important product is customer satisfaction

Comprehensive solutions from one source

Ensuring we have satisfied customers is our highest priority. Our entire business operations are focused on achieving this which results in our strict orientation on deriving maximum customer benefits. We want you to benefit directly from our products and services particularly from the close cooperation with us and have a real competitive edge in the market – both technically as well as economically.

Because we know our customers, their tough day-to-day working environment and their competition, it is always a question of ensuring that our products and services find solutions to problems, simplify and accelerate operations, enhance on-site safety levels and, in particular, help reduce time and costs. Therefore, around 1,300 PERI engineers worldwide are hard at work every day in order to develop efficient solutions and implementation plans to realize our customers projects. And it is not unusual that new products or additional services are generated from such individual solutions. Parallel to this, PERI research activities constantly strive to develop innovative technologies and products that meet the needs of our customers around the world.

As partner at the side of our customers jointly implementing the best and most cost-effective formwork and scaffolding solution in each case thus strengthening the competitiveness of our customers over the long term – and we work hard on this with total conviction.

An important contribution for ensuring the satisfaction of our customers: the PERI performance price

Our engineers take into consideration the total cost of materials and working hours in every product development – we call this the “performance price”. Fact is that if material costs are reduced and valuable planning, working, crane or machine time can be saved, then the investment quickly pays for itself and the price is put into perspective again.



Products and systems that successfully prove themselves in the market

Groundbreaking formwork and scaffolding technology which continues to set standards in the industry

The basic requirements of our developments is to ensure faster and safer working operations. PERI products are therefore designed so that they provide users and construction companies with advantages regarding the handling along with workload reductions, enhanced safety as well as cost and personnel savings.

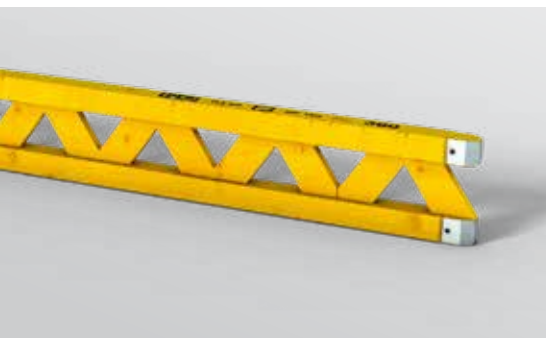
We thereby attach great importance to minimizing the number of individual components for system assemblies because this has a positive day-to-day effect: as a result, every use is faster and easier, logistics requirements are reduced, search times on the construction site are a thing of the past – to name just a few effects.

Innovative construction, intelligently-configured mechanical systems, high quality and durability are likewise given requirements for PERI engineers.

Wherever possible, we develop our systems for the widest possible range of applications. As a result, this allows maximum material utilization and avoids unused stocks of materials. Where necessary, we complement system components for very special applications so that expensive, project-specific constructions can be dispensed with. Thus, PERI solutions increase the economic efficiency, very often for all the construction processes.

Proof that we are on the right track with this approach is the fact that PERI has always set standards in the market with its innovations and that PERI systems have established themselves worldwide.

“We develop new products for applications with which we see rationalization potential with a real future. In this way, efficient system equipment with practical details is developed which maintain a strong position in the market over many years.”



GT 24 Formwork Girder

The GT 24 Formwork Girder is the “old timer” of PERI developments. It still continues to impress with its high load-bearing capacity and versatility.

TRIO

With only a minimum of different individual components, the TRIO Universal Wall Formwork System is a guarantee for fast forming.

ACS

The ACS Self-Climbing System complete with hydraulic drive can be climbed in all weathers and without a crane.

PERI UP Flex

With the flexible PERI UP Flex Modular Scaffolding, PERI started its activities for scaffold applications in industry.

VARIOKIT

PERI developed the VARIOKIT Engineering Construction Kit from rentable system components for tunnel, bridge and building construction.

MAXIMO

The innovative, single-sided tie technology of the MAXIMO Wall Formwork System reduces workloads and ensures enhanced concrete surface finishes.

Examples of PERI developments

1969
T 70V Wooden Lattice Girder

1972
KGF 240 Climbing Formwork with Carriage

1984
GT 24 Formwork Girder
SKS Single-Sided Retractable Climbing Formwork

1985
TRIO Panel Formwork

1989
ACS Self-Climbing System
SKYDECK Aluminium Slab Formwork
MULTIPROP Aluminium Post Shores
PERI ELPOS Planning Software

1995
PEP Tubular Steel Slab Props
TRIO Shaft Element
VARIO QUATTRO Column Formwork
PERI CAD Planning Software

1998
PERI UP T 72 Frame Scaffolding
PERI UP Rosett Modular Scaffolding

2005
RUNDFLEX Plus Wall Formwork
RCS Climbing System

2007
VARIOKIT Engineering Construction Kit

2008
GRIDFLEX Girder Grid Slab Formwork
PERI UP Flex Industrial Scaffolding
MAXIMO Wall Formwork

2010
VARIODECK Slab Table
VARIOKIT Heavy-Duty Shoring Tower
PEP Ergo Tubular Steel Slab Props
UNO – for Monolithic Construction

2013
MAXIMO MXK Bracket System
LPS Lightweight Climbing Enclosure
SCS Single-Sided Climbing System
VARIOKIT Balanced Cantilever Equipment / Heavy-Duty Truss Girder
ACS Core 200 Self-Climbing Formwork

2015
DUO Universal Formwork

2016
MAXIMO MXH Heated Formwork
PERI UP Easy Facade Scaffolding
SKYMAX Slab Formwork
ACS Core 400 Self-Climbing Formwork
ALPHAKIT Engineering Construction Kit

Innovations to meet every customer requirement

Focusing on user benefits

DUO Universal Formwork is in many ways a typical PERI product. Typical because the DUO system has taken on board customer requirements from various markets which has resulted in an extremely lightweight, easy-to-handle and versatile formwork. With a formwork manufactured from robust technopolymer, the virtually tool-free assembly along with the possible application for walls, foundations, columns and slabs, we have once again met these requirements with this special new development.

The application of polymer products has been the focus of PERI materials research for a number of years now. All development activities are aimed at the specific use of these polymers in formwork and scaffolding technology. Since 1995, for example, the plastic rack of the SKYDECK main beam has proven itself countless times, and is made of an engineering grade plastic. Furthermore, our portfolio has included for quite some time simple Slab Stopend Angles and other accessories made of this material.

The use of different materials is nothing new for us. We were one of the first manufacturers in favour of utilizing aluminium in formwork and scaffolding technology. In spite of some initial concerns of the market, this material has now become indispensable due to its many advantages.

Developments in scaffolding technology

The focus for a new type of scaffolding system was on combining the speed inherent in 3D scaffolding with the flexibility of modular scaffolding, and maintain compliance with current as well as future safety regulations.

This has resulted in PERI UP Easy with the special frame which provides the highest level of safety. Thanks to the ingeniously designed rosette, the Facade Scaffolding is compatible with the PERI UP Flex Modular Scaffolding. This provides extended application possibilities for more complex scaffolding tasks.



First-class quality is standard at PERI

You can count on it

We endeavour to produce and deliver consistently high quality on a sustained basis. Therefore, we continually invest in modern production processes and inspection procedures to become even better. Already during product development phase, we subject the components to a wide range of tests in order to get the most out of them ready for the serial production. This includes, among other things, longevity tests in salt baths or torsion tests on the individual components. Thus, we ensure that PERI systems are suitable for tough everyday operations on the construction site as well as being considered reliable enough.

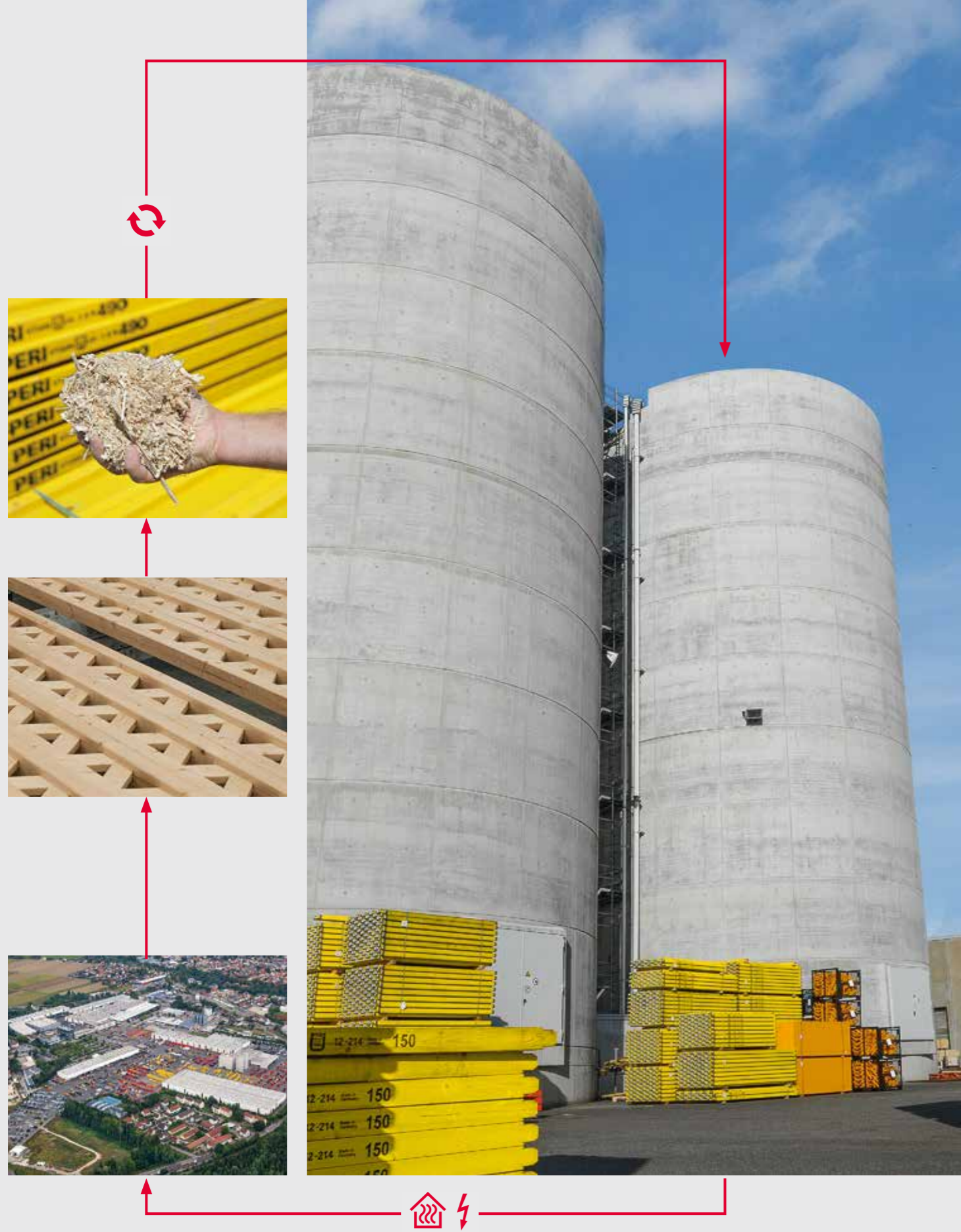
The entire process of the subsequent serial production is subject to continuous quality assurance which is clearly defined and has been repeatedly certified, from purchase through to delivery. This means we can provide the promised quality of PERI formwork and scaffolding systems.

Here, too, the results are repeatedly placed under continuing review. And naturally we always use new findings to implement further improvements. For example, an additional cavity sealing with active corrosion protection was developed for the MAXIMO Panel Formwork and integrated in the production process which, in turn, has further increased the durability of our innovative wall formwork.

The wide range of PERI development and production processes include load tests, durability tests as well as continuous quality control. Furthermore, certification from external testing institutes and organisations attest to the high quality of the PERI products.



“Development, production and quality assurance work hand in hand at our company. Highly qualified personnel and the very latest production and testing procedures ensure long-lasting products.”



A symbol of sustainability at PERI: wood chips which occur as a waste product in the girder production feed our biomass heat and power plant at the company headquarters in Weissenhorn. It generates heat and electricity for the entire location as well as neighbouring households.

Sustainability as a main principle

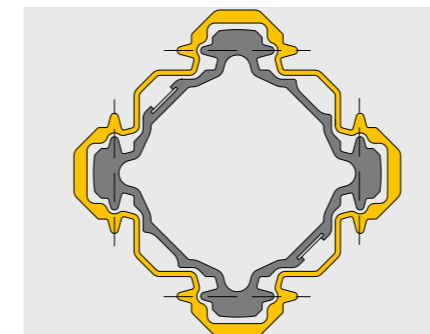
Taking active responsibility

Future viability as well as ecological and economic sustainability have a high priority for all our company activities. The focal point is geared towards the best material utilization as early as the development phase while the load-optimized design of the PERI systems and system components ensures economical use of materials. The selection of raw materials and their procurement takes place at PERI in terms of ecological sustainability. Therefore, for example, the wood for our plywood formliners originates as far as possible from certified, sustainably-managed forests. Our procurement processes are an integral part of the quality management system and we take into consideration and optimize current and future environmental costs. Thereby, the substitution of hazardous or harmful substances has also been company strategy at PERI for decades.

In the production, new technologies and efficient processes ensure resource-saving manufacturing and best product quality. This guarantees a high number of repeat uses and a long service life of the PERI systems which, in turn, positively influences the consumption of resources. However, if the demanding daily wear and tear does result in damage being caused, the PERI material can be professionally refurbished in our logistics centres. Delivery and construction site logistics are also optimized regarding shipping volumes and transportation routes. Strategically-positioned sites guarantee short delivery distances whereby transportation is also continuously optimised through an intelligent logistics network.

Last but not least as a family-owned company, we are in principle oriented towards maintaining sustainability. Future-oriented actions based on economic, social and environmental sustainability has always been a central element of the PERI culture. The PERI company management has thereby acted with a far-sighted approach and implemented a long-term strategy – beginning with the founding of new PERI locations and the comprehensive training programme for PERI employees through to the strategic development of new markets and business areas.

The design of the MULTIPROP Prop exemplifies optimized material utilization: the shape guarantees a high load-bearing capacity of the prop with minimum material requirements.



PERI systems have been designed to provide a long service life. With panel formwork, for example, even badly damaged elements can to be used countless more times after being repaired and fitted with a new formliner.



The DUO Universal Formwork components are made of a technopolymer in injection moulds which means no waste is generated. Used material can be used to manufacture new products.



Engineering at the very highest level

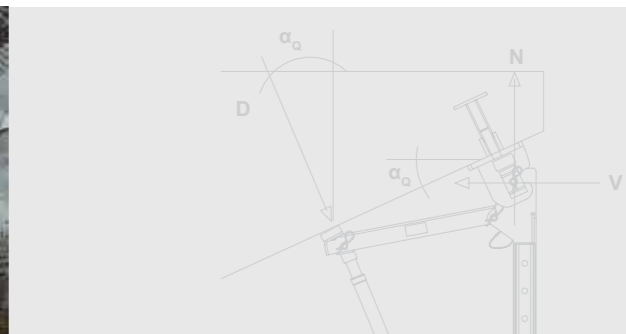
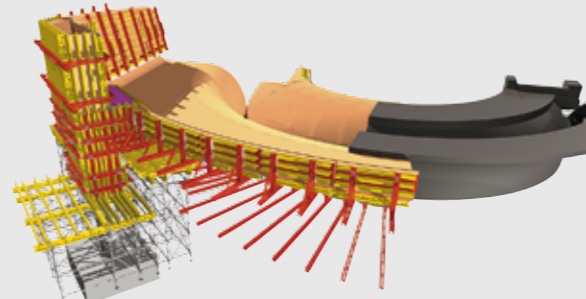
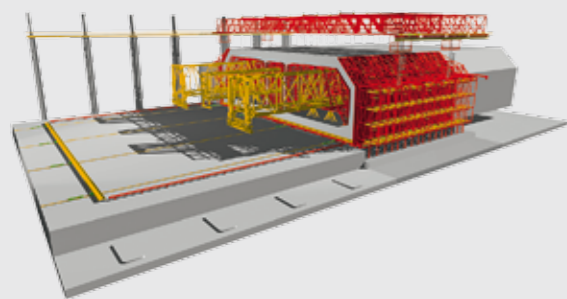
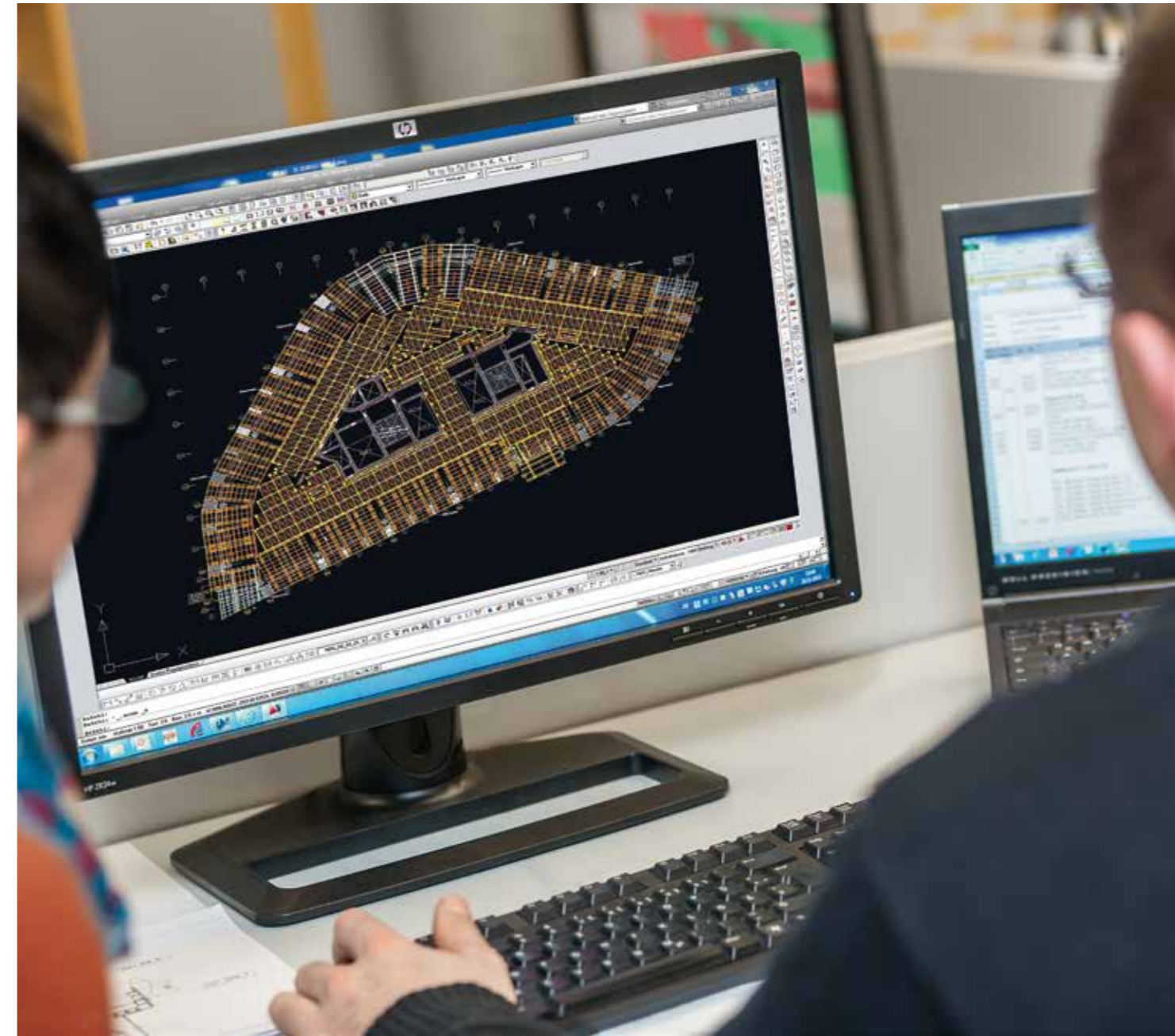
High professional competence and extensive experience of providing customized solutions

PERI engineers plan and design formwork and scaffolding solutions while taking into account the technical requirements, boundary conditions during the application as well as respective individual customer requirements. This results in optimized solutions for each project Task – very often during the tendering phase. Furthermore, PERI also provides the required technical documentation – from implementation drawings through to verifiable static calculations. Goal of the PERI engineers is always ensuring process optimization with the objective of reducing both execution times and costs.

In this connection, we are also intensively involved with the technology of Building Information Modeling (BIM). In the process, the systems are used for building information management during the planning and implementation phases which facilitates cross-company communication as well as over different locations. The goal of all PERI developments is the complete integration of formwork and scaffolding solutions in future BIM simulations. In the future, our engineers want to fully exploit the potential of 5-dimensional planning in the execution of construction work together with our customers.

The high level of expertise found in the international PERI application technology has been achieved through intense cooperation, close networking and continuous training of our engineers worldwide. In this way, we also ensure that the know-how in our company along with all the acquired international experience really does benefit each of our customers for every project regardless of its size.

“The thinking in processes for optimizing construction progress is a matter of course for our engineers. In addition to the technical requirements, they always take into account safety considerations and economic efficiency of the execution.”



Solutions that move you ahead

Reliable support during all phases of the project

The PERI range of services in the area of project support extends from the elaboration of feasibility studies for particularly challenging projects and material rentals for covering peak demands through to cleaning and repair services for the customer's own materials. Our close-knit network of logistics sites ensures fast availability of materials for every project. We also make our system equipment available in our rental parks and thereby provide our customers with a cost-effective option for managing peak demands or special project tasks.

If required, our supervisors can ensure that the PERI solutions are efficiently used on the construction site. Furthermore, we support the controlling processes on the customer side with high transparency and performance-related invoicing. For large-scale projects, PERI project managers help to adjust material quantities to suit actual requirements thereby achieving an ideal economically viable on-site material requirements/costs ratio.

The most important contact person for our customers is always the respective personal sales engineer. He bundles all requirements and works together with those responsible for the project implementation to draw up a corresponding project service package complete with a customized range of site-related services.



Extract from the PERI service portfolio in different project phases

PERI services are oriented towards the project phases on the customer side. In each step, we offer all services required for the formwork and scaffolding activities which provide our customers with economic benefits and thus real competitive advantages. This applies to both large and small construction projects – solution-oriented, prompt and direct – and always in partnership with the PERI sales engineer.

Offer phase	Work preparation	Execution phase	Project completion
PERI consultancy services <ul style="list-style-type: none"> ■ Analysis of the client's requirements ■ Proposed solutions while taking into consideration material stocks on the customer side along with the options of purchasing or renting ■ Performance specifications 	PERI engineering services <ul style="list-style-type: none"> ■ Offer and project plans ■ 3D planning / 5D planning with a construction sequence simulation ■ Verifiable static calculations ■ Parts lists ■ Training documents 	PERI project services <ul style="list-style-type: none"> ■ 24-hour presence with myPERI ■ Daily site reports ■ Formwork assembly ■ Freight logistics ■ Supervisor services ■ Site management ■ Logistics ■ Controlling ■ Quality assurance 	PERI services <ul style="list-style-type: none"> ■ myPERI invoice retrieval ■ MS Plus rental service ■ Repair of materials from customer's stock

"Our services are based on a practical approach designed to match the project phases of our customers. They bring real benefits to both large and small construction sites."



Knowledge and experience for your day-to-day work

We make sure you are well-equipped to handle all requirements

We are pleased to pass on our knowledge and years of experience to our customers at any time. In our exhibition centres around the world, we regularly present not only PERI innovations but also providing details and insights on the latest system equipment. For this, we organize seminars, workshops and product training where we provide detailed product knowledge as well as train participants for the day-to-day use and reveal practical tips and tricks. In the process, users learn how to safely and efficiently use PERI solutions on the construction site even when under time pressure.

In addition, we offer training opportunities that are specially designed for dealing with the tasks of those specialists involved in planning operations and site management. This includes, for example, PERI CAD training for professional formwork planning as well as seminars that provide information on legal requirements and standards.

Parallel to this are the PERI Entrepreneur Days which address current industry issues and provide a platform for the exchange of ideas.

We view this as a contribution to an active exchange of knowledge and experience among all those who work daily with our formwork and scaffolding technology. For us, this also counts as providing the best possible service to the customers.

“Not only do we know our products down to the last detail but also standards and regulations. In our training centres around the world, we pass on this know-how to the users.”



Your partner also for upcoming challenges

You can rely on PERI



An openness to new ideas, the courage to change and reliability in what we do. This is what you can expect from PERI also in the future.

PERI Competence with perspective

With creativity and a clear vision for the future

It is not unusual that we accompany and support our customers with special assignments: for structures with futuristic designs, on construction sites with enormous dimensions and huge logistical challenges, for statically complex buildings, challenging bridge and tunnel constructions or elaborate refurbishment operations. PERI is at home on the construction sites of the world.

In order to be prepared for such tasks, we deal intensively with many aspects of the construction industry: concrete technology, materials research and a diverse range of materials, new manufacturing methods and innovative solutions for surface protection. We use the very latest data processing methods, we actively drive issues such as BIM consistently forward and create practical software solutions and digital tools which help to accelerate and simplify the processes involved in formwork and scaffolding. PERI keeps its finger on the pulse for you at all times.

Rest assured that we will continue to be a reliable partner for you in the future regarding the implementation of ambitious construction and scaffolding tasks.

You can always rely on PERI – now and in the future!

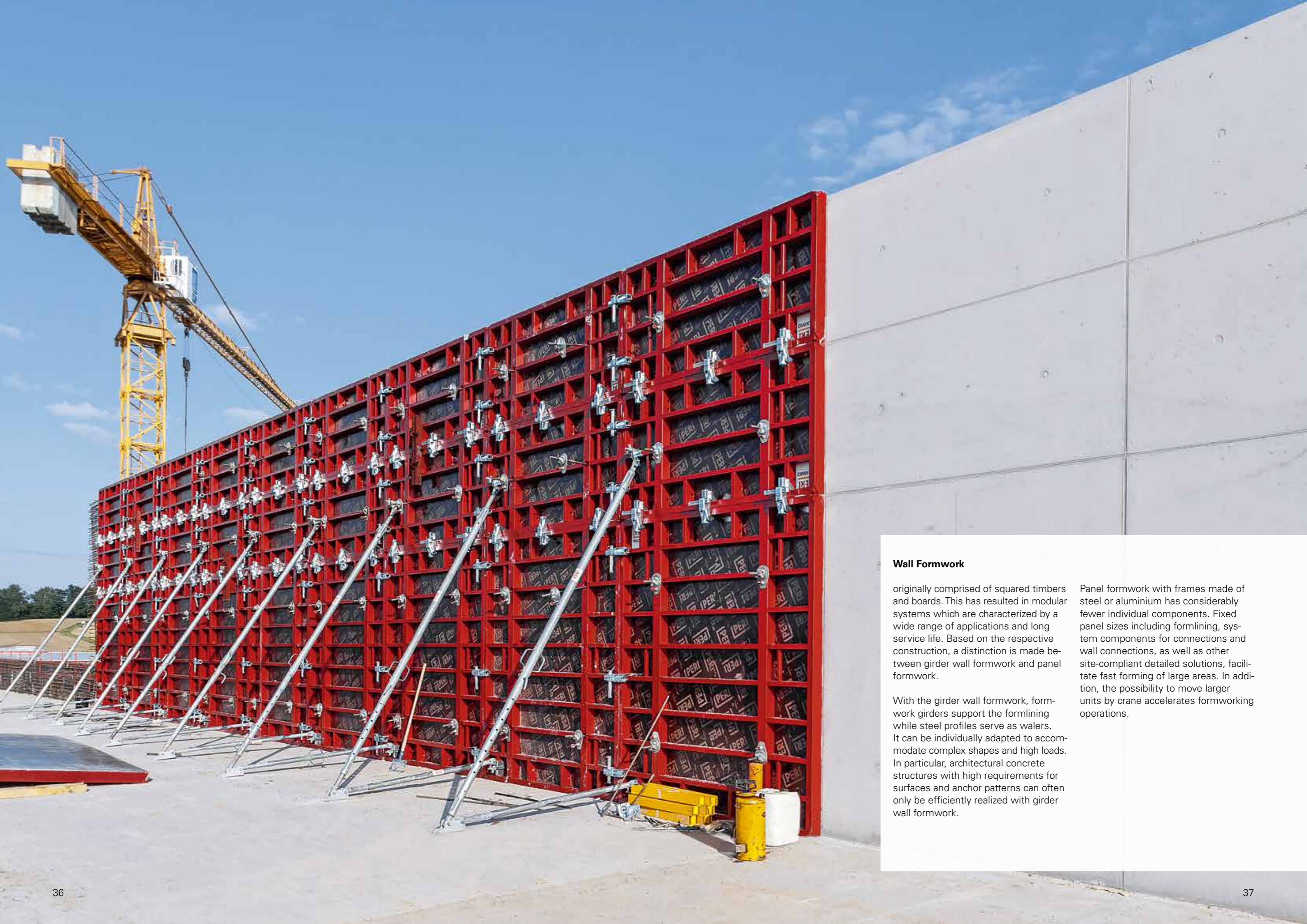


“Our mission is to remain at the forefront which means our customers will too. In order to achieve this, we will continue to rely on innovation and providing the best possible customer service in the future.”



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The following PERI formwork and scaffolding systems, as well as components, show an overview of the international PERI product portfolio. The appropriate programme for meeting the specific requirements of a market is defined by the respective PERI national company.



Wall Formwork

originally comprised of squared timbers and boards. This has resulted in modular systems which are characterized by a wide range of applications and long service life. Based on the respective construction, a distinction is made between girder wall formwork and panel formwork.

With the girder wall formwork, formwork girders support the formlining while steel profiles serve as walers. It can be individually adapted to accommodate complex shapes and high loads. In particular, architectural concrete structures with high requirements for surfaces and anchor patterns can often only be efficiently realized with girder wall formwork.

Panel formwork with frames made of steel or aluminium has considerably fewer individual components. Fixed panel sizes including formlining, system components for connections and wall connections, as well as other site-compliant detailed solutions, facilitate fast forming of large areas. In addition, the possibility to move larger units by crane accelerates formworking operations.

MAXIMO Panel Formwork

The particularly cost-effective system with MX tie technology and simultaneously providing the best concrete finish

Developed by PERI, the MX tie technology with one-sided tie installation greatly accelerates formworking operations. At the same time, MAXIMO is significantly faster than conventional panel formwork despite the lower site personnel requirements. Due to the innovative tie technology and optimized number of tie points, working time values for the system are verifiably up to 50% less. In addition, the centrally-arranged tie points result in a regular joint and tie pattern both horizontally and vertically.

Faster tie installation
through the one-sided tie technology without spacer tubes and cones

Minimum of anchors
through the optimized tie point arrangement

Improved concrete finish
through the neat joint and tie arrangement



- Flexible usable panel formwork with minimal working time values, compatible with TRIO panel formwork
- Panel heights up to 3.30 m, panel widths up to 2.40 m (standard)
- Maximum permissible fresh concrete pressure: 80 kN/m²
- Use with MX tie technology for wall thicknesses from 15 cm to 60 cm (wall thickness adjustable on tie)
- Use with DW ties for thicker walls
- Flush, aligned and tight connections with the BFD Alignment Coupler – including filler timber compensations up to 10 cm
- MAXIMO requires up to 40% fewer tie points as conventional systems
- Closing of unused anchor positions is not required as each tie point is normally used
- Easy cleaning due to the powder coating of the frame; improved corrosion protection through cavity protection on the profile inner surfaces



The specially-developed MX Tie is installed from one side only and is used without spacer tubes and cones. This means material and working time savings.



The wall thickness can be easily adjusted on the anchor by means of a cotter pin. The usual wall thicknesses are indicated through markings on the tie rod.

Extended programme

- **MAXIMO 300 / MAXIMO 360**
Panel heights 3.00 m and 3.60 m (with MX 18 Tie System; not available as rentable item)
- **MXP Platform**
The platform system with maximum safety for MAXIMO and TRIO panel formwork

- **MXH MAXIMO Heated Panel**
With MAXIMO combinable heated panel for concreting in colder climates; high level of cost-effectiveness through the enhanced utilization possibility of the system formwork

- **MXK Bracket System**
Modular platform system for MAXIMO and TRIO with widths of 0.90 m, 1.20 m and 2.40 m; safe pre-assembly of brackets, scaffolding platform and side mesh barriers on the horizontal panel

MAXIMO is mainly used in high-rise and industrial construction projects. The system follows clearly structured panel increments of 30 cm.



The modular MXK System consists of lightweight, pre-assembled system components. Assembly can take place manually on the ground.



In addition to the time savings, MAXIMO stands out due to its excellent concrete results through the clearly arranged joint and tie pattern.



TRIO Panel Formwork

The proven, universal panel formwork with only one connecting part

TRIO is the universal formwork system for all applications where the main focus is on reducing the shuttering times with conventional DW tie technology. With the BFD coupler for virtually all connections as well as many other practical system solutions, TRIO has successfully proven itself in countless projects around the world. TRIO can be used together with the more advanced MAXIMO panel formwork. A large range of accessories, such as the BFD Coupler or MXK Bracket System, can be used in both systems.

Easy and simple connections with the BRD Alignment Coupler as the only component for all panel connections

Fast working operations with only a minimum of panel widths as well as panels that can be used both horizontally and vertically

Large-area shuttering with standard panels up to 3.30 m x 2.40 m – providing a high level of surface evenness and only 2 tie positions

Extended programme

■ **TRIO Aluminium**
Lightweight formwork for crane-independent working; easily distinguishable by its yellow powder coating

■ **TRIO Structure**
TRIO panels with a free choice of formlining for special concrete surface requirements – supplied already pre-assembled



- Flexibly used panel formwork for fast working operations, compatible with MAXIMO panel formwork
- Panel heights up to 3.30 m, panel widths up to 2.40 m (standard system)
- Maximum permissible fresh concrete pressure: 80 kN/m²
- Can be used with DW 15 and DW 20 tie systems
- Flush, aligned and tight connections with the BFD Alignment Coupler – including filler timber compensations up to 10 cm
- Simple cleaning operations due to the powder-coated frame

The BFD Coupler can be operated with one hand. The framed panels are connected flush, aligned and tight in one working step.



A minimum of different components facilitate easy and fast forming with TRIO – both in single-family housing construction as well as for large projects.



The aluminium TRIO panel elements are yellow powder-coated; they can easily be moved by hand.



With the TRIO shaft element, complete shaft internal formwork can be moved quickly; the all-round striking clearance is 30 mm.



The platform system, consisting of working platforms, access ladders and guardrails, provides maximum safety.



DOMINO Panel Formwork

The compact wall formwork for a wide range of uses in general construction and civil engineering

DOMINO is the lightweight, craneable panel formwork with compact dimensions. The system is particularly suitable for residential and civil engineering projects as well as construction in existing buildings. Through the inset tie points, sleeve foundations, parapets, retaining walls and beams can be quickly and easily formed. If no crane is available, the DOMINO Alu version is used. The DRS Alignment Coupler ensures flush, aligned and tight panel connections.

Easy and simple handling through small-sized panels and low weight – especially when using the aluminium panels

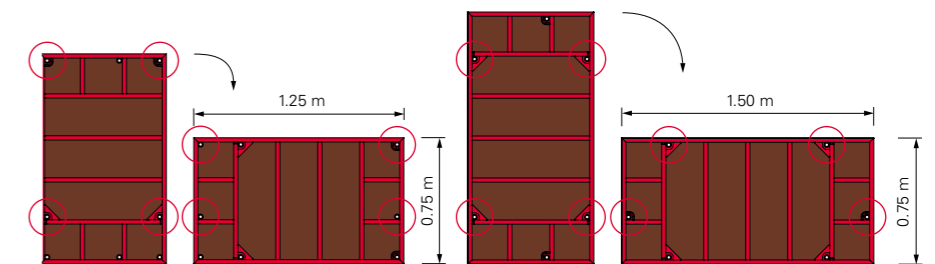
Ideally suited for foundations due to inset tie points and matching accessories

Fast panel connections with the DRS Alignment Coupler as the only component for all panel connections

Extended programme

- **DOMINO Alu**
Lightweight aluminium elements, clearly distinguishable through the yellow powder coating
- **DOMINO 150 | 275 | 300**
Elements with heights of 1.50 m, 2.75 m and 3.00 m for an extended range of applications

- Light aluminium panel formwork for a wide range of uses, can also be mounted without requiring a crane
- Panel heights up to 2.50 m, panel widths up to 1.00 m (standard version)
- Maximum permissible fresh concrete pressure: 60 kN/m²
- All connections are guaranteed to be flush, aligned and tight with the DRS Alignment Coupler
- DKS Wedge Connector for ensuring easy connections in the foundations with lower load-bearing requirements



Problem areas, e.g. ties near the ground for foundations, can be easily handled due to the inset tie points.

DOMINO elements are also available in aluminium; the yellow powder-coating distinguishes them from the red steel elements.

DOMINO is the robust wall formwork for general construction and civil engineering. It is particularly suitable for realizing foundations.



LIWA Panel Formwork

The simple, lightweight steel formwork with a cleverly designed corner solution

LIWA deliberately dispensed with more elaborate equipment features in favour of lower investment costs. The system has very few different frame elements as every standard panel is also a multi-purpose panel with a perforated strip. This means that corners as well as columns can be formed with LIWA without requiring any special panels. This simplifies formworking operations as well as work preparation and storage of materials. LIWA is a market-oriented solution if, for example a system formwork is used for the first time.

Very few different components

Each standard panel is simultaneously a multi-purpose panel

Simple design

With robust, powder-coated flat steel frames

Can also be used without a crane

The low weight of 35 kg/m² also allows for the 75 cm panel to be installed manually



Push-Pull Props and Kickers are attached to the anchor struts of the panel by means of the LIWA Brace Connector.



With the multi-purpose panels, columns up to 55 cm x 55 cm can also be formed in 5 cm increments.



The product range includes comprehensive safety equipment such as scaffold brackets or opposing guardrails.



For higher requirements, the LRS Alignment Coupler ensures flush panel joints – also for compensations to 5 cm.

- Simply designed, lighter PERI steel formwork with flat steel frames and only a 10 cm overall height
- Formwork heights up to 3.00 m, panel widths up to 75 cm (standard system)
- Maximum permissible fresh concrete pressure: 50 kN/m²
- Can be used with the DW 15 Tie System
- Wedge Connector for standard panel joints
- Wedge Clamp Compensation for compensations up to 5 cm
- LRS Alignment Coupler with aligning function

VARIO GT 24 Girder Wall Formwork

The variable wall formwork with the proven GT 24 formwork girder

With girder wall formwork, the arrangement of the individual system components can be freely selected. As a result, the VARIO GT 24 can be adapted to suit all geometries and requirements, e.g. tie positions or acceptable fresh concrete pressure. The system is used as project formwork in residential and industrial construction, bridge abutments and retaining walls as well as in particular for architectural concrete parts

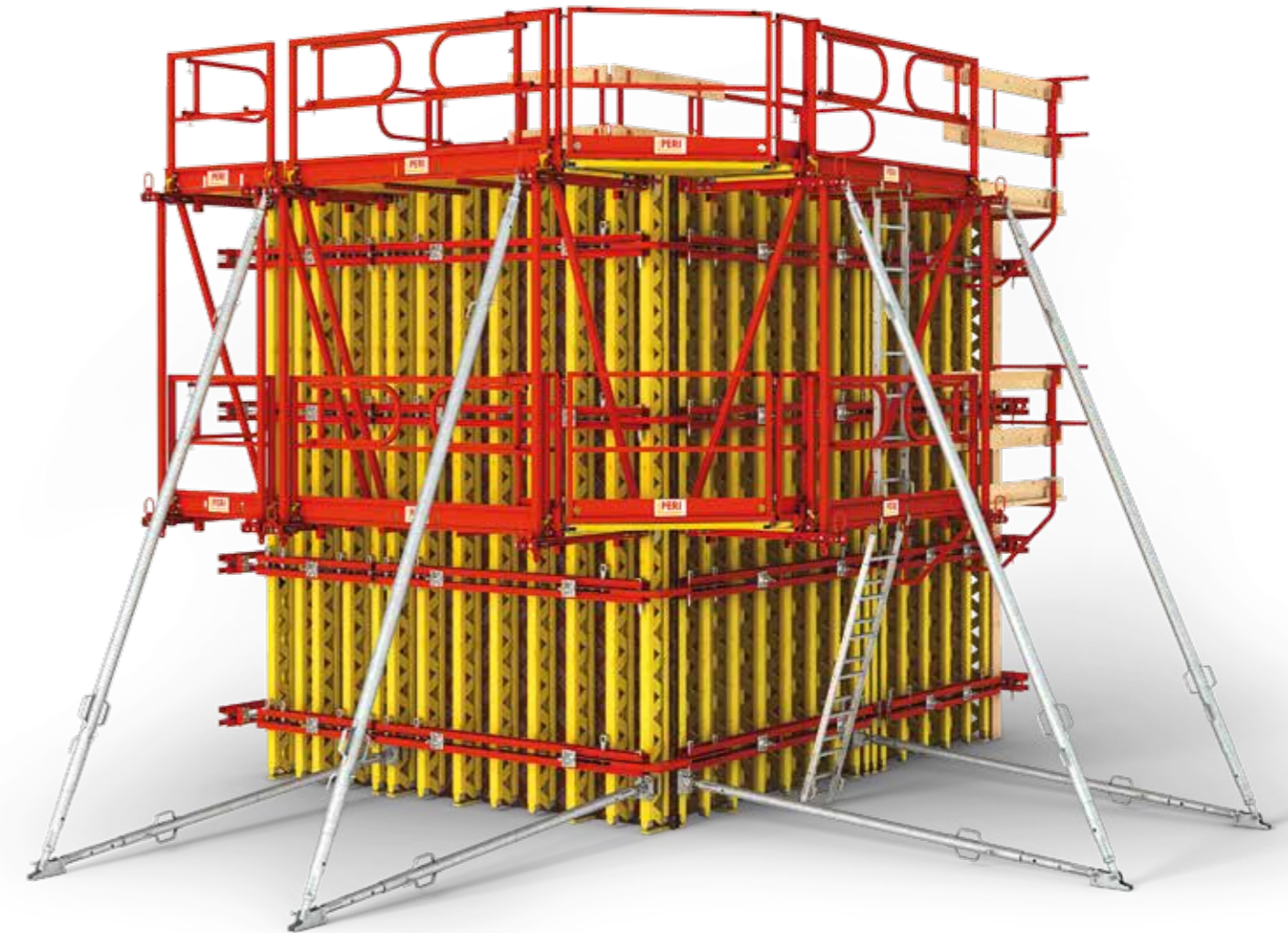
Adaptable to suit all requirements through the variable arrangement of formwork girders and walers

Also for architectural concrete executions due to the freely-selectable tie positioning and joint arrangement in accordance with the planning specifications

Continuous adjustment through the elongated holes in the walers and couplings with flush, aligned and tight panel connections



14 m high VARIO elements in a polygonal arrangement. Large-sized FinPly Maxi formlining sheets ensure excellent concrete surfaces.



When forming bridge piers, the VARIO GT 24 wall formwork is frequently used on climbing brackets.



The girder wall formwork in combination with the RCS Rail Climbing System for the construction of elevator and stairwell shafts in a high-rise building.



- Flexible wall formwork with the main components: GT 24 Formwork Girder, SRZ / SRZ / SRU Steel Walers, formlining and related connecting parts
- Project-related planning and assembly
- Flexible panel heights, determined by the length of the GT 24 Girder (standard lengths 0.90 m to 6.00 m in 30 cm increments; special lengths up to 17.80 m)
- Flexible panel widths, determined by the length of the SRZ / SRU Steel Walers
- Minimizing the number of formwork girders due to their high bending rigidity and load-bearing capacity
- Project-specific construction, adaptable for accommodating a very high maximum fresh concrete pressure
- Elongated holes in the steel walers and panel couplings allow 100 % tension and compression-proof panel connections resulting in tight panel joints

RUNDFLEX Circular Wall Formwork

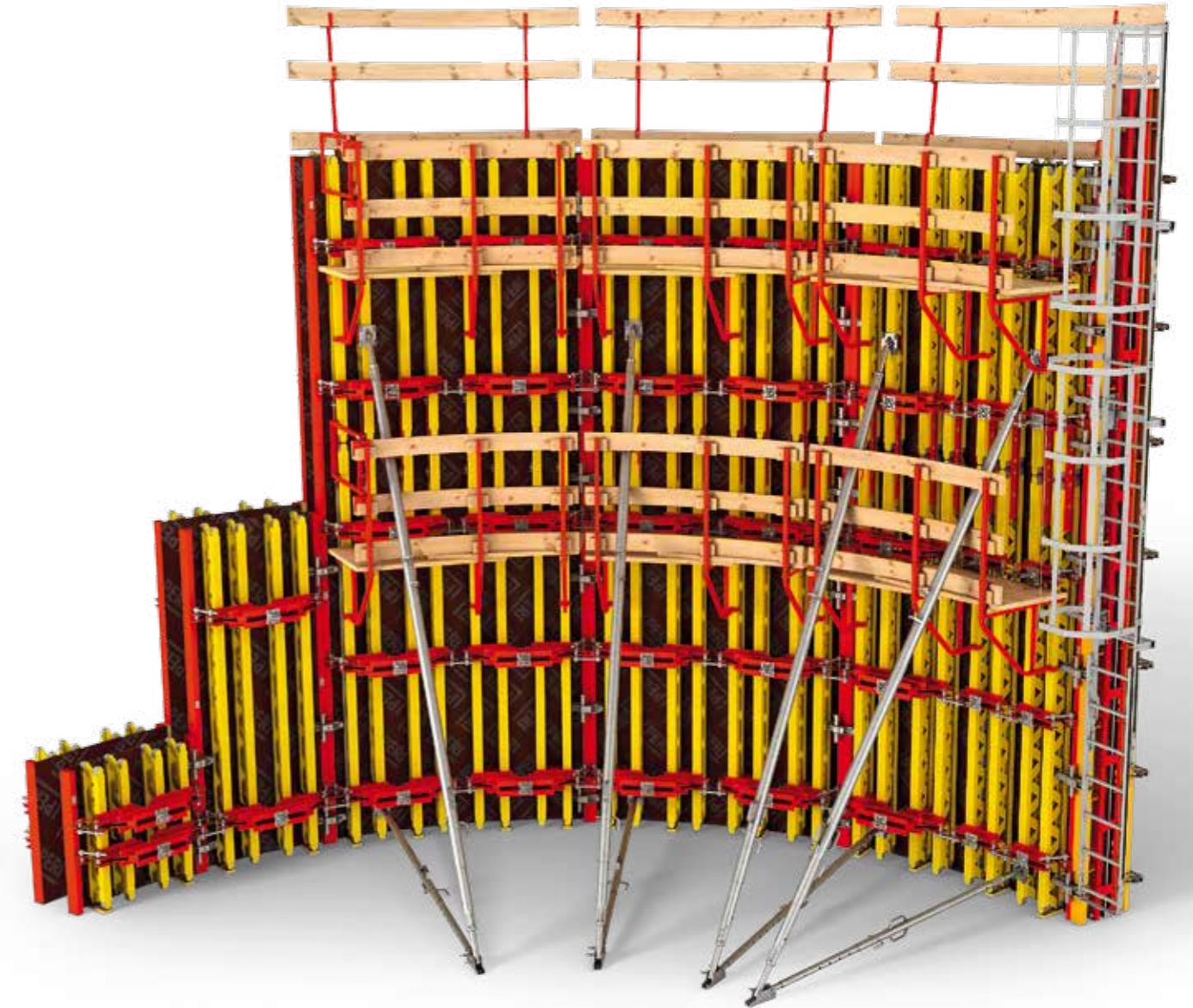
Continuous and quickly adjustable circular wall formwork for radii with diameters greater than 1.00 m

The RUNDFLEX wall formwork provides pre-assembled standard panels for curved walls. These can be quickly adjusted to suit the required radius and without any modification work on the panel. Therefore, RUNDFLEX is especially effective for realizing structures such as wastewater treatment plants, spiral ramps for multi-storey parking facilities or silos where radii are constantly changing.

Less installation effort with pre-assembled units and the proven BFD Alignment Coupler

Fast adjustment through a simple adjustment procedure by means of a template and spindles with self-cleaning hexagonal threads

Especially variable through the flexible adjustment of wall internal radii of 1.00 m and larger



The use of RUNDFLEX on climbing brackets during the construction of a bridge.



The self-cleaning adjusting spindles are adjusted to fit the required curvature by means of a ratchet spanner.



The radii of the RUNDFLEX panels are adjusted with spindles. Adapting to changing radii is therefore carried out extremely quickly.



- Pre-assembled formwork panels for circular walls with diameters larger than 1.00 m
- Panel heights up to 3.60 m, panel widths up to 2.50 m (external radius)
- Maximum permissible fresh concrete pressure: 60 kN/m²
- Flush, aligned and tight connections with the BFD Alignment Coupler – including filler timber compensations up to 10 cm
- Compensations up to 26 cm with the Alignment Coupler 38

RUNDFLEX Plus Circular Formwork

The particularly safe circular formwork for diameters greater than 2.50 m

Being fully equipped with platforms, guardrails and access ladders, constructing circular walls with RUNDFLEX Plus is a particularly safe undertaking. The formlining is screwed on at the rear as far as possible ensuring that very good surface qualities are achieved. Radii greater than 2.50 m are continuously adjustable with RUNDFLEX Plus which means costly modifications are not necessary.

Efficient and rational working operations

with a low number of spindles, easy radii adjustment as well as fast connections and extensions

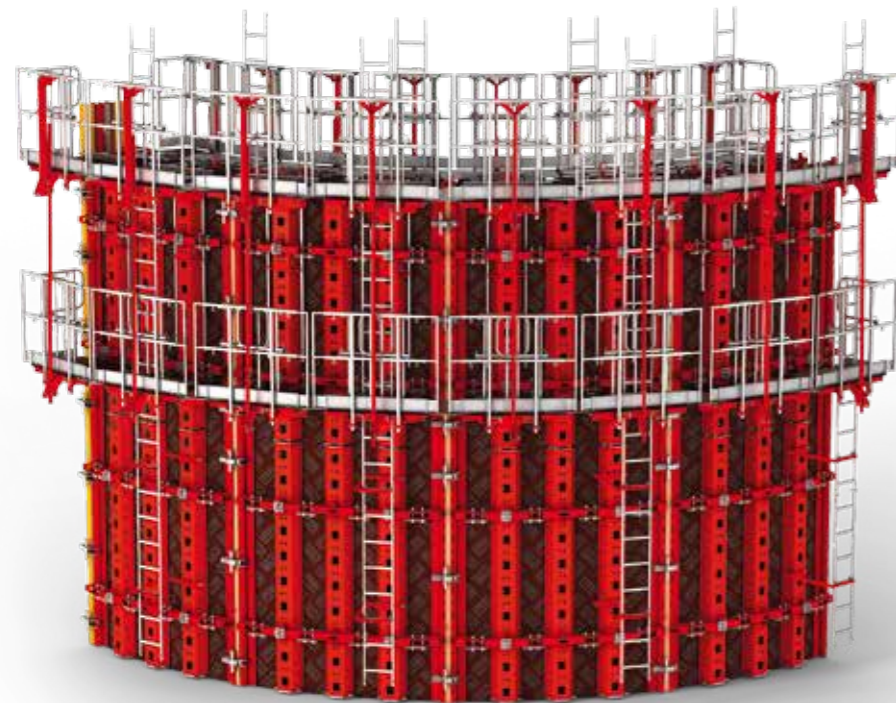
Low number of ties

with only 0.54 ties per m² of wall area

Safe working conditions

with a complete platform system

- Pre-assembled formwork panels for circular walls with diameters larger than 2.50 m
- Panel heights up to 3.60 m, panel widths up to 2.50 m (external radius)
- Maximum permissible fresh concrete pressure: 60 kN/m²
- Panel connections and compensations up to 10 cm with the BFD Alignment Coupler



Assembly of the accessories is carried out on the horizontally-positioned panel. During the moving procedure, everything remains mounted in position.



Only a few spindles are used for the rough adjustment of the RUNDFLEX Plus; this can also be done even with fully-assembled platforms.



With the appropriate platforms, guardrails and access ladders, safe working and concreting scaffolds can be realized.



GRV Articulated Waler Circular Formwork

For forming circular structures without the use of ties

With the GRV Articulated waler Circular Formwork, the external ring tension force as well as the internal compression force are transferred by the closed ring of walers. Consequently, the system allows circular structures to be realized without tie points. This results in substantial savings, for example, the construction of containers whereby the alternative would be the use of water-tight anchor points.

Forming without ties

due to the closed ring of walers

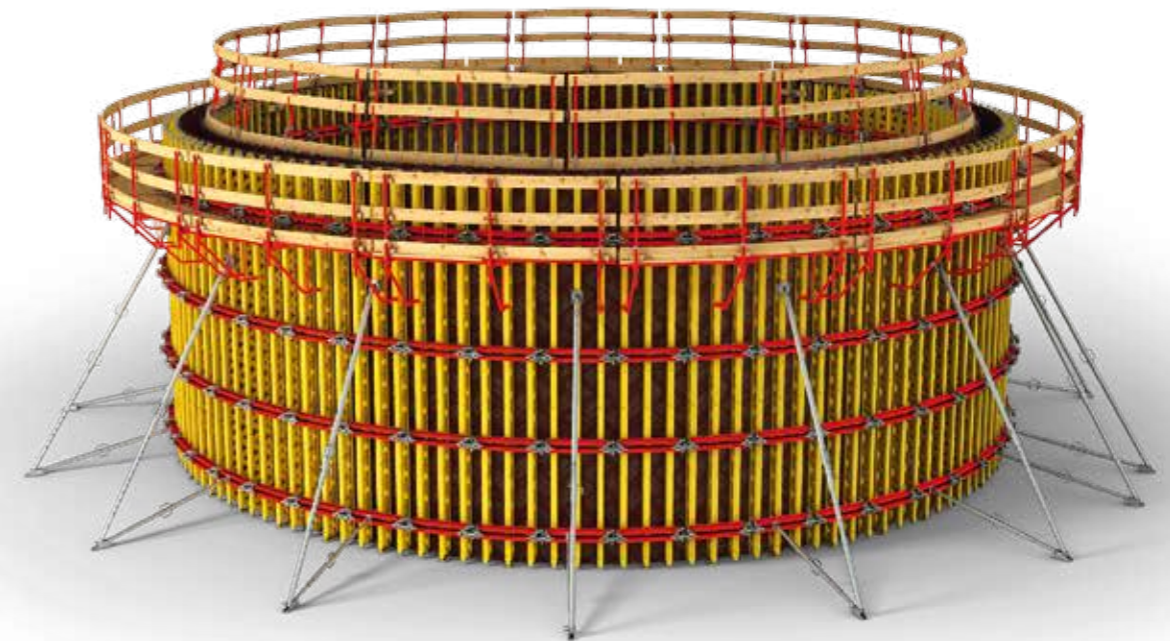
Continuously adjustable

for all internal radii greater than 0.90 m

Versatile in use

for containers or a wide range of arched bridges

- Tie-less formwork for circular structures with concrete radii from 0.90 m, also for arched bridges
- Project-specific assembly of elements with 4 different articulated walers and spindle walers
- Tensile ring forces up to 300 kN can be accommodated



The GRV Circular Wall Formwork – here combined with steel walers, formwork girders and shoring – can also be used for arched bridges.



GRV can be used for all radii. By means of the articulated connections of the GRV walers, small radii of 0.60 m can also be shuttered.



The use of the GRV for larger radii is especially cost-effective when several identical circular structures are to be concreted one after the other.



SB Brace Frame

Reliable load transfer for single-sided forming operations up to 8.75 m high

SB Brace Frames transfer the fresh concrete pressure into the sub-structure and foundations during single-sided concreting of structural elements. It can be used with all PERI wall formwork systems. In addition, SB Brace Frames can be used as horizontal heavy-duty brackets.

Very versatile use

with all PERI wall formwork as well as horizontal heavy-duty brackets

Quickly connected without additional components

as all required connection parts are already mounted on the Brace Frame

Easy to transport

through matching the individual component geometries to suit truck and container dimensions



RS Push-Pull Props

A complete programme with extension lengths up to 14.00 m

RS Push-Pull Props are used for the vertical alignment of and transferring wind loads from wall and column formwork as well as prefabricated concrete elements. They have been designed in particular regarding a longer service life, low maintenance costs and fast handling. The push-pull props also serve as kicker braces, the provision of additional kickers is not required.

Fast and safe handling

Rough adjustment and fine adjustment for realizing the appropriate length take place safely within seconds from the installation area

Used also with prefabricated concrete elements

Push-Pull Prop Adapter and Quick Connector mounted from a safe position

Durable

Galvanized tubes and threads ensure permanent protection against corrosion and a long service life



PERI Tie Technology

Reliable sealing of tie points

With the DK and SK Tie Systems, tie points can also subsequently be reliably sealed. The tie points are sealed with concrete cones using a specially-developed sealing compound.

Guaranteed leak-proof

Waterproof and gas impermeable, fire-resistant, sound-proof and diffusion-proof as well as approved for drinking water containers

For different diameters

Cones and spacer tubes for a range of tie diameters are available





Column Formwork

is to be designed to be able to accommodate relatively high fresh concrete pressures as comparatively small cross-sections are concreted quickly. Therefore, the joints in particular are to be formed very carefully and tightly sealed.

Column formwork is comprised of panel formwork elements or based on individual formwork girders; steel formwork is also available.

The quick and easy adjustment of the cross-section and height with minimum effort and the least possible number of system components is an important criterion for the cost-effectiveness of a column formwork system. In addition, columns with the same cross-sections

are frequently required to be constructed in large numbers so that the systems need to be quickly transported to the next place of use without any assembly effort. Furthermore, system solutions have been developed with which the high demands frequently placed on concrete surfaces, evenness or the sharp edges of corners can be fulfilled.

RAPID Column Formwork

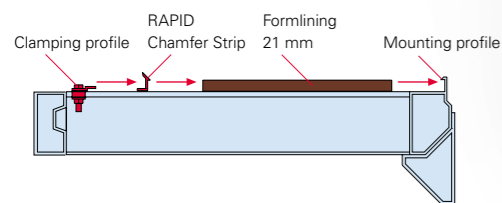
For the highest requirements on concrete surfaces and edge formation

Through a unique clamping principle for the RAPID, the formlining is simply clamped to the frame thus avoiding any nail or screw imprints. With full-surface formlining panels, high quality architectural concrete surfaces can be realized. RAPID is correspondingly designed to accommodate particularly high fresh concrete pressures.

For architectural concrete surfaces without any impressions
with freely-selectable, clamped formlining

Also for sharp-edged column cross-sections
with suitably milled formlining

Fast basic assembly
due to lightweight aluminium panels along with a simple clamping principle for the fixing of formlining



- For square and rectangular cross-sections continuously up to 60 cm x 60 cm (58 cm for sharp edges)
- Cross-sections from 85 cm x 85 cm up to 130 cm x 130 cm with waler for bracing and additional anchor
- Height adjustments up to maximum 8.10 m in 30 cm increments with 3 different panel heights (0.60 m / 2.10 m / 3.00 m)
- Panel connection when extending the frames with bolts (factory fitted) in the top column strut
- Maximum permissible fresh concrete pressure 120 kN/m²
- With working and concreting platforms as well as access ladders

QUATTRO Column Formwork

Movable as a complete unit with push-pull props and platform

QUATTRO column formwork can be moved with only one crane lift complete with push-pull props and concreting platform – alternatively by hand using transportation wheels. As the formlining is screwed on at the rear, concrete surfaces subject to more stringent requirements can be realized with QUATTRO.

Time-saving shuttering and striking
with panels which can be tightened or separated with only a few simple steps.

Fast moving
of complete units with the crane, or optionally by hand with 4 transportation wheels for heights up to 3.50 m

For enhanced surface qualities
due to the plastic formlining being screwed on at the rear



- For square or rectangular cross-sections from 20 cm x 20 cm up to 60 cm x 60 cm in 5 cm increments
- Height adjustments up to 4.50 m in 25 cm increments with 4 different panel heights (0.50 m / 1.25 m / 2.75 m / 3.50 m)
- Panel connections when extending through ring bolts that also serve as crane suspension
- Maximum permissible fresh concrete pressure 80 kN/m²
- With working and concreting platforms as well as access ladders

TRIO Column Formwork

The sensible supplement to TRIO wall formwork

With the 90 cm wide TRIO column panels, square and rectangular-shaped columns can be realized. With tie holes in the frames, the panels can also be used in TRIO wall formwork operations. As a result, it is a sensible and logical supplement to the wall formwork system.

Easy and simple connection

of extended panels at the joints with the proven BFD coupler

No nailing of chamfer strips

due to the clamping mechanism and PERI chamfer strip

High number of re-uses

through the robust design of the panels



The chamfer strip with a 15 mm edge length is easily attached to the column panel without requiring any additional fastening means.



- For square or rectangular cross-sections from 20 cm x 20 cm up to 75 cm x 75 cm in 5 cm increments
- Height adjustments up to maximum 8.10 m in 30 cm increments with 3 different panel heights (0.60 m / 1.20 m / 2.70 m)
- Panel connections when extending the frames with the BFD coupler
- Maximum permissible fresh concrete pressure 100 kN/m²
- With working and concreting platforms as well as access ladders

LICO Column Formwork

Lightweight, cost-effective column formwork for forming without a crane

With its low individual panel weights and simple frame construction of the panels, LICO is ideal for assembling and dismantling by hand. This column formwork is the right choice if lower surface requirements are to be fulfilled and when the emphasis lies on economic efficiency.

Cost-effective column formwork

with simply constructed steel frames for working without the use of a crane

Easy and simple assembly

with only 3 panel heights and connecting means which are permanently attached to the panels and cannot be lost

Ring bolts on all panels

serve as load bearing points for moving with the crane as well as for panel connections when extending



Captive column tie bolts and nuts are permanently attached to each panel.

- For square and rectangular cross-sections from 20 cm x 20 cm up to 60 cm x 60 cm in 5 cm increments
- Larger cross-sections with additional ties
- Height adjustments up to maximum 8.10 m in 50 cm increments with 3 different panel heights (0.50 m / 1.00 m / 3.00 m)
- Panel connection when extending by means of ring bolts on the panels that also serve as crane suspension
- Maximum permissible fresh concrete pressure 80 kN/m²
- With working and concreting platforms



VARIO GT 24 Column Formwork

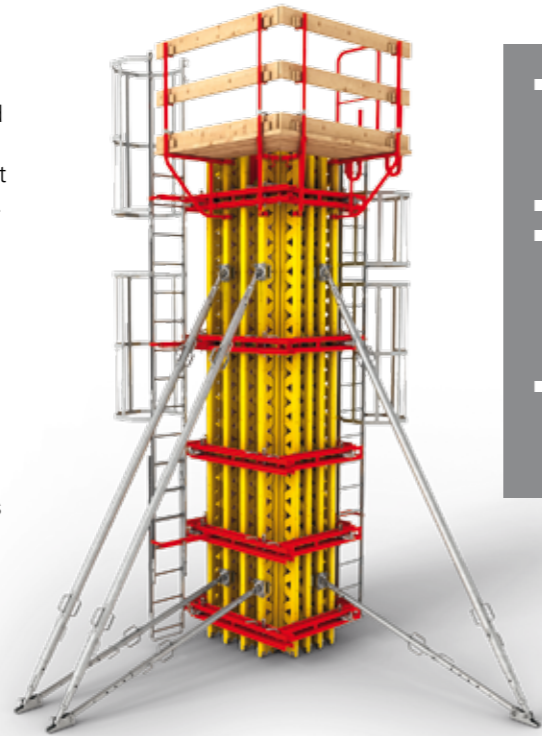
For continuously variable cross-sections, all heights and architectural concrete requirements

VARIO GT 24 is always a project-specific solution consisting of formwork girders, steel walers and any selected formlining. It can be adapted to suit every cross-section, concreting height and required fresh concrete pressure. Architectural concrete requirements can also be optimally fulfilled with VARIO GT 24.

Continuously adaptable
to match rectangular and square column cross-sections of all sizes

For architectural concrete surfaces
through project-specific constructions with any type of formlining

For high concrete pressures
through individual arrangements of formwork girders and steel walers



- For square or rectangular cross-sections continuously from 20 cm x 20 cm to maximum 120 cm x 80 cm
- Project-specific adapted solution
- Maximum permissible fresh concrete pressure 100 kN/m² in the standard configuration; planned as required for higher pressure
- With working and concreting platforms as well as access ladders

VARIO QUATTRO Column Formwork

The foldable girder formwork for larger cross-sections

VARIO standard components and articulated walers as well as tie sets are used for the VARIO QUATTRO. The formwork can be moved as a complete unit in one crane lift and provides excellent architectural concrete finishes with sharp or chamfered edges.

Fast shuttering and striking
Easy and simple unfolding due to the articulated waler

Reduced crane time requirements
Moving of complete units complete with push-pull props, concreting platforms and access ladders

Largest cross-sections
For columns with up to 120 cm edge lengths



- For square and rectangular cross-sections from 20 cm x 20 cm up to 120 cm x 120 cm in 5 cm increments
- Project-specific adaptation
- Maximum permissible fresh concrete pressure 100 kN/m² in the standard configuration
- With working and concreting platforms as well as access ladders

SRS Circular Column Formwork

The steel formwork for circular columns with the best surface finishes

With tight panel joints and ability to accommodate high fresh concrete pressures, the steel SRS Circular Column Formwork produces the highest quality concrete surfaces. A minimum of individual components and ladder access connected with the formwork ensure fast and safe applications.

Fast assembly
with two column halves and integrated tie yoke with self-cleaning hexagonal thread

Best concrete surfaces
due to the high production quality of the steel formwork

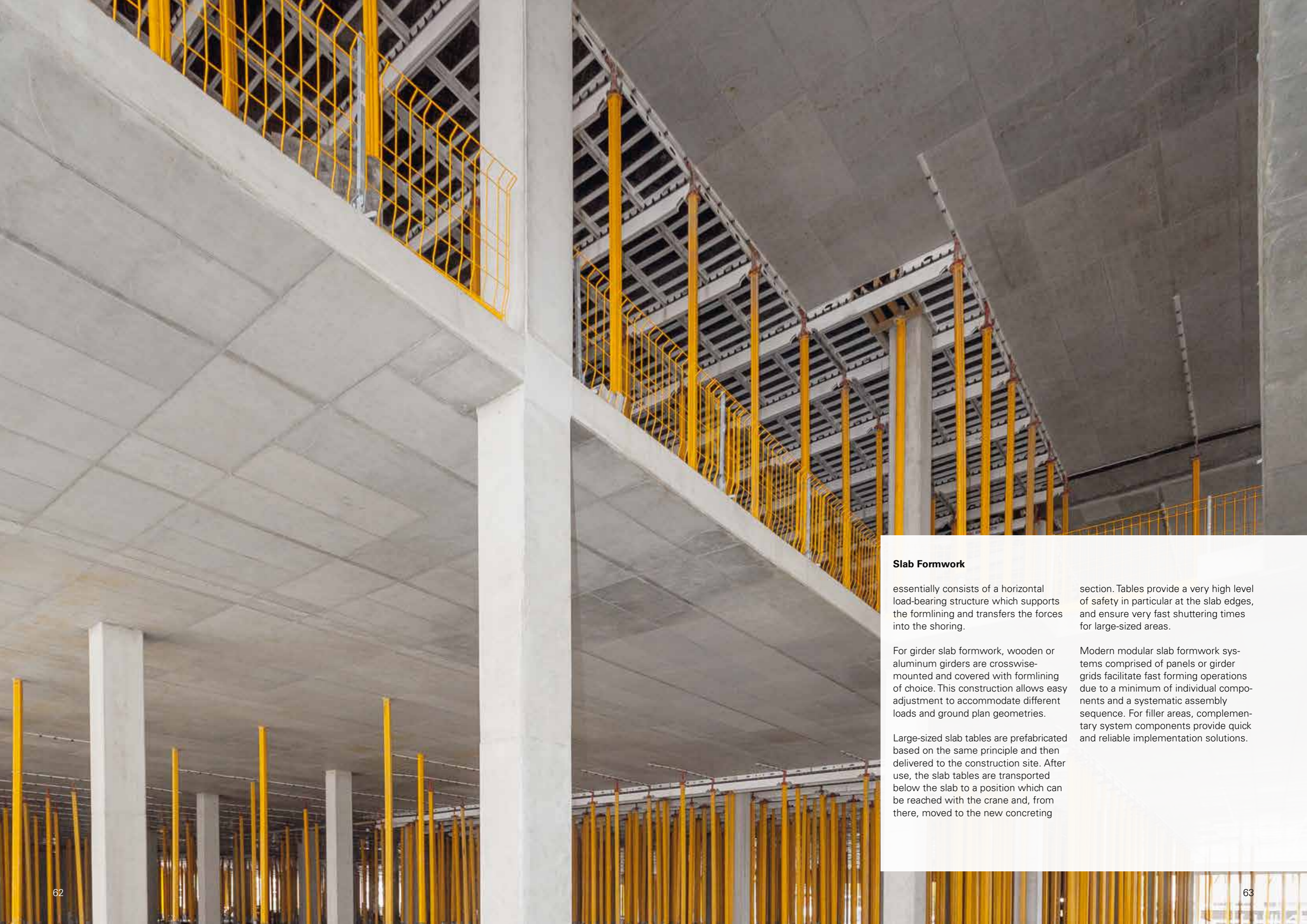
Safe and reliable logistics
due to integrated stacking aids for easy stacking and safe positioning of the panels during transport



The tie yokes with self-cleaning hexagonal thread are permanently connected to the panels and cannot be lost.



- For circular columns with diameters from 25 cm to 70 cm in 5 cm increments
- Special sizes with up to 120 cm diameters available
- Panel heights up to 8.40 m depending on the diameter, extendable in 30 cm increments
- Panel connection when extending through ring bolts on the panels that also serve as crane suspension
- Maximum permissible fresh concrete pressure 150 kN/m²
- With working and concreting platforms as well as access ladders



Slab Formwork

essentially consists of a horizontal load-bearing structure which supports the formlining and transfers the forces into the shoring.

For girder slab formwork, wooden or aluminum girders are crosswise-mounted and covered with formlining of choice. This construction allows easy adjustment to accommodate different loads and ground plan geometries.

Large-sized slab tables are prefabricated based on the same principle and then delivered to the construction site. After use, the slab tables are transported below the slab to a position which can be reached with the crane and, from there, moved to the new concreting

section. Tables provide a very high level of safety in particular at the slab edges, and ensure very fast shuttering times for large-sized areas.

Modern modular slab formwork systems comprised of panels or girder grids facilitate fast forming operations due to a minimum of individual components and a systematic assembly sequence. For filler areas, complementary system components provide quick and reliable implementation solutions.

SKYDECK Panelized Slab Formwork

The proven aluminium panelized slab formwork with very fast shuttering times

SKYDECK's range of applications extends from residential construction through to industrial construction projects with thicker slabs. With extensive range of accessories, the slab formwork is ideally suited for markets with very high safety standards. The systematic assembly sequence and lightweight system components accelerate working operations. In addition, early striking with the drophead system reduces on-site material requirements. The small prop requirements ensures more freedom of movement under the slab formwork and simplifies the horizontal transportation of materials.



The approx. 15 kg lightweight system components support quick and simple working operations with SKYDECK.



The size of the panel dictates the respective prop position, measuring is not required. The outward projecting teeth on the longitudinal beams secure the panel against moving out of position.



One blow of the hammer releases the drophead; in the process, the formwork is lowered by 6 cm. Main beams and panels can then be struck.



The SKYDECK platform ensures safe working conditions at the slab edges and saves the installation of safety scaffold in the level below.



The lifting platform allows safe shuttering and striking operations. It can also be used for reworking tasks or dismantling the shoring construction.

Effortless working

with very lightweight and easy to handle components

Fast forming

due to the simple and systematic assembly sequence and only a minimum of slab props

Easy cleaning

through powder-coated elements, components made of plastic, and undercut panel edges

Low on-site material requirements

due to early striking with the drophead and fast deployment of the panels and beams in the next storey



- Panel slab formwork with lightweight aluminium system components including formlining
- For slab thicknesses up to 42 cm (with 225 cm main beam) or with 150 cm main beam and 75 cm panel width for slab thicknesses up to 109 cm
- With lightweight individual components (panels and main beams weigh only 15.5 kg respectively)
- Systematic assembly sequence whereby the size of the panel dictates the prop position
- Only 0.29 props per m² of slab formwork
- Through the change in the direction of the panel, filler areas are reduced to a minimum
- With practical accessories for fast longitudinal and lateral compensations as well as the closing of residual gaps
- High level of safety at slab edges with cantilevered girders and SKYDECK platforms
- Safety on the front side by means of end guardrails that can be installed in any position on the main beams without requiring tools.

GRIDFLEX Grid Element Slab Formwork

The slab formwork for simple assembly and a high level of working safety

GRIDFLEX is used for constructing residential and multi-storey buildings. The standard element weighs only 20 kg, and is pushed upwards into position by means of the Shuttering Aid GF with site personnel safely positioned on the slab below. Slab props are subsequently hooked in and vertically aligned. On the now accessible girder grid, the formlining of choice can be installed. The recurring systematic assembly sequence ensures fast forming operations.

Safe shuttering procedure

by swivelling the elements upwards with site personnel positioned on the slab below

Simple working operations

with one standard and two compensation elements as well as the GRIDFLEX Prop Head

Filler areas are quickly closed

through a simple change of direction of the elements along with the use of transverse and longitudinal infills



The different colours of the powder coating indicate the function of the slab elements. This simplifies both the forming and logistical operations.

The assembly sequence is very simple: hook-in element, push into position with the shuttering aid, attach slab prop and position vertically.

After the assembly process has taken place, the closed girder grid can be safely accessed for installing the formlining.



GRIDFLEX has received a number of awards as an innovative and particularly safe system.

- Slab formwork with walk-on aluminium girder grid for formlining of choice
- For slab thicknesses up to 33 cm, or with additional middle support of the element up to 67 cm
- Lightweight components – the standard element weighs only 20 kg
- Only 2 system components required for each standard field (Prop Head and GRIDFLEX Standard Element)
- Optimized for PEP / PEP Ergo Slab Props, only 0.5 props per m² of slab surface (slab thickness d = 3 cm)
- Through the change in the forming direction, filler areas are reduced to a minimum
- Closing of filler areas with only 2 different filler elements
- Systematic assembly sequence
- Simple, swivelled upwards from below guardrail solution for the slab edges

MULTIFLEX Girder Slab Formwork

The flexible girder slab formwork for all ground plans and slab thicknesses up to 1.00 m



- Girder slab formwork consisting of main and cross beams for the formlining of choice
- Project-specific selection of the formwork girders and their spacing
- For slab thicknesses of up to 100 cm with GT 24 Formwork Girders, for slab thicknesses up to 50 cm with VT 20K Formwork Girders
- Adapting the individual component weights in accordance with the boundary conditions
- Free choice of shoring
- No infill areas due to project-specific planning
- Tilt-resistant support of the cross beams on the main beams through the use of Flexclips



MULTIFLEX can be adapted to suit all ground plans. The overlapping of the slab girders and change of direction of the main beams ensure maximum flexibility.



The use of the GT 24 Lattice Girder as a twin main beam, in connection with PERI UP Flex Shoring, facilitates the transfer of heavy loads over great heights.



The Flexclip is available for three different girder combinations. The additional component ensures tilt-resistant connections of the girders without any nailing.

The main components of the MULTIFLEX are the VT 20K or GT 24 Formwork Girders. As the main and cross beams, their position and spacing as well as the formlining can be freely selected, MULTIFLEX provides maximum flexibility for a wide range of requirements. If the high load-bearing GT 24 Formwork Girders are used, large spans for the main and cross beams can be realized. MULTIFLEX is therefore the ideal solution for complicated ground plans, slabs with offsets or integrated downstand beams, as well as forming operations in confined spaces.

Optimized use of materials through any combination of GT 24 and VT 20K Formwork Girders as well as a freely selectable girder arrangement

For all ground plans through the variable positioning of the girders – also polygonally or overlapping

For all surface requirements with freely selectable formlining for the stipulated quality and adaptable to suit the required joint arrangement



With the PERI MULTIFLEX Configurator app, beam and prop spacings can be optimized quickly and easily.



The choice of girder is based on project-specific requirements: the GT 24 Lattice Girder allows large spans and thus reduces the number of parts to be moved. The VT 20K Solid Web Girder is the cost-effective solution for smaller slab thicknesses.

VARIODECK Steel Waler Slab Table

The slab table with steel walers for large formwork areas and heavy pre-fabricated parts

VARIODECK is the ideal and safe solution for slab edge areas when panel slab formwork is to be used for the inner area. Slab areas of around 15 m² and up to 50 cm thick can be formed with the table. VARIODECK is quickly moved into the next storey in each case with a single crane lift. By means of the swivel head, the 4 props can be easily folded in the longitudinal direction of the table, e.g. for moving under beams.



The VARIODECK Table provides a quick and safe solution for slab edge areas in particular.



Due to the low overall height of only 36 cm, 20% less transportation and storage volumes are required than for slab tables with main beams consisting of 20" wooden girders.

Quickly ready for use

through the provision of pre-assembled tables – during assembly, only the lower part of the swivel head must be attached to the slab prop

High load-bearing capacity

with longitudinal-positioned steel walers which allow large cantilevers or can accommodate heavy prefabricated parts

Flexibly adaptable

by continuously moving the Table Swivel Head ± 15 cm



- Pre-assembled slab tables in 4 standard sizes (4.00 m x 2.15 m | 4.00 m x 2.65 m | 6.00 m x 2.15 m | 6.00 m x 2.65 m)
- For slab thicknesses up to 50 cm (with 4 MULTIPROP slab props); larger slab thicknesses or dimensions with additional support or PERI UP shoring
- Horizontal transportation throughout the storey using the Table Trolley, Table Lift or Transportation Wheel on the shoring
- Moving storey to storey with the crane and Table Lifting Fork
- Width compensation of up to 50 cm through protruding cross beams which serve as supporting surface for the formlining
- Can also be used as an edge table with guardrail holders and guardrail posts without any modification of the prop positions
- Use as a safety scaffold in accordance with DIN 4420

Project Table

Project-specific planned tables, also for infill areas and special geometries



The Table Head TK securely connects the props and slab table together. It is the cost-effective alternative to the Table Swivel Head.

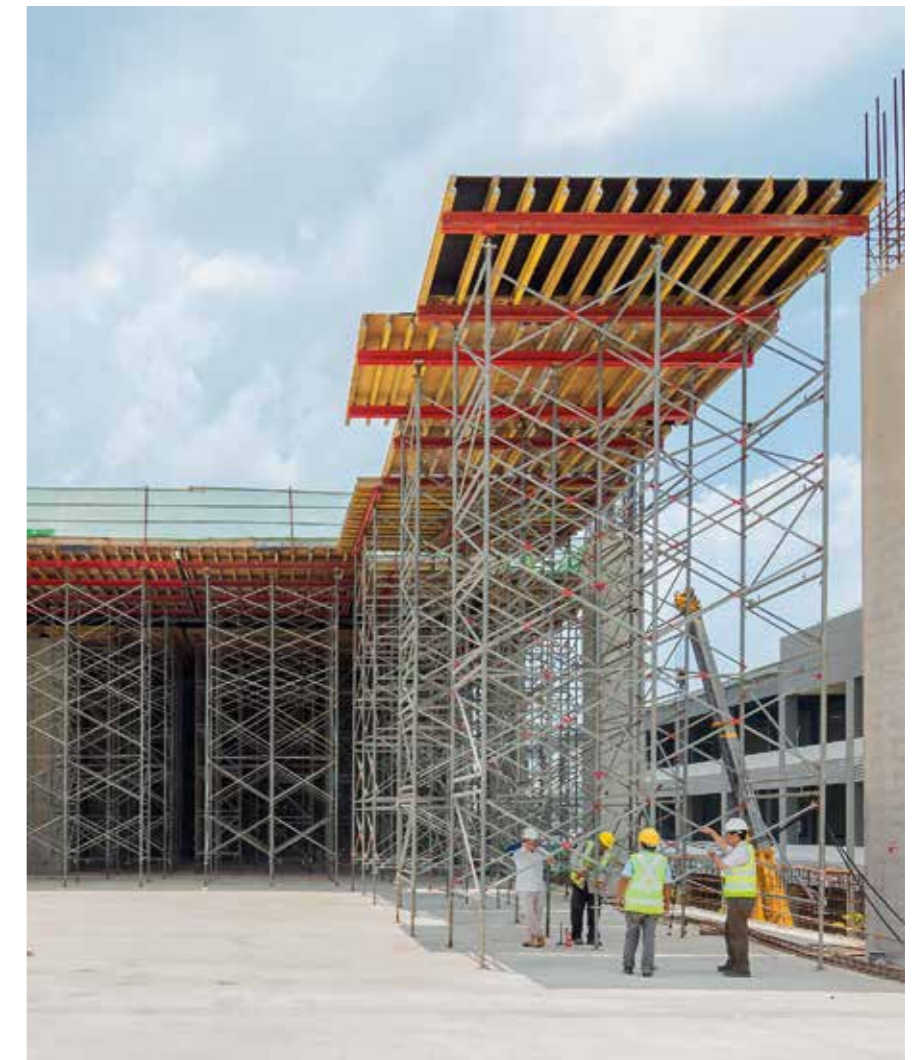


The project-specific planning facilitates very cost-effective slab tables as the static load of the individual components is optimized.



For large slab thicknesses and high loads, high load-bearing GT 24 Formwork Girders are used.

For higher geometric or static requirements, slabs at great heights as well as residual areas, project-specific slab tables are planned and assembled. Depending on requirements, swivelling Table Heads or simple, rigid connections can be used. In particular, the support of the slab tables can be designed extremely flexibly – from simple slab props through to shoring towers with heights of more than 20 m.



SKYTABLE Slab Table

The large-sized slab table for areas up to 150 m²

SKYTABLE is the ideal solution for the forming of large slab areas. For buildings with open facades, areas of up to 150 m² can be formed with this large-sized slab table. SKYTABLE operations are always project-specifically planned. The dimensions are in accordance with the building geometry and are only limited by the maximum dead weight of the table. With the remote-controlled lifting mechanism, SKYTABLE can be quickly and safely moved to other storeys.

Extremely quick
with very large forming surfaces, easy and simple lowering with short distances

Extremely safe
through a remote-controlled moving procedure of the tables from a safe position on the concreted slab

Extremely adaptable
through project-specific, individual planning



The crane pulls the table horizontally out of the building with the help of the lifting mechanism and the single roller. Workers are not required to stand on the table at any time.



- Project-related planned slab table with areas of up to 150 m²
- 6.00 m to 24.40 m long and 1.80 m to 6.10 m wide with 2 trusses; 9.00 to 15.00 m long and 6.00 m to 9.00 m wide with 3 trusses
- For slab thicknesses up to 40 cm
- Easy moving throughout the storey by means of the Transportation Trolley and Lifting Unit STM with integrated chain hoist; transport into the next storey with remote-controlled lifting mechanism
- Load transfer via MULTIPROP Props which are mounted to the truss girders by means of quick release devices; for greater heights, use with MULTIPROP shoring towers
- No infill areas due to project-specific planning

Accessories for Slab Tables

Practice-oriented equipment for ensuring safe moving procedures

For moving the slab tables, the PERI portfolio includes features a range of equipment. For fast transport into the next storey, PERI Transportation Forks are used. The transportation forks are always in a horizontal position when not in use as well as when transporting a slab table. The Table Lift allows fast moving of tables throughout the storey. The flexible and easy to steer equipment is fitted with an electric drive and can also be used in confined spaces. Alternatively, slab tables can be aligned and horizontally transported with the cost-effective table trolley. The Stripping Cart serves as movable working scaffold with a standing height of maximum 4.65 m.





Universal Formwork

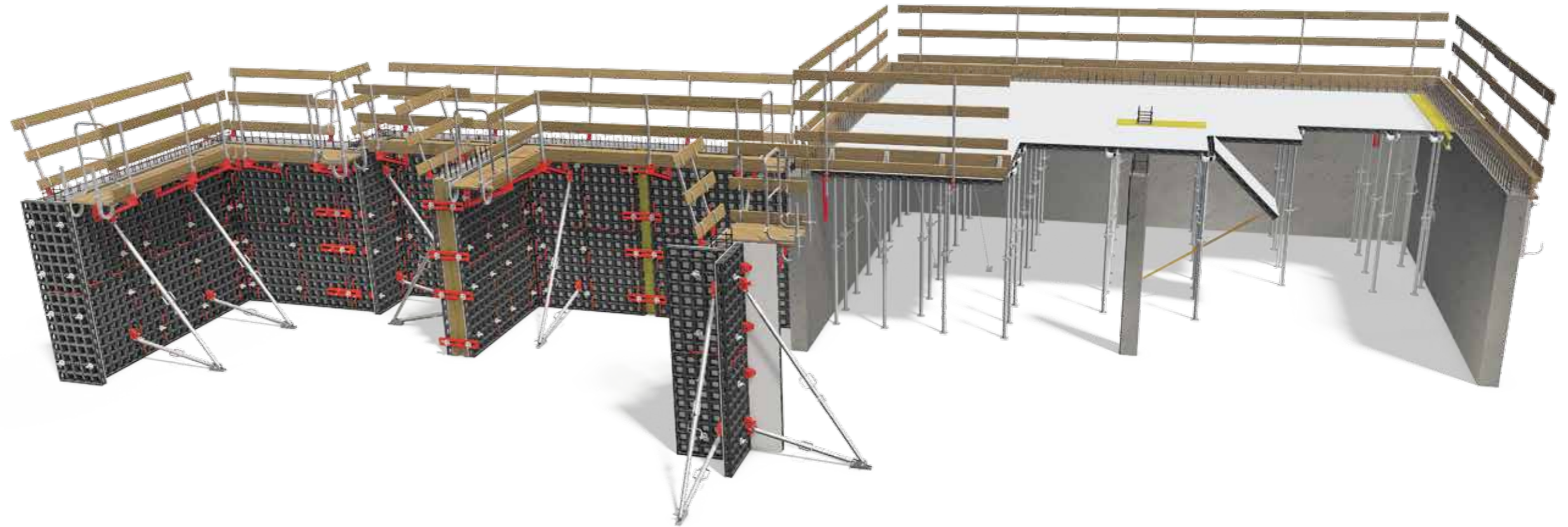
stands for a system formwork whereby the same components can be used for a range of applications – these therefore can be used universally for the forming of horizontal and vertical structural elements. The system components are optimized in terms of their multiple usage for the various applications. As a result, the investment costs for universal formwork are significantly lower than that of several comparable formwork systems for these applications.

In addition, the small number of different system components simplifies the requirements and material requisition on site. The benefits become even more evident when viewed from a

life-cycle perspective: the user works more efficiently through always using the same system, the demand on storage area decreases and transportation costs are significantly reduced.

The universal lightweight formwork for walls, columns and slabs

DUO can be used both for foundations, walls and columns as well as for slabs and beams. The system is characterized by the extremely simple handling and the minimum number of different system components. Almost all operations with DUO can be carried out without tools while the working steps are very easy to understand. Even those less experienced users of system formwork can work quickly and efficiently with DUO. New is not only the concept but also, in particular, the material used. Both the Panels – including the formwork – and the DUO accessories are made of the innovative Polytech composite material. Due to the low weight, no crane is required for assembly operations.



- Particularly lightweight panel formwork made of the innovative Polytech technopolymer for forming walls, columns and slabs
- High degree of resistance against all environmental influences; 100% recyclable
- Elements with heights of 60 cm and 135 cm as well as up to 90 cm widths
- Max. permissible fresh concrete pressure: 50 kN/m² (for walls)
- Max. permissible fresh concrete pressure: 80 kN/m² (for columns and wall sections)
- For square and rectangular columns from 15 cm x 15 cm up to 55 cm x 55 cm in 5 cm increments
- Optimized for slabs up to 30 cm thick
- Low-noise assembly without requiring a hammer

Universally applicable

Flexible forming of walls, columns and slabs using only one system

Ergonomic in all respects

Low weight, crane-free handling and intuitive application

Easy replacement of formlining

Quick repair with just a few screws – without requiring any special skills

An example of easy and simple use: the shape of the DUO Connector and the panel openings allow only one single installation option.



When forming the slab, work is completely carried out from a safe position below; the panels are simply hooked in and then pivoted upwards.



The replacement formlining can be mounted by hand using only a few screws – also on the construction site and without any special tools.



Due to the manageable dimensions of the DUO panels, these are also ideally suited for the construction of foundations.



DUO is made of Polytech material, that provides permanent protection against moisture as well as being very light and highly flexible in terms of product design.





Individual Formwork

stands for solutions that PERI individually plans and pre-assembles. In contrast to so-called project-specific solutions, what is meant here is formwork which undergoes stationary prefabrication before use. This is then the case if production on the construction site is not possible; either due to the very complex design or because special tools and machines are required. The prefabricated formwork elements are subsequently quickly and easily connected on the jobsite to produce the complete formwork.

With so-called free-form formwork, the highest architectural demands on geometries and surfaces can be realized. Such unique pieces are quite cost-effective due to the high proportion of standard elements, e.g. formwork girders and steel walers, which

are re-used after the free-form formwork has been dismantled.

In addition, individual formwork is also used for monolithic construction, when identical building structures are to be realized in large quantities, for example, social housing projects. In the process, always using the same system ensures extremely short assembly times and fast construction progress.

Precision-made for an individual design

For the construction of complex, multi-curved reinforced concrete components, PERI provides customized freeform formwork. Based on a 3D building model with so-called freeform surfaces, the formwork units are individually produced in the PERI formwork assembly facilities. Assembling the individual elements on the construction site is similar to system formwork. Statically load-bearing elements are usually based on VARIO GT 24 Girder Wall Formwork. Hence, many individual components can be further used after project completion.

Custom manufactured

On the basis of a 3D model, precision manufactured under optimum conditions in the stationary PERI formwork construction facility.

Cost-effective realization

Extremely economical with a high proportion of standard system components from the PERI product portfolio

Fast assembly

Easy and simple assembly of prefabricated formwork elements on the construction site – similar to a system formwork



- For virtually all building shapes that can only be realized with a project-specific formwork
- High production quality thanks to the assembly under stationary conditions
- Designed for a permissible fresh concrete pressure in accordance with project requirements
- Formlining screwed on at the rear for meeting architectural concrete requirements
- Taking into consideration the site-specific boundary conditions for the final assembly
- Cost-effective realization with a maximum proportion of rentable system components

UNO – for the monolithic construction method

Quick and efficient forming of repeat building structures in social residential construction



With UNO, walls and columns, slabs and beams as well as stairways are shuttered simultaneously and concreted using the monolithic construction method. UNO is therefore a cost-effective solution for forming social residential buildings featuring frequently repetitive floor plans. The aluminium elements are prefabricated on a project-specific basis and can be assembled without the use of a crane.

Efficient working procedures
with lightweight elements, ingenious technology and very few accessory components

Innovative anchoring technology
with reusable anchors that are installed on one side and up to 70% fewer anchor points than comparable systems

Fast striking
with an ingenious transition between wall and slab formwork as well as the Drophead which allows early striking

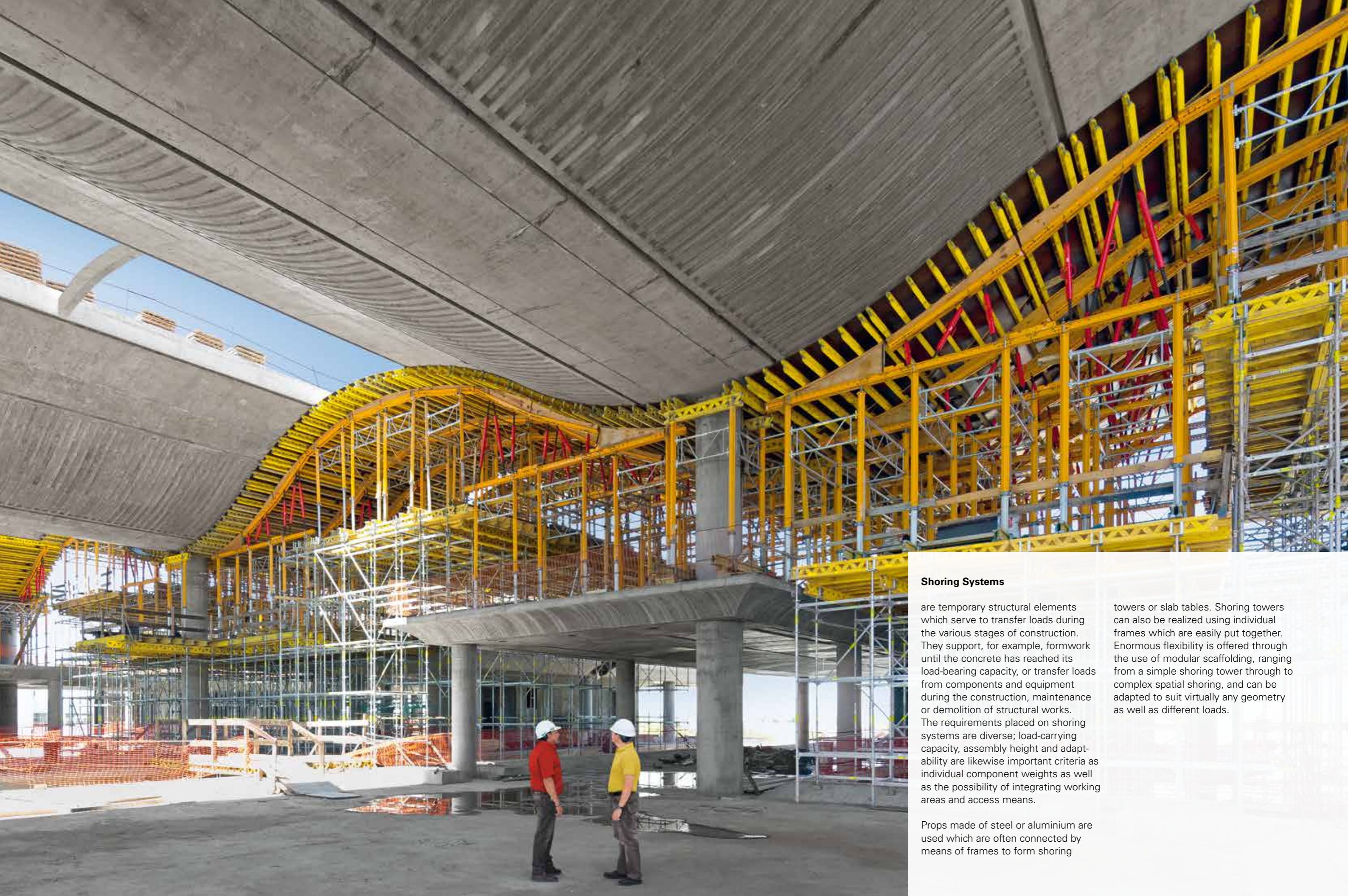
All UNO formwork elements are made of aluminium and thus very light; no crane is required for assembly on the jobsite.

Brackets and guardrail posts provide the necessary safety for users in UNO multi-storey construction projects.

PERI manufactures the UNO elements on a project-related basis and in compliance with high quality standards – for virtually all dimensions and structural forms.



- For wall thicknesses from 8 cm to 30 cm and slab thicknesses up to 30 cm
- Permissible fresh concrete pressure: 80 kN/m² (hydrostatic)
- Crane-independent working operations using lightweight aluminium elements which are also easy to clean
- Very tight panel connections through the Wedge Coupler
- Conical ties without spacer tubes, installed from one side only
- Simple striking of the walls due to the Spacer Coupler
- Early striking of the slab with the Drophead; as an option, panels can be directly supported



Shoring Systems

are temporary structural elements which serve to transfer loads during the various stages of construction. They support, for example, formwork until the concrete has reached its load-bearing capacity, or transfer loads from components and equipment during the construction, maintenance or demolition of structural works. The requirements placed on shoring systems are diverse; load-carrying capacity, assembly height and adaptability are likewise important criteria as individual component weights as well as the possibility of integrating working areas and access means.

Props made of steel or aluminium are used which are often connected by means of frames to form shoring

towers or slab tables. Shoring towers can also be realized using individual frames which are easily put together. Enormous flexibility is offered through the use of modular scaffolding, ranging from a simple shoring tower through to complex spatial shoring, and can be adapted to suit virtually any geometry as well as different loads.

PEP Ergo Tubular Steel Slab Props

The galvanized tubular steel slab prop with up to 50 kN load-bearing capacity

PEP Ergo Props are mainly used for supporting slab formwork. Numerous practical features ensure fast and safe handling – this includes, for example, the trendsetting Adjusting Nut or the ergonomic G-Hook which cannot jam. The galvanization guarantees a long service life. However, if a prop is damaged during the tough everyday working operations on the jobsite, the inner and outer tubes can be replaced separately.

Load-bearing capacity far beyond the norm

Prop load up to 50 kN – with a comparatively low dead weight (PEP Ergo E-300: G = 19.4 kg; max. F = 50.4 kN)

Quickly adjusted

The 12 cm long adjustment range eliminates frequent re-positioning whilst the measuring scale on the inner tube accelerates length pre-adjustments

Simple connections

Prop heads can be attached to both the inner and outer tubes

Trendsetting Adjusting Nut

The shape of the Lowering Nut shows the direction for lowering when under load while the captive handgrip allows easy adjustment



- Fully galvanized tubular steel slab props for transferring vertical loads
- Maximum prop load: 50 kN
- Building authority approved
- Prop lengths: up to 1.50 m | 2.50 m | 3.00 m | 3.50 m | 4.00 m | 5.00 m
- Generous adjustment range of 12 cm
- Total length stamped on inner tube in 10-cm increments to the pegging holes
- Tripods or frames available as installation aids
- Anti-crush device with a safety clearance of 10 cm provides protection against injury
- Prop type and length can be read directly from the outside on the end plate, also on stacks of props

MULTIPROP Aluminium Post Shores

Equally economical as lightweight individual props or shoring towers

MULTIPROP Post Shores are used as individual props and – in combination with MULTIPROP frames – as shoring towers or load towers under tables. Compared with tubular steel slab props, the aluminium MULTIPROP weighs 90 kN and carries significantly higher loads whilst, at the same time, has a very low dead weight. With different frame lengths, square or rectangular shoring towers can be optimally adapted to suit individual construction site conditions. The frames also serve as platform beams and side protection for working levels.

Reduced number of props

due to the high permissible leg loads of up to 90 kN

Well thought-out details

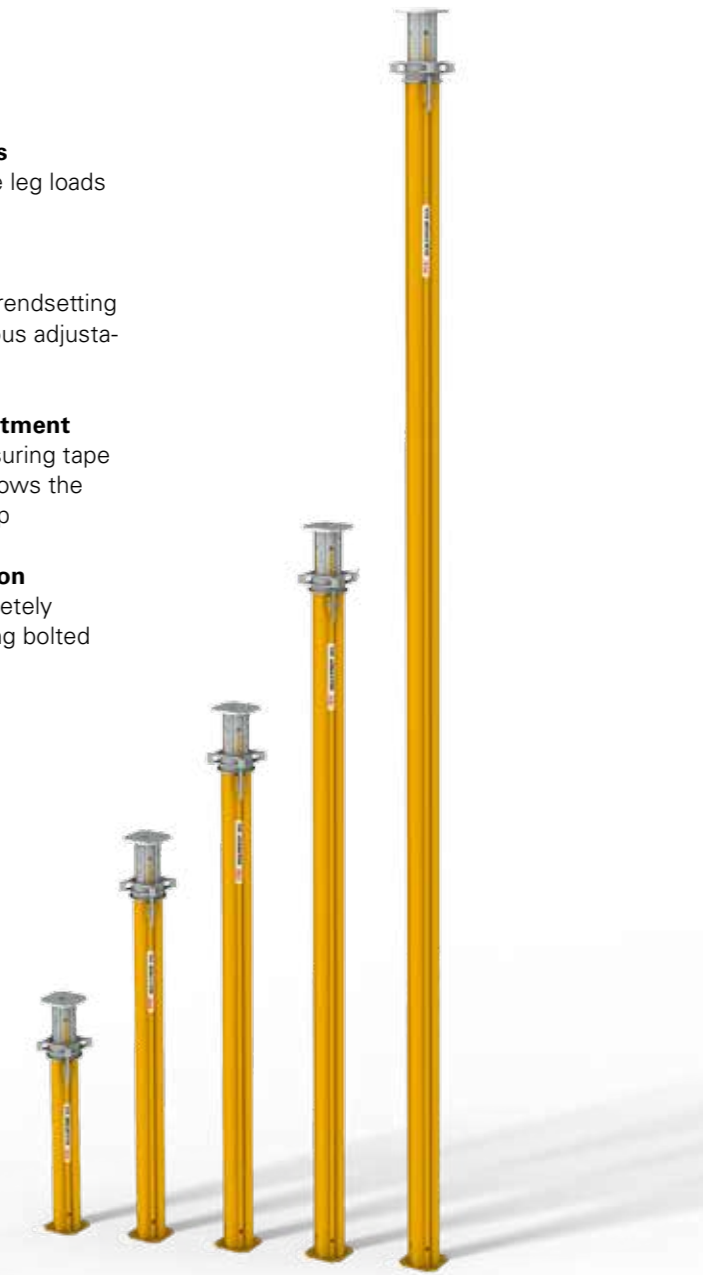
with self-cleaning thread, trendsetting Adjusting Nut and continuous adjustability

Time-saving length adjustment

due to the integrated measuring tape on the inner tube which shows the complete length of the prop

Practical wedge connection

for the MRK Frames completely without any time-consuming bolted connections



- Aluminium post shores with powder coating for transferring vertical loads particularly under slab formwork; as shoring tower with frames for transferring vertical loads over great heights
- Leg loads up to 90 kN in accordance with the type test
- Max. type-tested assembly height (shoring tower with MRK Frames): 14.40 m or 14.90 m (with Base Plate MP 50)
- Building authority approved
- Prop lengths: up to 1.20 m | 2.50 m | 3.50 m | 4.80 m | 6.25 m
- Steel MRK Frames are available in the following sizes: 62.5 cm | 75 cm | 90 cm | 120 cm | 137.5 cm | 150 cm
- Aluminium MRK Frames are available in the following sizes: 201.5 cm | 225 cm | 230 cm | 237 cm | 266 cm | 296 cm
- Continuous thread for infinite adjustment of the prop height without pegging
- Adjustment range of up to 2.20 m (MP 480)
- Provides 36 mm of adjustment with every turn of the nut
- Anti-dropout device prevents the inner tube from accidentally slipping out

ST 100 Stacking Tower

The efficient shoring system with only one frame size for all heights

The ST 100 Shoring Tower has been designed for fast assembly and dismantling according to the stacking principle. The individual frames are simply inserted into each other and offset at 90°; tools are not required. With a single frame type, all required assembly heights can be realized. Diagonals ensure extremely tight connections for crane transport and during erection.

Fast assembly

Easy and simple assembly without bolts or pins – without any tools whatsoever

Minimum of planning

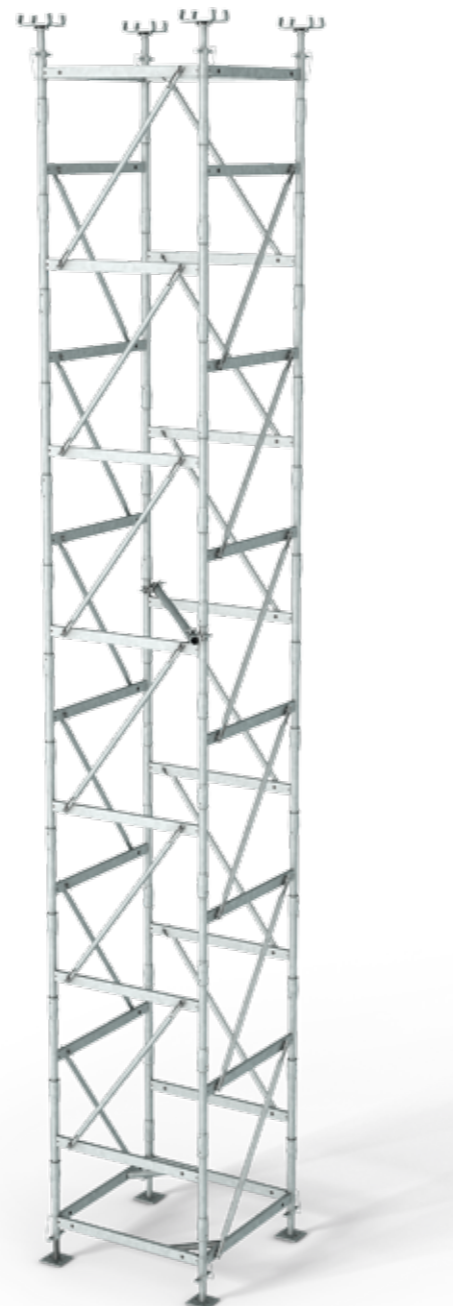
With only one frame size and without combination tables each application height can be easily planned

Extremely easy handling and logistics

With only 5 system components and a 63 cm spindling range, all tower heights can be realized



- Shoring tower with 1.00 m x 1.00 m ground plan comprised of 4 stacking frames per m of tower height respectively (frame height 50 cm)
- Leg loads of over 50 kN – depending on the tower height and wind load
- In accordance with the type test, up to 214 kN load per tower with assembly heights of up to 22.29 m
- Fast height adjustment through the 50 cm grid dimensions of the frames in combination with a 63 cm spindling range
- Moving the towers by means of the Transportation Wheel
- Crosshead Spindle for accommodating up to 2 GT 24 | VT 20 Formwork Girders
- Head Spindle for accommodating steel walers or other steel profiles (maximum tilt of the Head Plate 4.4 %)



PD 8 Slab Table

The shoring for slab tables and high leg loads

As the PD 8 System offers large spindle extension lengths, it is a very cost-effective solution especially as a slab table for great heights. Thus, the shoring can be quickly adapted to suit different slab heights as well as being lowered for moving under large beams. In addition, the PD 8 can also be used as shoring towers and stair towers.

For high clearances

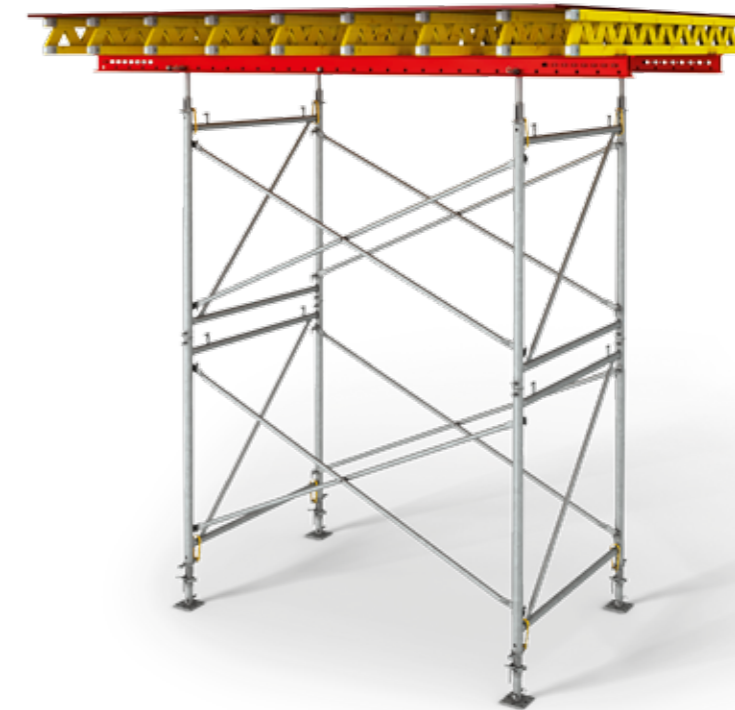
can be used as a table with up to 55 kN per leg for large slab heights

Quickly and continuously adaptable

with only 2 frame heights and large spindle extensions

System components with a wide range of applications

can also be used for shoring towers and stair towers



- Scaffolding construction made of welded, completely galvanized steel tube elements with spindles at the head and base for use as a slab table, shoring tower or stair tower
- For loads up to 55 kN per leg (as slab table)
- Basic dimensions under the slab tables: 1.50 m x 1.25 m up to 1.50 m x 3.50 m
- Basic dimension of shoring tower: 1.50 m x 1.50 m
- Basic dimension of stair tower: 1.50 m x 3.00 m
- Continuous height adjustment from 1.55 m with only 2 frame sizes and up to 88 cm spindle extensions in the head and base areas respectively
- Easy horizontal moving procedure with the Trolley and Winch Unit
- Vertical repositioning with the PERI Transportation Fork

The maximum level of flexibility in shoring solutions

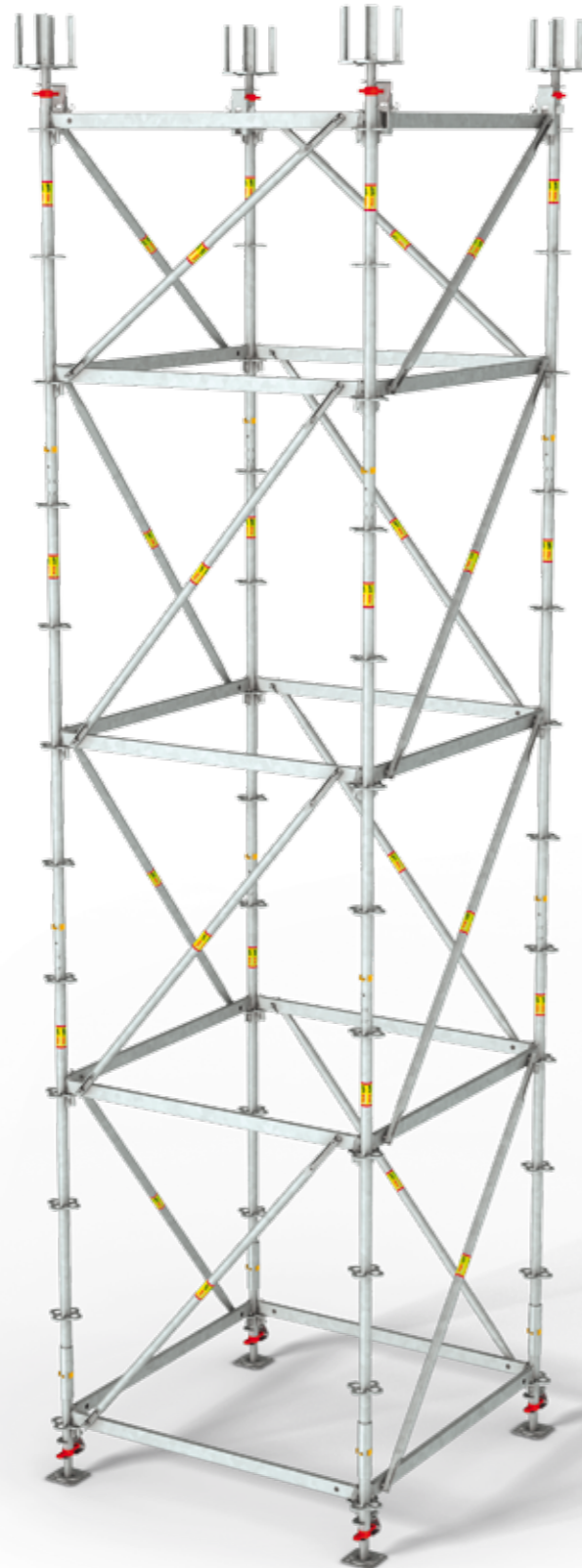
PERI UP Flex is the universal modular scaffolding for a wide range of tasks. For realizing shoring assemblies, the system grid dimensions of 25 cm and 50 cm provide optimum adaptation possibilities to suit different geometries and loads. Thus, for example, the legs are simply bundled together in order to transfer concentrated loads. With PERI UP Flex, shoring towers, shoring towers with additional frames as well as spatial shoring can be cost-effectively assembled. With self-securing deck, ledger with gravity lock and the completely flat covering of the working areas, the system offers a very high level of safety.

High degree of material utilization
through the optimal positioning of the standards according to the respective load situation

Maximum adaptability
with uniform grid size in all three dimensions

Movable in large-sized units
through the extremely rigid node connection between the standards and ledgers

Flexible compatibility
thanks to the optimal coordination to match PERI slab formwork systems as well as usual steel and timber dimensions



- Modular scaffolding with fully galvanized standards, ledgers, diagonal braces and decking, guardrails and other accessories for shoring assembly
- As type-tested, free-standing shoring tower up to 8.39 m high and for loads up to 40 kN; restrained at the top up to 21.89 m high (or 22.34 m with spindle extension) and for loads up to 46 kN
- As shoring tower with additional frames or framework unit for high vertical and/or horizontal loads
- Project-specific planning as spatial load-bearing structure for virtually all geometries and loads
- Standards and top standards, ledgers, diagonal braces and decking in many lengths in 25 cm and 50 cm grid dimensions
- Continuous height adjustment through the combination of 2.00 m long standards and top standards in different lengths
- Easily adaptable with bay lengths in 25 cm and 50 cm grid dimensions and a node spacing of 50 cm in all 3 directions

PERI UP Flex Shoring Tower MDS

The shoring tower with system-integrated safety for vertical assembly and dismantling

Assembly and dismantling of the MDS Shoring Tower takes place with protection always provided by means of end-to-end guardrails. The user is always in a safe and secure position during all assembly situations – without requiring any additional measures. The MDS Decking is attached to the ledgers without tools while any unintentional lifting from below is simply not possible. The supply of materials is carried out through the inside of the shoring tower.

Safe assembly without additional components

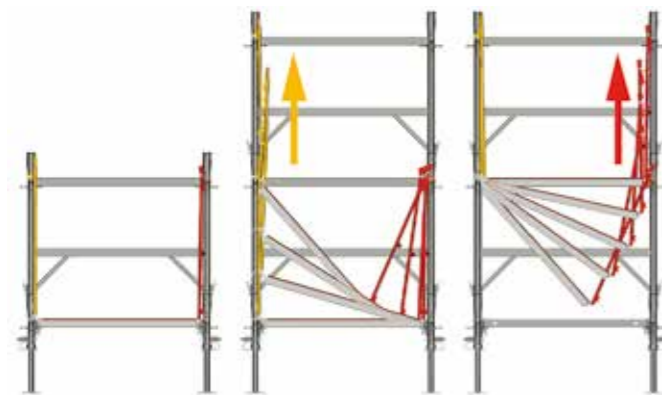
through the specific type of design with decking and end-to-end guardrails

Accelerated working operations

with only a minimum of system components and constantly repeating assembly steps

Effortless handling

through the low weight and ergonomically advantageous working operations (centre of the body)



- Vertically-assembled shoring tower comprising PERI UP Flex system components and additional decks
- As a free-standing shoring tower with assembly heights up to 6.39 m and for loads up to 45 kN; restrained at the top, up to heights of 9.39 m and loads up to 50 kN
- Ground plan: 1.25 m x 1.00 m | 1.50 m | 2.00 m | 2.50 m | 3.00 m
- As a shoring tower with additional frames for concentrated vertical loads
- Modular adaptation of the tower ground plan in a longitudinal direction
- Height adjustment in 50 cm increments by combining the MDS 100 Frame and MDS 50 Intermediate Frame; fine adjustment via the Head and Base Spindles

PERI UP Flex Shoring Tower Plus

The height-flexible table support

With standards and ledgers from the PERI UP Flex Modular Scaffolding as well as only a minimum number of additional components, shoring especially for slab tables can be realized. For the head and base areas, strengthened standards along with spindles featuring large extension lengths are used with the PERI UP Flex Shoring Tower Plus. This allows the table construction to be lowered as required, particularly important when moving under beams.

Large spindling range

of up to 88 cm in the head and base areas

Cost-effective

through the use of system components from the PERI UP Flex Modular Scaffolding

Enhanced load-bearing capacity

for heights up to 8.76 m and leg loads up to 52 kN



- Reliable load-bearing capacity: 52 kN (restrained at the top)
- Variable ground plan in 25 cm and 50 cm increments
- As support under slab tables: 4-legged or 6-legged for large-sized tables (e.g. VARIODECK)
- Continuous height adjustment with up to 88 cm spindle extensions at the top and bottom
- Use as shoring tower also possible
- Using reinforced standards, can also be used only in the base area and with standard components in the head area

PERI UP Flex Heavy-Duty Prop HD

The heavy-duty prop with integrated load control

The 4-legged heavy-duty prop consists of PERI UP Flex system components and carries concentrated loads up to 200 kN. The hydraulic cylinder in the base allows displacement and force-controlled lowering of the prop under load as well as planned force-controlled pre-stressing which is required with shoring in existing buildings. The hydraulics can be moved from prop to prop which reduces cylinder requirements.

Systematic prestressing with hydraulic cylinders, e.g. for shoring in existing buildings

Controlled release under load through the hydraulic cylinder in the base

Cost-effective through the use of standard components from the PERI UP Flex modular scaffolding

Lightweight and small-sized components for easy handling in confined spaces during refurbishment in existing building and industrial facilities

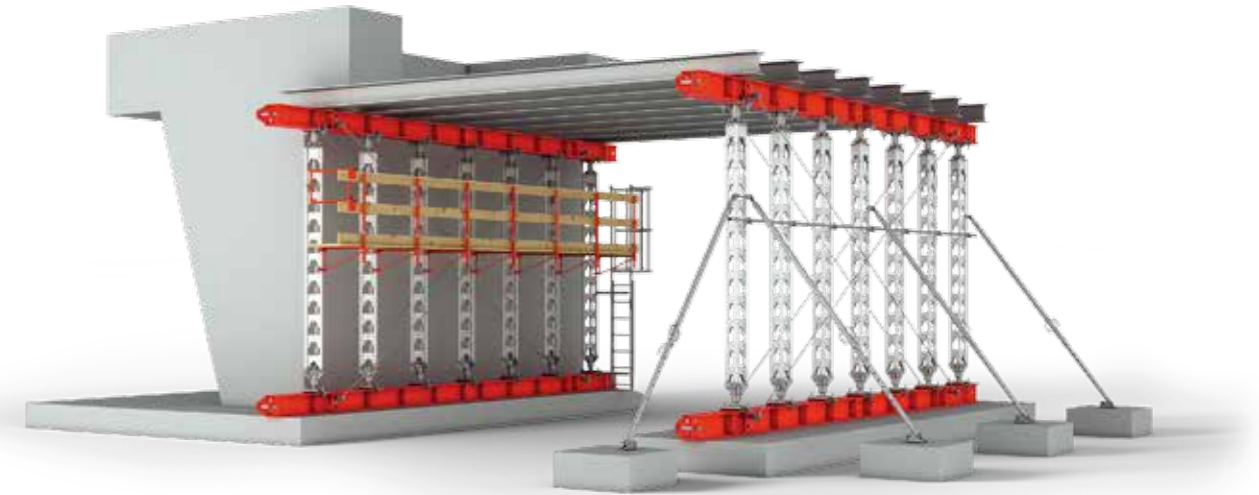


- 4-legged heavy-duty prop for transferring concentrated loads up to 200 kN with assembly heights up to 8.00 m
- Comprising PERI UP Standards with lengths from 50 cm to 3.00 m, Ledgers UH Plus, Lowering and Head Spindles as well as an additional hydraulic unit for the base
- Continuous height adjustment via the Head Spindle; prestressing and release via the Lowering Spindle with the help of the hydraulic Lowering Unit HD
- Mechanical load transmission when at rest via the Adjusting Nut
- Head Spindle with 3° tiltable Head Plate; connection to HDT Main Beam possible



HD 200 Heavy-Duty Prop

The tool-free assembled prop for loads up to 200 kN



HD 200 is the solution comprised of individual prop sections for loads up to 200 kN. The easy handling facilitates fast assembly. The props are very flexible in their application – from structural renovation through to bridge construction. For an extended range of applications, the individual props can be connected to form main beam areas.

Fast assembly requiring no tools through integrated chord couplings for connecting the individual sections

Assembly by hand with lightweight individual components – the largest aluminium section weighs less than 30 kg

Controlled lowering up to 10 cm with the lowering device

Can also be used as a main beam area by connecting the props by means of main beams; diagonal bracing with system components without requiring any welding



- Shoring prop consisting of coupled aluminium sections for medium-heavy shoring (steel sections for higher loads and larger support heights); can also be used as main beam area
- For loads up to 200 kN
- Assembly in 30 cm increments up to 12.20 m total height (without intermediate supports)
- 3 aluminium prop sections (30 cm | 90 cm | 270 cm) and 2 steel sections (90 cm | 210 cm)
- Head Spindle with 3° tiltable Head Plate
- Lowering device with 10 cm lowering range for easy lowering when fully loaded



Working Scaffolds

are temporary constructions. They serve to create higher-positioned working areas for construction site activities, on buildings as well as on industrial facilities. In addition, they ensure that working areas can be safely accessed.

Modular scaffolding systems guarantee fast erection times, high load-bearing capacities and safety levels for assembly and dismantling as well as during use. While frame scaffolding is aimed at ensuring a high tempo for 3D scaffolding construction, modular scaffolding with nodal points for connecting ledgers, brackets and other components provides greater flexibility for geometrical adjustments. In the process, country-specific occupational

health and safety legislation and standards regulate the requirements placed on a scaffold with respect to assembly, bracing, anchoring and sufficient load-bearing capacity for the various areas of application.

Scaffolding is also named after its area of application. For work operations on the front of a building, narrow facade scaffolding is used. On construction sites, working platforms are normally utilized as well as reinforcement scaffold. Industrial scaffolding is the name given for providing access and work platforms on industrial installations.

PERI UP Easy Facade Scaffolding

The extremely lightweight frame scaffold for safe working conditions

PERI UP Easy with the innovative frame combines safety and cost-effectiveness in an ideal way. The scaffolding is characterized by its very low weight which has resulted in significantly reduced assembly and dismantling times. As the guardrail for the next scaffolding level is mounted without any additional components when using the Easy Frame, the scaffolder is secured against falling on every level without requiring rope protection. The special feature: the Easy Frame rosette allows the combination with system components of the PERI UP Flex Modular Scaffolding. This opens up new application possibilities also for complex tasks.



Less weight

Faster working due to the extremely low weight of the individual components

More safety

Fall protection without additional components through the systematic assembly procedure with protection provided by the guardrail mounted in advance

Fast assembly

Standard configuration without couplings and with a quick anchoring system, requiring almost no installation tools at all

Maximum range of applications

Combination with PERI UP Flex System Components due to the Easy Frame rosettes



Due to the special shape of the Easy Frame, the guardrail for the next scaffolding level can be mounted from the safety of the lower level – without any additional components and the extra time involved.



For PERI UP Easy, the 66 cm wide combi-decking as well as 33 cm wide steel decks are available. All decks are equipped with the integrated protection against lifting.



System components of the PERI UP Modular Scaffolding can be connected to the rosettes of the Easy Frame. This means, for example, stairs can be directly connected – without additional frames or components.

- Facade scaffolding as working and safety scaffold
- Standard configuration with a 67 cm system width / 66 cm decking width
- For use as working scaffold in accordance with DIN EN 12811-1:2004-03
- Can be used as safety and roof edge safety scaffold Class D and as roof edge safety scaffold with protection panels Class SWD 1 in accordance with DIN 4420-1: 2004-03
- One-piece combi decking $b = 66$ cm with integrated protection against lifting, can be loaded up to max. LC 3 (2.00 kN/m²)
- One-piece steel decking $b = 33$ cm with integrated protection against lifting, can be loaded up to LC 4 (3.00 kN/m²) with $l = 3.00$ m
- Gap-free decking surfaces without separate gap coverings
- Internal bracket decking, removable for use on external walls with a thermal insulation system
- Fast opening and closing of scaffold bays, e.g. for the transport of materials

PERI UP Flex Facade Scaffolding

Extremely adaptable and with a high load-bearing capacity

PERI UP Flex Modular Scaffolding can be used for realizing robust, high load-bearing facade scaffolds. The decking is mounted directly on the ledgers while the bay lengths are adjustable in 25 cm increments. Connecting other system components to the standards is possible using 50 cm node spacings. The integrated lock against lifting along with the Gravity Lock for the ledgers accelerate assembly operations. Optionally, the ledgers are mounted in advance from a safe position.

Extremely adaptable

Adjustments are carried out in a uniform grid arrangement of 25 cm which provides a high level of flexibility for complex facade scaffolding

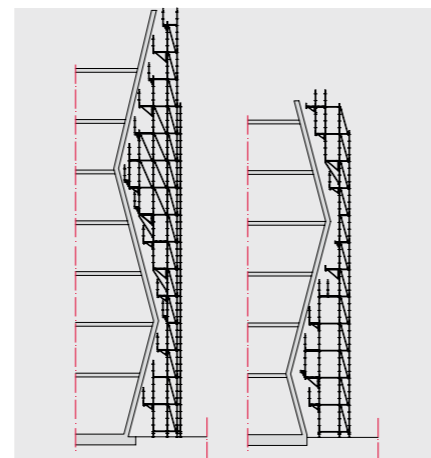
Gap-free decking levels

Each bay is covered completely with system decking and without any tripping hazards

High load-bearing capacity

Up to Load Class 6 depending on the assembly

- Modular scaffolding as facade scaffolds; standard configuration with system widths of 75 cm or 100 cm
- Used for all work to be carried out with $b = 75 \text{ cm}$ for Load Class 1 – 4 ($0.75 \text{ kN/m}^2 - 3.00 \text{ kN/m}^2$) as well as with $b = 100 \text{ cm}$ for Load Class 1 – 6 ($0.75 \text{ kN/m}^2 - 6.00 \text{ kN/m}^2$)
- Corresponds to the requirements of European Standards EN 12810 and EN 12811
- Uniform, metric length and width grid arrangement of all system components of 25 cm or 50 cm
- Scaffold bay lengths: 50 cm, 75 cm, 100 cm, 125 cm, 150 cm, 200 cm, 250 cm, 300 cm
- Easy and safe assembly with the Gravity Lock: when placing the wedge head in the rosette, the wedge drops into the opening due to its own weight and automatically locks
- Securely-installed decks through the integrated lock against lift off (Locking Deck); level and slip-resistant decking surfaces



Gravity Lock and Locking Deck are the key, most advantageous features of the PERI UP Flex Modular Scaffolding.



During assembly, the wedge of the ledger drops through its own force of gravity into the rosette and locks automatically.



The decking is mounted directly on the steel ledgers and held securely in position without requiring any additional components.

PERI UP Flex Working Platforms

Safe working at any height through the high flexibility of the modular scaffolding

With PERI UP Flex, safe working platforms can be realized at any height. With the continuous metric system grid of all components and the possibility of changing the direction of the decks, the modular scaffolding can be optimally adapted to suit virtually any local conditions. With the self-securing ledger connection on the rosette and the integrated protection against lifting in the decking, PERI UP Flex can be mounted extremely quickly. During use, the end-to-end guardrails and yellow toe board as well as the slip-resistant decks ensure a high degree of working safety.

Trip and gap-free working levels

Working areas are completely covered without any gaps and simple conversions are made to accommodate any obstructions

Extremely safe

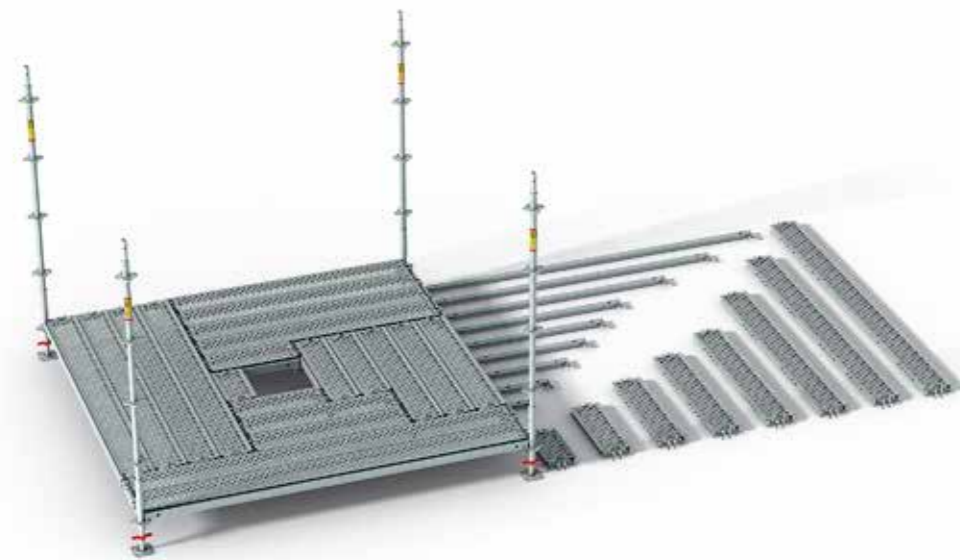
Non-slip due to perforated decking, end-to-end protection provided by guardrails and toe boards in a signal colour

Quickly mounted

Fast assembly with the Gravity Lock and self-securing decking (Locking Deck)

Very high load-bearing capacity

Special node rigidity and high loadability of the connection



Fits in all directions

PERI UP Flex has a system grid of 25 cm and 50 cm. The wide range of ledgers with lengths starting from 25 cm allow decking to change direction during installation. This ensures maximum adaptability to suit project-specific geometries – no couplings are required.



- Modular scaffolding for erecting complex work scaffolds
- Fits in all directions: uniform, metric length and width grid arrangement of all system components of 25 cm and 50 cm; connection possibilities to the standards with 50 cm spacings
- Scaffold bay lengths: 50 cm, 75 cm, 100 cm, 125 cm, 150 cm, 200 cm, 250 cm, 300 cm
- Easy and safe assembly with the Gravity Lock: when placing the wedge head in the rosette, the wedge drops into the opening due to its own weight and automatically locks
- Non-lift decking through the integrated lock against lift off (Locking Deck); slip-resistant decks
- Level working areas without any gaps between the decks
- Rigidity of the ledger connections allows high leg loads which means fewer diagonals are required
- High level of working safety through the end-to-end guardrails and toe boards
- Can be used with a wide range of supplementary system components and accessories for diverse applications

PERI UP Flex Suspended Scaffolds

Movable scaffolding solutions

For movable-type solutions, Standards together with the Trolley UFS 20 can be attached to I-shaped steel profiles. The Trolley carries loads of up to 19.7 kN and allows entire platforms to be moved e.g. on the underside of oil platforms or bridges. For project-specific solutions, rentable steel components from the VARIOKIT Engineering Construction Kit or other PERI formwork systems for the supporting structure are often used.

System grid construction

through the variable adjustment of the mounting for the Standard independent of the flange width

Easy moving procedure

with a minimum of effort due to the smooth-running plastic rollers

Can be used on different steel profiles

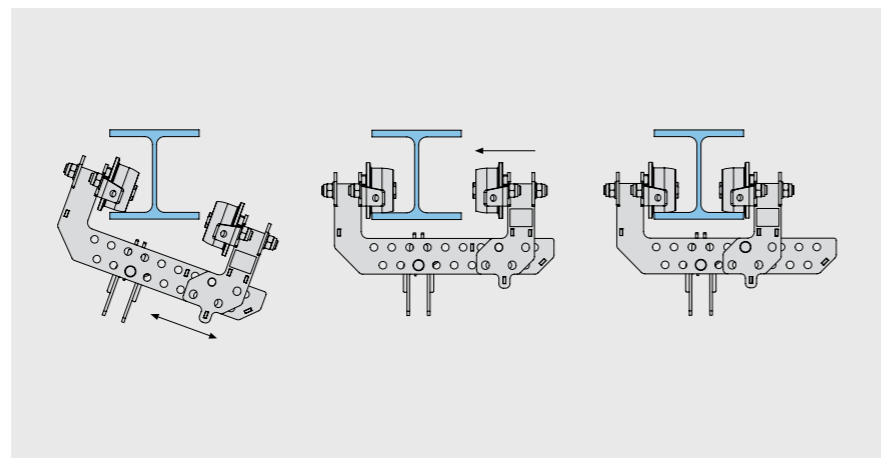
due to the site-compliant design and can be adapted to suit 20 cm to 32 cm wide girders with up to 40 mm flange thicknesses



The Trolley UFS 20 can also be used on PERI RCS Rails – as shown here for transporting materials in a refurbishment project.



For the installation, one of the roller holder legs can be moved. The roller spacing can be adapted to accommodate the steel girder and is secured by means of a bolt.



PERI UP Flex Bridging

Working platforms up to 10.00 m long with the Lattice Beam ULS

With the PERI UP Flex Lattice Beam ULS, bridging spans up to 10.00 m long can be cost-effectively realized. The beam consists of 5 easy-to-handle individual components with a maximum length of 1.50 m and maximum weight of 15.4 kg. The beam length can be adjusted in 25 cm increments. The proven UDG Decks can be directly mounted on the upper chords of the beam.

Ideally suited for refurbishment projects

due to the compact dimensions and low weight, can also be used in confined spaces and access via manholes

Simple and fast assembly

with pins and cotter pins, also for bracing with diagonals – without any tube-coupler connections

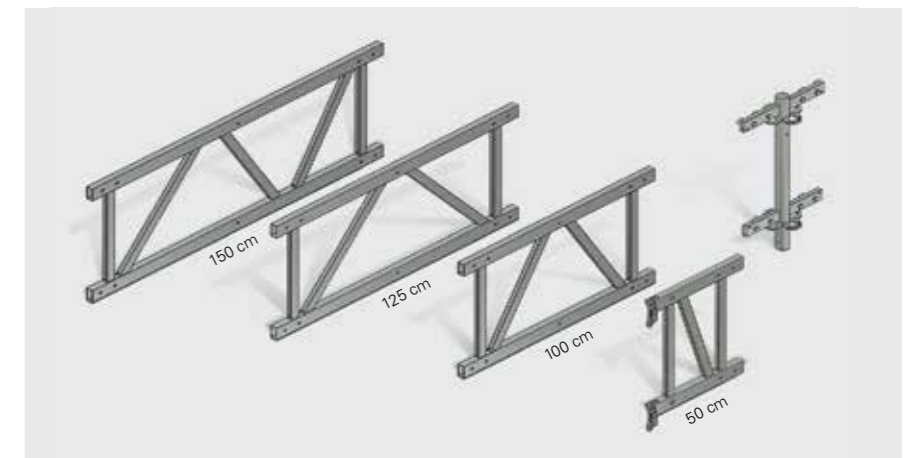
Particularly cost-effective

through the combined use with PERI UP Flex Standards and Decking



The system is comprised of 3 intermediate elements and a connecting element as well as a 50 cm long end element which is connected to the rosettes.

- Loads up to 3.00 kN/m² with spans of up to 10.00 m
- Spans from 3.00 m to 10.00 m in 25 cm increments
- Installed on the rosettes of the Standards
- Compact dimensions with individual lengths from 50 cm – 150 cm and a beam height of 50 cm



PERI UP Flex Reinforcement Scaffold

Practical scaffold units for working on the formwork
– extremely stable without ballast or anchors

The PERI UP Flex Reinforcement Scaffold with a base width of 150 cm or 250 cm can be assembled up to a length of 3 bays in a longitudinal direction. It is very stable without requiring any ballast or anchors as long as it is positioned in front of a wall or formwork which can then provide support. The self-securing ledger connection and the integrated protection against lifting in the decks ensure fast assembly. The continuous, gap-free uniform deck covering provides users with a very high level of safety during work operations.

Guaranteed stability without anchors or ballast

Used without anchors and ballast in front of formwork and walls

Simple to plan

Fast determination of material requirements by means of prefabricated units

Movable in large-sized units

Due to the tension-proof connections, entire large-sized units can be moved by crane

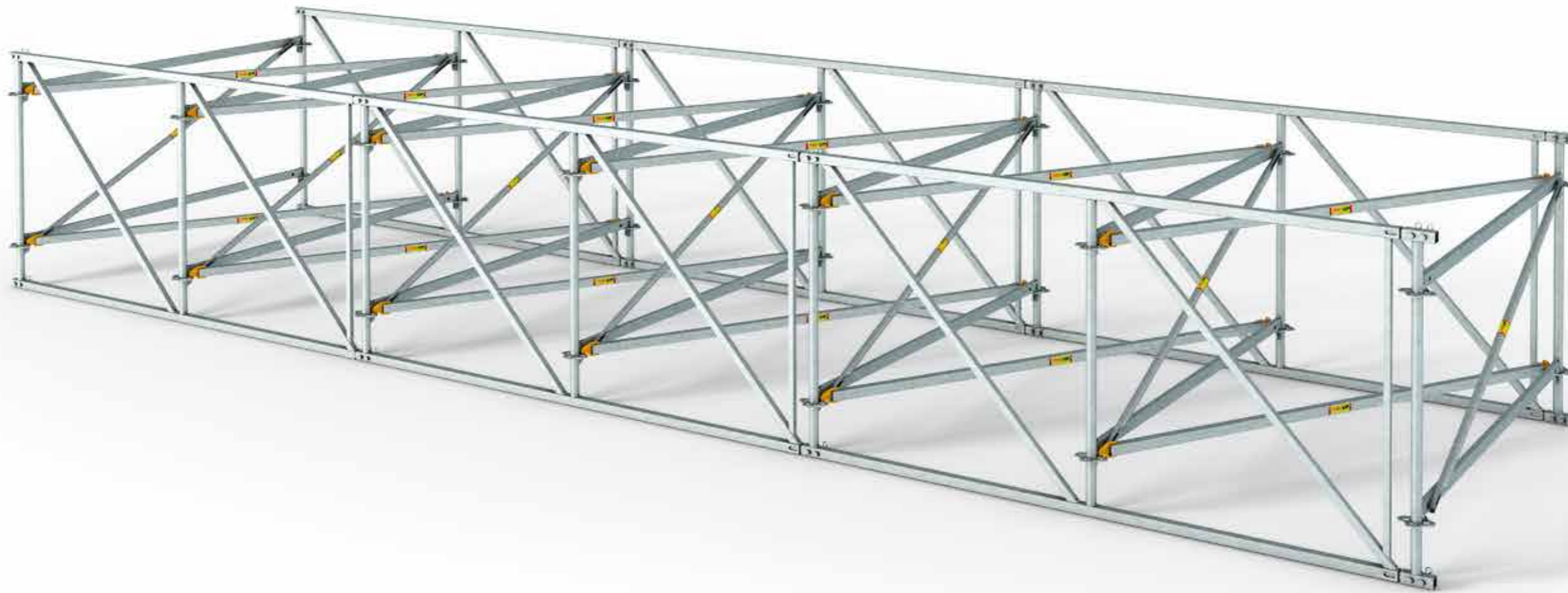


- Working scaffold for reinforcement, shuttering and concreting operations
- Working scaffold for Load Classes 1 – 3 according to EN 12811-1 (0.75 kN/m² to 2.00 kN/m²)
- Fulfills wind load requirements according to DIN EN 1004 and DIN EN 12811
- System widths: 75 cm and 100 cm
- Storey height: 200 cm
- Scaffold bay lengths: 150 cm, 200 cm, 250 cm, 300 cm
- Maximum standing height 6.60 m (with base width 150 cm) or 10.80 m (base width 250 cm)



PERI UP Flex Working Platform LGS 150

For wide-span working platforms and temporary pedestrian footbridges



The LGS Lattice Girder System offers safe and efficient solutions for large spans and/or high loads. Apart from the use of trusses for weather protection roofs, temporary (pedestrian) bridges or working platforms can be realized at any height with the LGS Truss Segments.

Fast assembly

Ledgers and diagonals can be connected to form very stable units

For large spans

The high bending loading capacity allows large spans to be realized

Versatile

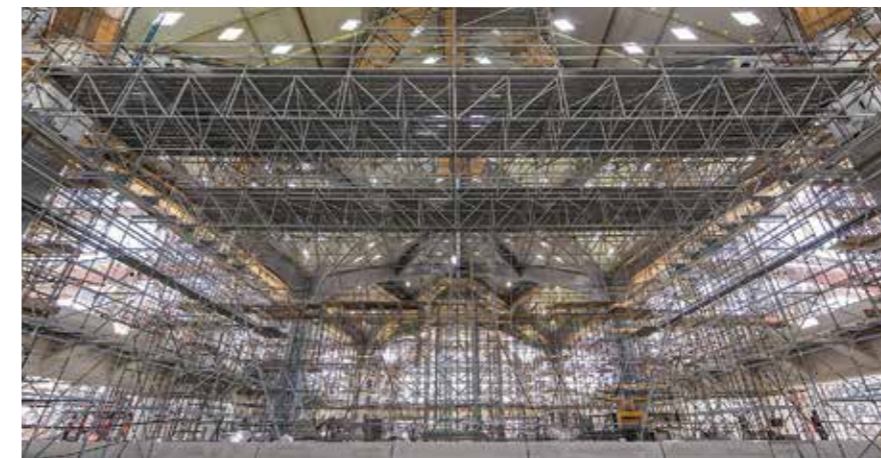
Flexibly adaptable to suit different geometries – as a platform or bridge

With the LGS Lattice Girder System, safe working platforms can be realized. If required, completely close areas can be formed with system decking and dust-proof coverings.

LGS is suitable for temporary pedestrian bridges and meets the requirements regarding guardrail loads and geometries for use in public areas.

This manually movable scaffolding with its 20 m span is based on the LGS system and, among other things, serves as a working platform for implementing corrosion protection measures.

Movable platforms with 25 m spans provide safe working areas for different tasks to be carried out on the underside of a railway station roof.



- Lattice girder for wide-span bridging and temporary pedestrian footbridges
- Maximum span:
12.00 m with 5 kN/m² or
20.00 m with 2 kN/m²



Temporary Access

must fulfil different requirements regarding geometries and maximum loads which are defined, in particular, by the respective area of application and user groups. Basically, a distinction is made between access to higher-positioned working areas and temporary access means for public areas.

Access solutions for working areas must be adapted primarily to suit the number of users as well as the loads incurred. Authorised users are all those involved in the construction project, i.e. persons in appropriate working clothes with suitable protection equipment.

Users of public stairs, however, are all persons who use areas open to the general public – from infants to frail elderly people. In addition, large gatherings of people can be expected. Accordingly, specific requirements for flight widths, execution of intermediate landings and safety equipment – among other things – are to be taken into consideration.

The lightweight stair tower for flexible access solutions

The lightweight aluminium flights of stairs with 75 cm widths are mounted on ledgers of the PERI UP modular scaffolding. This results in 4-legged stair towers with alternating staircase units or staircase units in the same direction with heights of up to 100 m. The PERI UP Flex Stair 75 is designed to accommodate 2.00 kN/m² loads and serves as access to working areas or construction sites.

Flexible assembly

Through the 25 cm grid dimension, all bays can be completely closed even in the smallest of spaces

Easily adapted

for accessing building openings with brackets and small flights of stairs – regardless of storey heights

Fast installation

with only a minimum number of ledgers and anchors

- Quickly assembled, welded flights of stairs with 75 cm widths (clear stair width 67 cm)
- Can be used for alternating staircase units or staircase units in the same direction with assembly heights from 2.00 m up to 66.00 m (project-specific planning up to approx. 100 m assembly height)
- Ground plan: 1.50 m x 2.50 m or 1.50 m x 3.00 m
- Permissible loads: 2.00 kN/m² for flights of stairs and 2.00 kN/m² for the entire construction for a run of staircase and landing of 20 m
- Adaptation for accessing building openings in height increments of 25 cm by means of laterally-mounted brackets
- Flights of stairs can also be installed next to each other with movements in both directions as well as centrally attached guardrails



With the Stair 75, all working levels on construction sites can be quickly and safely reached.

Stair tower with twin staircase units for the construction of a liquid gas tank. Guardrails mounted on the outer and middle stringers provide safe passage.



Height adjustments to building openings are carried out by means of short flights of stairs and externally mounted brackets – regardless of the floor height.



PERI UP Flex Stairwell Stairs

The version for narrow spaces

With the stairwell stairs, compact access means can be provided on the inside of buildings with small staircase wells. For this, shorter ledgers are connected at the same height at 90° angles while using flights of stairs with smaller run lengths and heights. At the same

time, the stairwell staircases 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 for small areas and narrow geometries.



PERI UP Flex Stair 100 / 125

Stairs for high load-bearing and accessibility requirements

The PERI UP Flex Stair 100 / 125 is assembled using stringers and individual stair treads. The 10-legged stair tower with heights of up to 50 m is designed for a load of up to 3.0 kN/m². With 100 cm or 125 cm step widths and separate landings, the stair is ideally suited for large numbers of users.

High load-bearing capacity

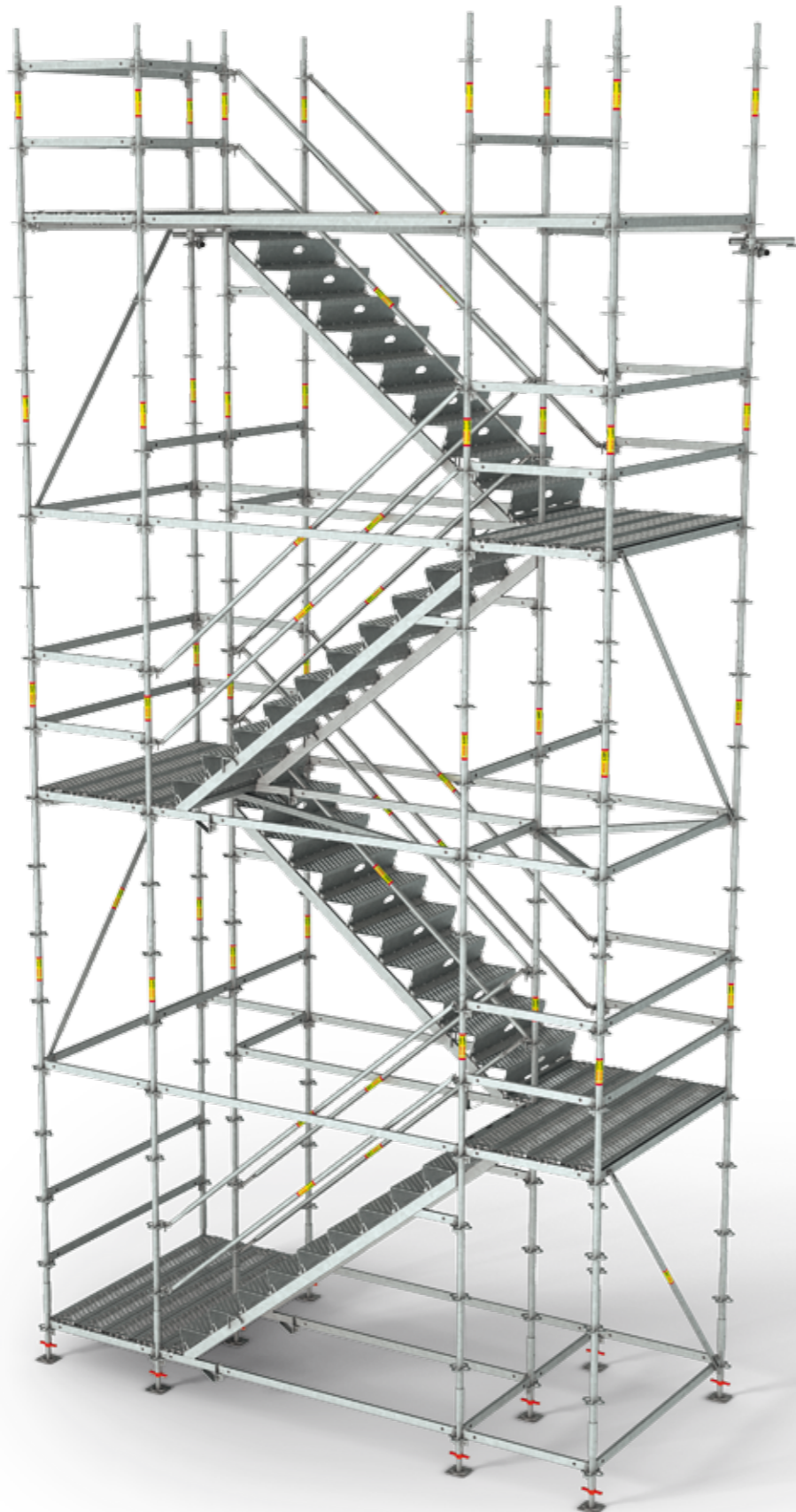
Designed for loads of 3.00 kN/m² for a run of staircase and landing of 20 m

With conveniently-sized widths

Sufficient space for site personnel to pass each other, transport of materials and stretchering injured persons

Erection without the use of tools

The stringers are mounted first followed by the steps which interlock during installation without requiring additional components



- Stairs comprised of stringers and individual stair treads with 100 cm or 125 cm widths (clear stair widths of 96 cm or 121 cm)
- Can be used as staircase units in the same direction or alternating staircase units with 2.00 m up to 50.00 m assembly heights
- Ground plan: 2.00 m x 4.00 m (Stair 100) or 2.50 m x 5.00 m (Stair 125)
- Permissible loads: 3.00 kN/m² for flights of stairs or 40.0 kN for the entire construction or 3.0 kN/m² for a run of staircase and landing of 20 m

The perforated decking is extremely slip-resistant – also when walked on with oil-smearred shoes.



The lightweight individual steps are quickly installed; they interlock during assembly and secure automatically.



The Stair 100 / 125 system provides sufficient space also allowing people to easily pass each other. This is a big advantage with large crowds.



PERI UP Rosett Public Stair

The stairs for meeting the highest requirements in public areas

PERI UP Rosett Public Stair is the ideal solution for temporary stairs in public areas. Typical applications are providing access to grandstands or as temporary pedestrian bridges as well as stair replacement during renovation work. With these stairs, particularly high requirements regarding permissible loads, flight widths along with guardrail and landing arrangements can be fulfilled. As a result, the system always focuses on providing complete safety for all users.

Different structures with the same system components

Can be used as single or linked continuous staircases, dog-legged staircases or as stair towers

Conforms to current legal requirements

Stair geometry and landing arrangement meet the requirements for use in public areas

For large public gatherings

With a permissible live load of up to 7.50 kN/m²

For large public gatherings, linked continuous staircases with separate access points through inner guardrails are used.

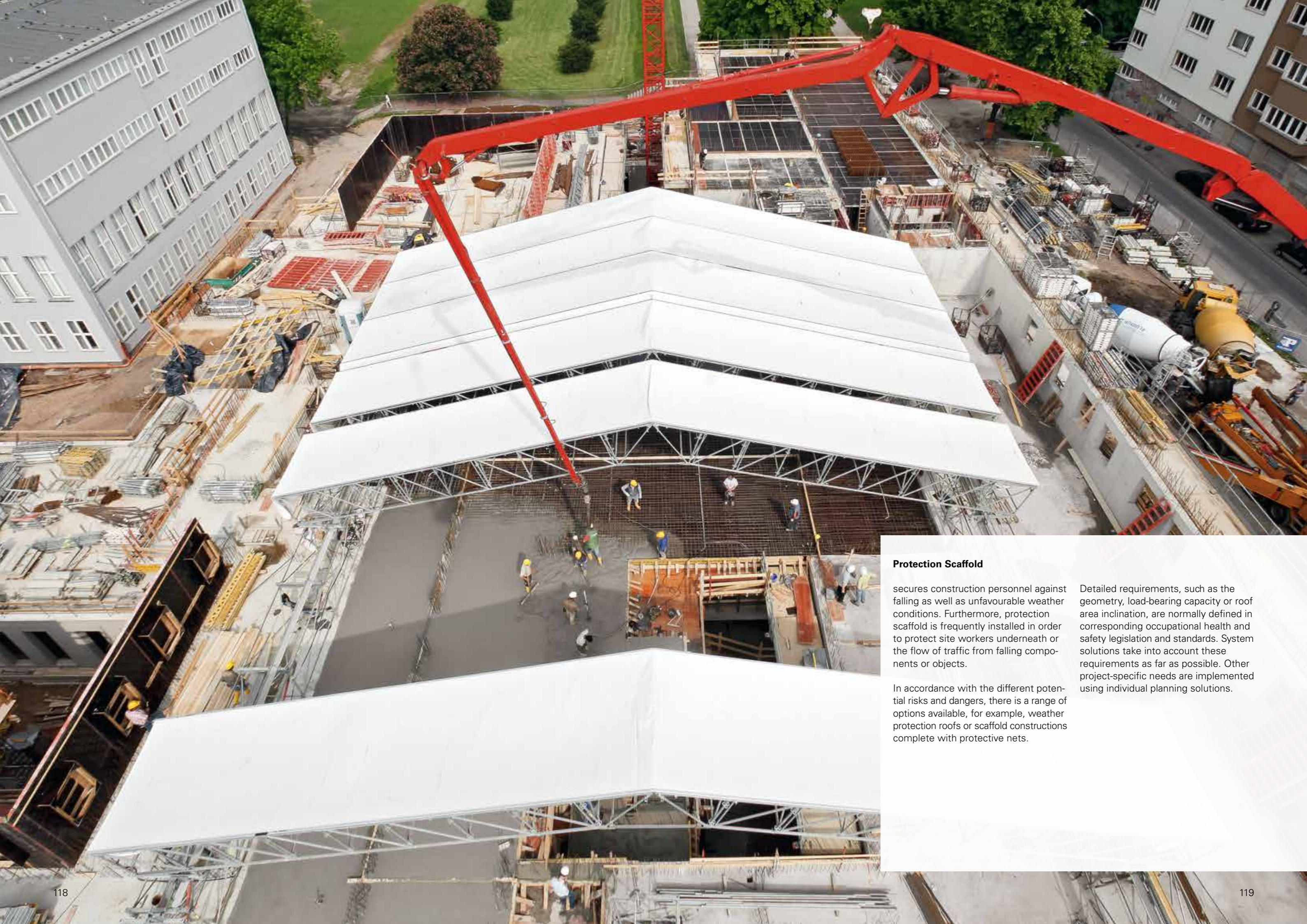
During reconstruction work, this 14 m high stair tower serves as an emergency escape route. VARIOKIT system components support the transfer to the building.

Temporary pedestrian bridges can also be individually adapted to safely accommodate the expected crowds of people.



- Stairs comprised of stringers and stair treads with 150 cm, 200 cm or 250 cm widths
- For use in public areas
 - as single continuous staircase
 - as linked continuous staircases
 - as dog-legged staircases
 - as stair towers with or without stair wells
- Stair tower ground plan $\geq 3.25 \text{ m} \times 5.50 \text{ m}$
- Fulfills the geometrical requirements concerning landing arrangements, rise and tread ratio, safety barriers and climbing over guardrails as well as vandal-proof demands
- Permissible live load 7.50 kN/m², guardrail load up to 2.00 kN/m





Protection Scaffold

secures construction personnel against falling as well as unfavourable weather conditions. Furthermore, protection scaffold is frequently installed in order to protect site workers underneath or the flow of traffic from falling components or objects.

In accordance with the different potential risks and dangers, there is a range of options available, for example, weather protection roofs or scaffold constructions complete with protective nets.

Detailed requirements, such as the geometry, load-bearing capacity or roof area inclination, are normally defined in corresponding occupational health and safety legislation and standards. System solutions take into account these requirements as far as possible. Other project-specific needs are implemented using individual planning solutions.

PERI UP Flex Weather Protection Roof LGS

Reliable protection against the effects of the weather with the lattice girder system – also for large spans

With the PERI UP Flex Weather Protection Roof LGS, 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. LGS is designed to accommodate large spans and high loads. It 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.

Fast assembly

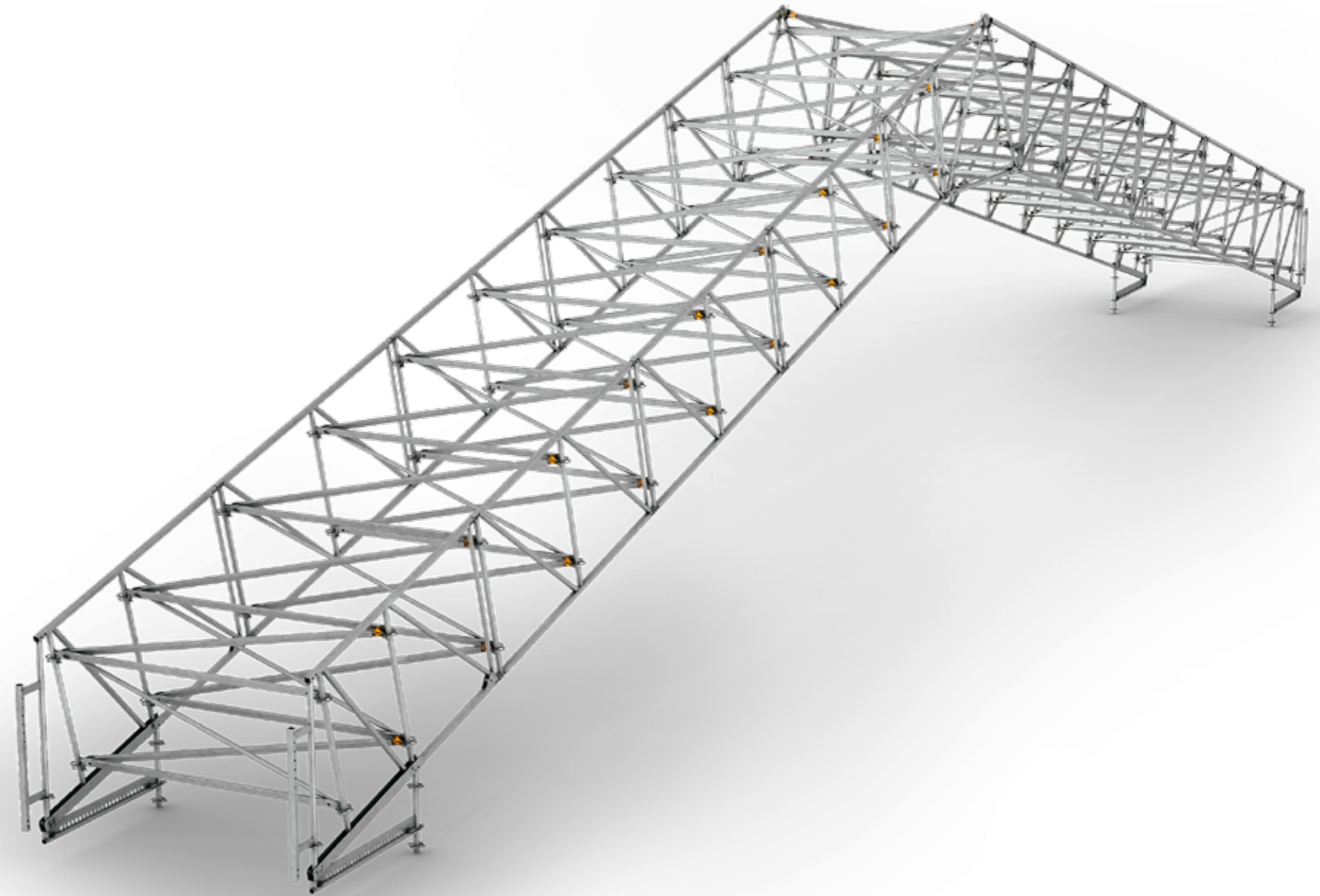
Easy pre-assembly on the ground, and raising the complete girder package by crane

Flexible adaptability

Can be realized with different inclinations and geometries

Safe without personal protective equipment

Walkways ensure safe working conditions on the roof segments without requiring personal protective equipment against falls from a height



- Spans up to 45 m, up to 35 m without tension system
- Standard roof inclination 15°; project-specific roof inclinations on request
- Dimensions of LGS Basic Element H = 150 cm, L = 300 cm or L = 150 cm
- Variable girder spacings from 50 cm to 300 cm
- Individual roof geometries through project-specific adaptation of the Ridge Elements

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.



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



As an option, the tarpaulin can be closed by means of an electric drawing-in device. One tube facilitates the drawing in of the Keder rails.



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.



Project-Specific Protection Scaffold

Numerous solutions with system components



For work carried out on overhead lines, PERI UP protection scaffold comprised of lightweight system components secured the crossings over the public roads.

With its continuous system grid arrangement, PERI UP adapts to all terrain and load situations and allows easy and safe assembly.

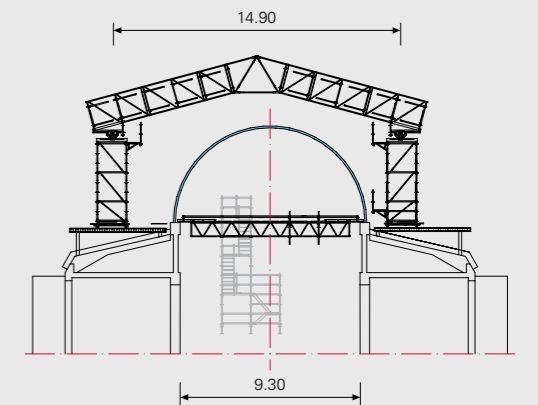


With a wide range of PERI system components and extensive know-how, PERI engineers provide cost-effective and project-specific protection scaffold constructions. In the process, components from different PERI systems are frequently combined in order to realize safe solutions with optimized load transfer – for example, for temporary (pedestrian) bridges or large-sized working platforms at any height.



Platform and roof on the basis of the PERI UP scaffolding system allow safe and uninterrupted renovation work on the arched glass roof. The scaffold simultaneously protects the public areas positioned below.

Thanks to the coordinated grid arrangement, the scaffolding and VARIOKIT system components can be ideally combined. ULS Lattice Girders bridge the 9.30 m spans. Fixed at the respective ends of the top chords, cantilevered SRU system steel walers served as lateral support and in order to transfer the defined loads.



LGS is suitable for temporary pedestrian bridges and meets the requirements regarding guardrail loads and geometries for use in public areas.

A tunnel construction protects passers-by during renovation work. Strengthened with VARIOKIT components, it also serves as a load-bearing support construction for a mobile working scaffold.





Climbing Systems

are used for the construction of vertical as well as inclined structural elements at great heights, e.g. high-rise building walls, bridge piers and dams. In addition to simple scaffold platforms, there are other different climbing systems whereby brackets, platforms and formwork are connected to form securely mounted units. These climbing units can be lifted as one unit to the next concreting section after striking has taken place.

With the traditional crane-climbed formwork, units are moved by crane and attached to climbing anchors which have been concreted in advance. If a hydraulic climbing device lifts the units to the next storey, then this is called self-climbing formwork. For this crane-independent variant, the climbing unit is guided mostly by means of rails

while dedicated climbing shoes provide safe and secure anchorage on the building. Apart from systems with integrated hydraulics, rail-climbed systems are also available which operate using mobile self-climbing devices.

For different building shapes and tasks, optimized system variants have also been developed: climbing systems for facade areas, building cores and shafts as well as inclined bridge pylons.

Climbing protection panels, which serve as a wind shield and anti-fall protection, complete the product portfolio for ensuring safe and comfortable working conditions at great heights.

FB Folding Platform

The universal platform for working and safety scaffold



The FB Folding Platform can be used as working and safety scaffold. In addition, it serves as a support for wall formwork up to 5.40 m high or as a roof edge protection scaffold. The Folding Platform is delivered fully assembled to the jobsite. The small number of required anchors and low assembly costs make the Folding Platform particularly cost-effective.

Simple application

Little effort required and fast assembly even with complicated ground plans

Advantageous for planning, utilization and provision

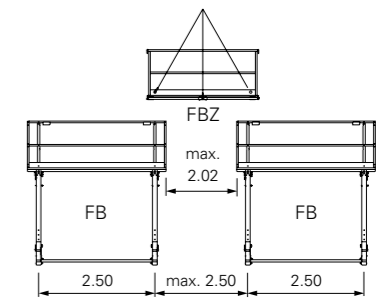
Only 3 different platform types and always identical anchor spacings

Efficient solutions

Corner Platform can be used for both the left and right sides; converted in only a few assembly steps to roof edge safety scaffold

Uncomplicated use with every ground plan

Compensation areas as well as internal and external corners without special platforms possible



Intermediate platforms bridge gaps between the main platforms; also with constant anchor spacings.

The Folding Platform is delivered pre-assembled and can be quickly lifted into position using four-sling lifting gear.

The Folding Corner Platform can be used on both the right and left sides. It is delivered as one unit together with the Corner Platform Frame.

Only a 27 cm effective stacking height ensures minimum space requirements during transportation, on the jobsite and in the yard.



- Working scaffold according to DIN EN 12811 and safety scaffold in accordance with DIN 4420; formwork scaffold for closing formwork up to 5.40 m high; with guardrail height extension also as roof edge protection scaffold
- Platform length 300 cm; platform width 180 cm (standard platform)
- Permissible load according to DIN EN 12811: Load Class 4 (300 kg/m²) when using main, intermediate and corner platforms; Load Class 5 (450 kg/m²) for special use only with main platforms
- Finishing platform as access to optional wind bracing
- Support extensions with adjustable pressure point for bridging building openings

ASG Working Platform

The particularly narrow platform for tight working areas

The ASG 70-100 Platform is used where working areas with limited space prevent the use of wider working platforms.

For limited working areas

Platform width of only 70 cm; can also be used for those basements which border the sheet piling

Ready for immediate use

Platforms are delivered to the jobsite already pre-assembled

Optionally extendable

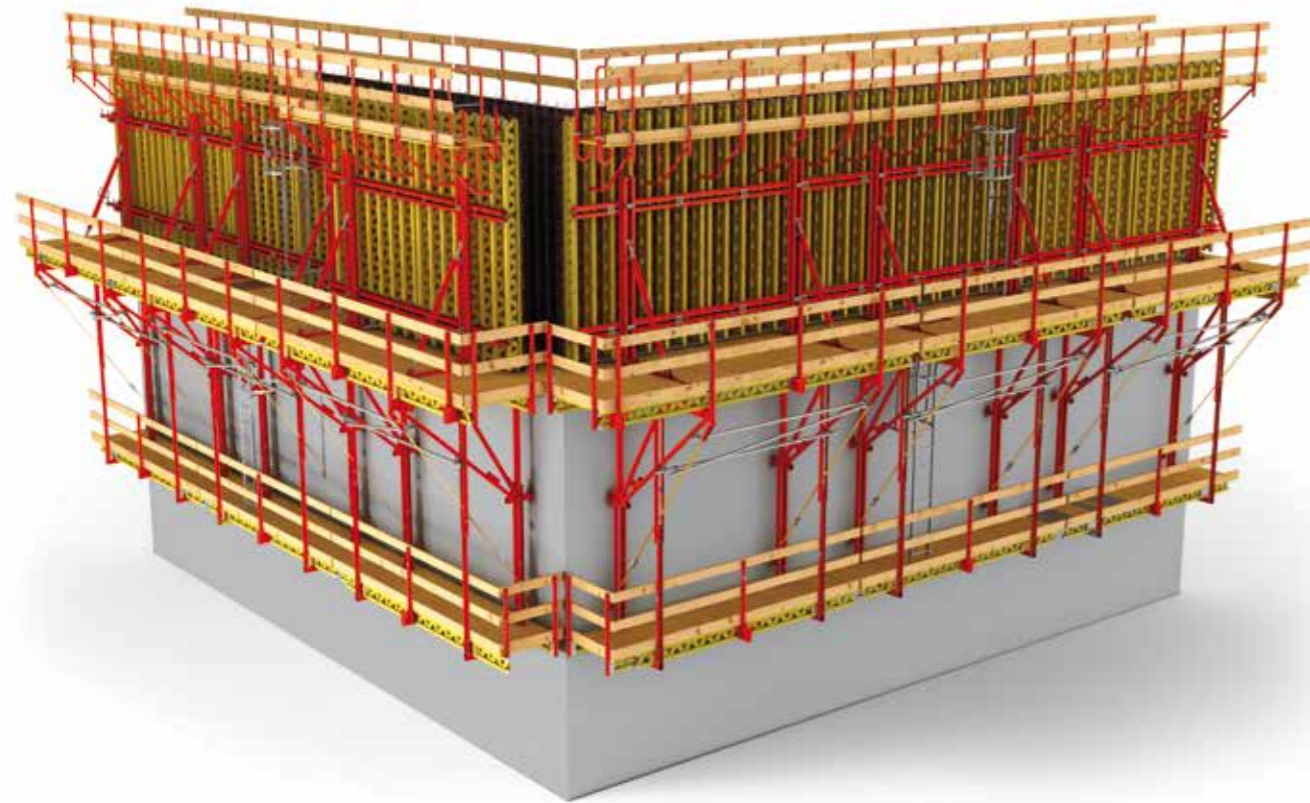
With extended support surface and additional planking, platform width can be widened to 100 cm



- Working scaffold Load Class 2 (150 kg/m²) according to DIN EN 12811
- Support for wall formwork up to 5.40 m high
- Platform lengths of 2.40 m and 3.00 m; platform widths of 70 cm and 100 cm
- Brackets can also be used individually with planks
- Can be used with cavity wall suspension without lost anchor parts on precast hollow walls

CB Climbing Formwork

Crane-movable climbing Units –
 bracket platform with large-sized wall formwork



CB Climbing Formwork is normally used for supporting large-sized, anchored wall formwork. The climbing unit consists of formwork, working platform, brackets with formwork carriage and strongbacks as well as finishing platform. It can be moved very quickly by crane.

Large scaffold units

with simultaneous high load assumptions through the high loading capacity of the brackets

Time-saving moving procedure

of the securely assembled units consisting of platform and formwork in only one crane lift

Free of tripping hazards

in front of and behind the formwork as the platform lining is placed over the brackets (valid for CB 240)

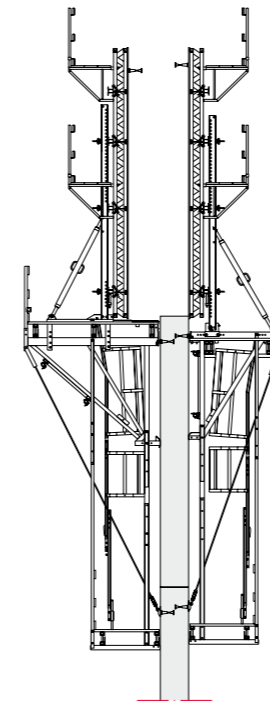
■ **CB 240**

Bracket width 2.40 m with Carriage (75 cm retraction distance), Strongback and Adjustable Brace

■ **CB 160**

Bracket width 1.60 m with Adjusting Unit, Strongback and Adjustable Brace

- Shoring for supporting anchored wall formwork; alternatively, purely as working scaffold
- Type static for formwork heights up to 5.40 m
- Finishing platform with ladder provides access to the wall
- Optional equipment with wind bracing which prevents tipping inwards



CB 160 with primary formwork (right), combined with CB 240 with closing formwork (left).



Use of the CB 240 Climbing Formwork with TRIO Wall Formwork for a 27 m high tower building. The BR Shaft Platform supports the shaft internal formwork.



Climbing formwork solution with CB Climbing Platforms and dimensionally-accurate rounded VARIO GT 24 Wall Formwork.

BR Shaft Platform

For shaft platforms when supporting shaft internal formwork

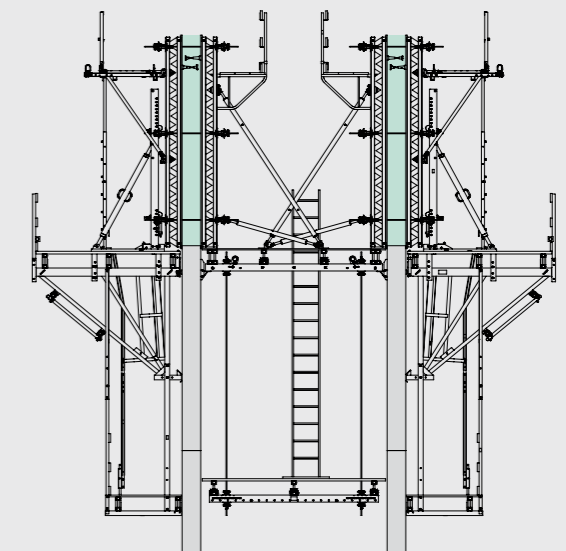
BR is the simple solution for supporting shaft internal formwork in stairwells and elevator shafts. It consists of BR Platform Beams that are tailored to exactly match the respective shaft dimensions. The decking is supported by GT 24 Formwork Girders or timbers which are fastened to the platform beams by means of Hook Straps.

Project-specific optimized

Customized adaptation of the beam

Variable support possibilities

Support on folding brackets, anchored with M24 Climbing Anchors; alternatively, on gravity pivot plates in storage boxes (no lost anchor components)



SCS Single-Sided Climbing System

The solid bracket system for single and two-sided applications

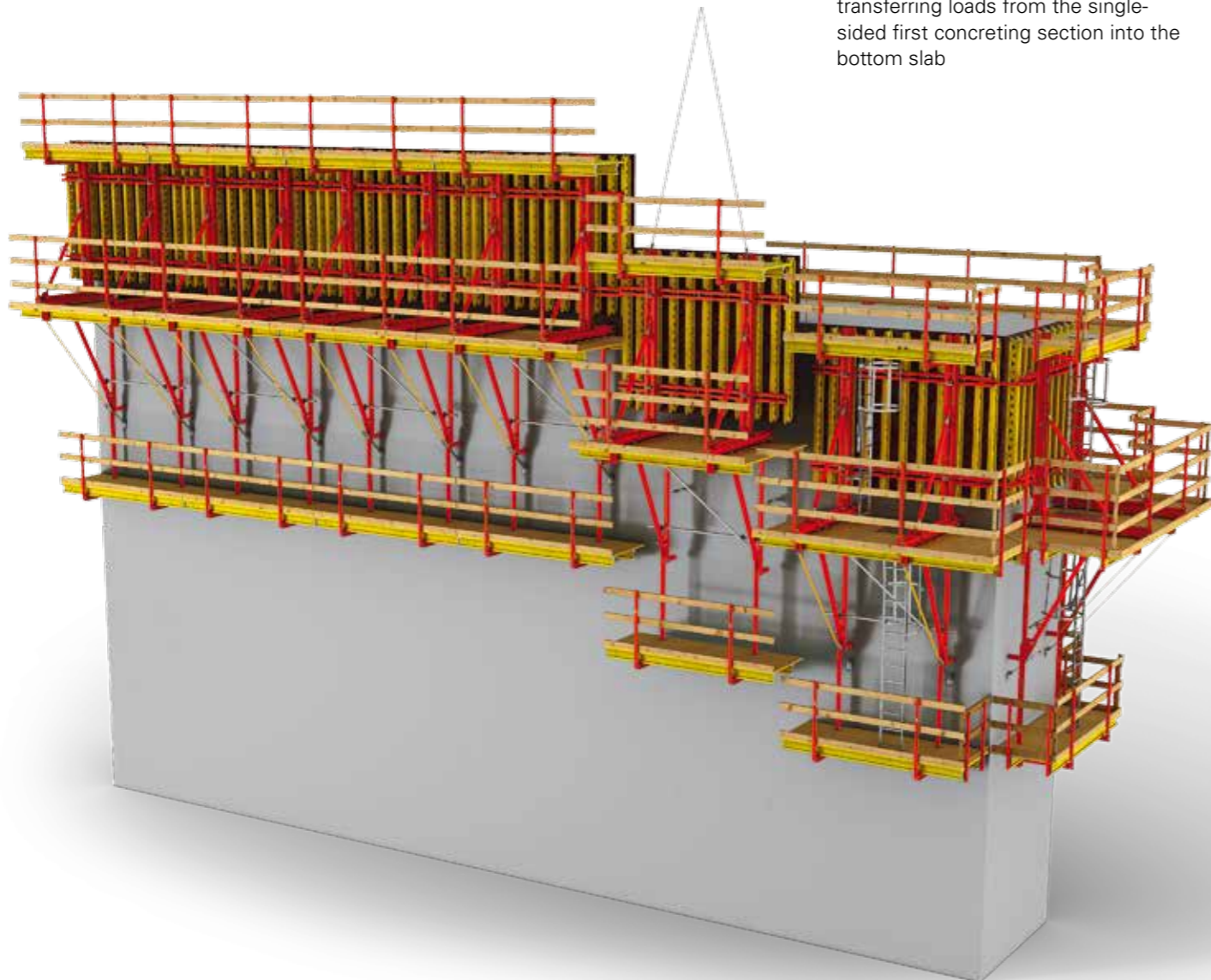
SCS serves as a load-bearing structure for supporting single-sided, non-tied or two-sided, anchored wall formwork. The loads from the fresh concrete pressure are transferred – without formwork ties – through the brackets into the climbing anchors of the previous concreting section. The SCS Climbing System is characterized by a high level of cost-effectiveness as the modular concept with multi-piece brackets facilitates optimum adaptation to suit project-specific requirements and geometries.

Large, craneable climbing units due to the particularly high load-bearing capacity of the brackets with good utilization of the anchoring

Material-optimized solution with the same formwork and components for the starter and subsequent standard cycles

Safe, horizontal working areas through inclinable platforms which can easily be adapted to suit inclined structural elements

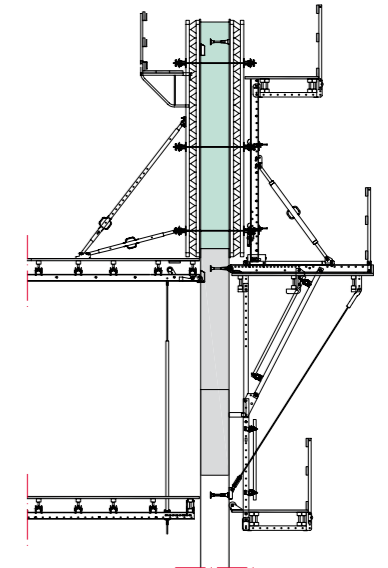
- **SCS 190**
Bracket width approx. 1.90 m with adjusting unit for tilting the formwork. For two-sided use as primary formwork opposite the SCS 250
- **SCS 250**
Bracket width approx. 2.50 m with formwork carriage (up to 63 cm retraction distance depending on the formwork system); also suitable for two-sided, anchored applications
- **SCS Starter Brace Frame**
Consisting of strongbacks, spindles and an additional starter waler for transferring loads from the single-sided first concreting section into the bottom slab



The SCS 190 Climbing System in combination with VARIO GT 24 Girder Wall Formwork for a double-curved dam wall.



The transfer of heavy loads and the reduced number of anchor points with the SCS ensure an extremely high level of cost-effectiveness.



SCS can also be used for two-sided applications with formwork heights up to 6 m. This increases material utilization whilst simultaneously lowering the logistical time and effort.

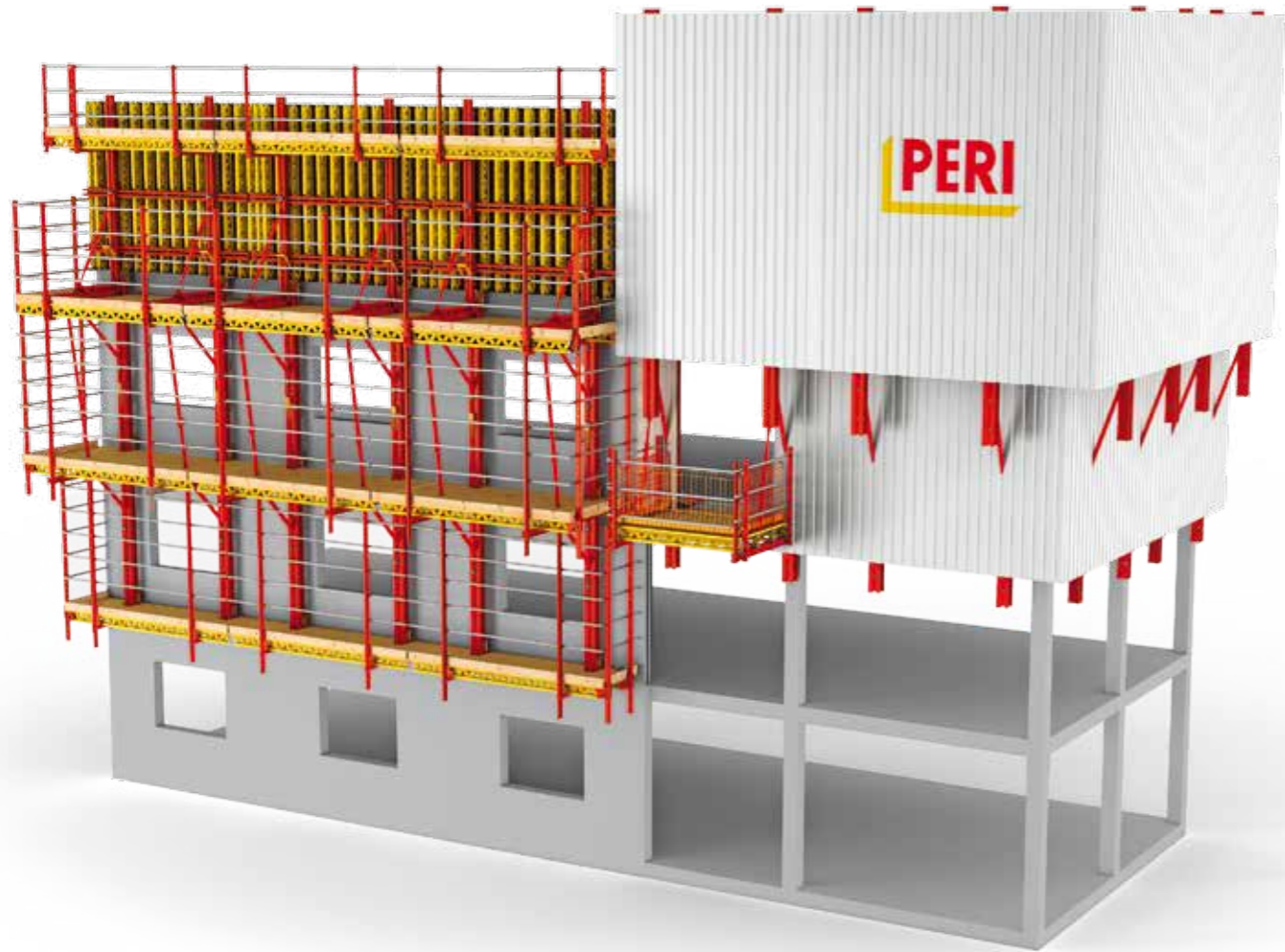
Use of SCS Climbing Formwork for the construction of the new locks in the Panama Canal.



- Support structure for supporting non-tied, single-sided wall formwork
- Crane-movable climbing units comprised of a platform unit and VARIO GT 24 Girder Wall Formwork
- Optimized for a concreting height of 3.00 m (vertical applications) or 2.50 m (forward-inclined applications)
- Addition of a finishing platform possible
- Separate adaptable working platform for use on inclined structures; concreting and finishing platforms can be tilted by $\pm 15^\circ$ und $\pm 30^\circ$
- Starter Brace Frame with strongbacks, spindles and an additional starter waler for the first concreting section, with diagonal anchors fixed in the ground

RCS Rail Climbing System

The universal modular climbing system for a wide range of applications



The RCS combines the advantages of different climbing systems in a modular system and is used as climbing formwork as well as a climbing protection panel. Through the rail-guided climbing, the climbing unit is securely connected to the building at all times which makes the climbing procedure fast and safe also in windy conditions. The units are moved by crane or by means of mobile climbing hydraulics to the next section. RCS is easily adapted to suit jobsite-specific requirements.

Safe rail-guided procedure

The moving unit is connected at all times to the building by means of a climbing shoe

Flexible mounting

The climbing shoe can be attached to the walls as well as slab edges

Variable assembly

Due to the 125 mm hole arrangement of the climbing rails, the platforms can be optimally adapted to suit the respective storey heights

RCS C Formwork Scaffolding

in standard use for supporting wall formwork for storey heights of 2.70 m to 4.50 m; with carriage (90 cm retraction distance)

RCS CL Light Climbing Formwork

for medium-height structures; with climbing rail extensions and intermediate climbing shoes, only one finishing platform is then required

RCS P Climbing Protection Panel and Guardrails

enclosure and guardrails provide gap-free protection for work carried out on the building shell floors



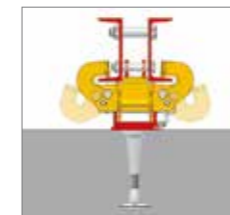
The mobile climbing device allows climbing without a crane. The hydraulic cylinders are mounted on the climbing shoe between the wall and climbing rail.



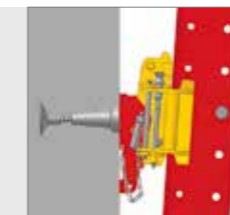
For the RCS enclosure, different materials can be used, e.g. LPS mesh panels, trapezoidal sheeting, multi-layer wooden boards or netting.



The Climbing Protection Panel can be used in a line also with protruding and recessed slab edges. For this, the supporting components are used together with horizontal RCS Climbing Rails.



Foldable runners allow the lateral dismantling of the climbing shoe and simplify the initial assembly.



The RCS Climbing Rail can be inclined 4° in forward as well as reverse directions in order to climb over wall offsets.



Articulated mounting of the climbing shoe in the RCS Wall Shoe, can be swivelled for use on circular buildings.

- Rail-guided, safe climbing procedure for wall formwork, working platforms and enclosures
- 125 mm hole arrangement in the rails for aligning the platforms to suit the height of the storey
- Building authority approved standard anchoring for walls and slabs; if required, also with a horizontally-arranged climbing rail for larger cantilevers
- Optional self-climbing in 50 cm increments with mobile self-climbing devices
- Compatible with components of the VARIOKIT Engineering Construction Kit



RCS MP Landing Platform

The flexible solution for moving loads by crane

The RCS MP Landing Platform serves to quickly and safely move formwork and materials to high-rise buildings. The platform with steel decking can be optionally anchored in the slab or clamped between two floors by means of MULTIPROP props. The continuous side protection, along with the additional scaffold tubes, also ensure safe working conditions when slab tables are attached.

Flexibly arranged and secured

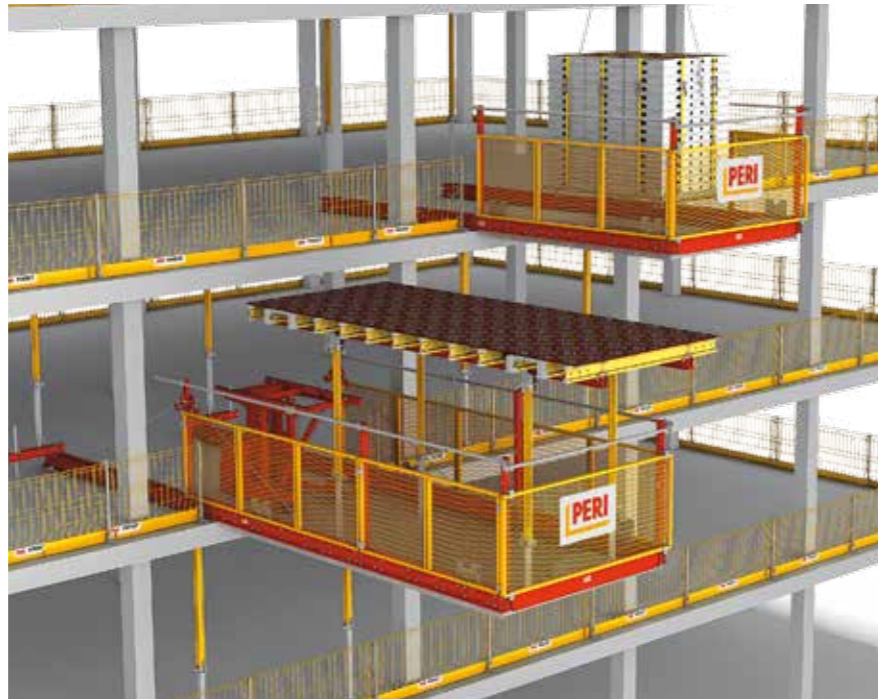
The platform can be positioned at any point on the building and is either anchored on the slab or securely clamped between two slabs

All-round safety

With non-slip checker plate flooring and continuous side protection on the platform provided by LPS mesh enclosures

Fast assembly

Delivery takes place pre-assembled, the mesh enclosures are easily inserted and secured with bolts



The RCS MP Platform complete with steel decking for moving materials is available as standard in two sizes.



The platforms can be stacked pre-assembled and space-savily transported. The guardrails are simply inserted on the construction site.

- RCS MP 375 Platform with a cantilever of 3.75 m for transporting slab props and panel slab formwork
- RCS MP 550 Platform with a cantilever of 5.50 m for transporting large-sized slab tables
- Anchoring the RCS Carrier Profile with climbing anchors or tied through the concrete by means of DW 15 tie rods; alternatively, clamping the Carrier Profiles between two slabs with MULTIPROP slab props
- Minimum clear width of 2.52 m; with the clamped version, the passage width can be extended to over 3.00 m through the arrangement of walers under the props

LPS Lightweight Climbing Enclosure

The protection system with lightweight mesh elements

The LPS with its mesh enclosure is the lightweight alternative to heavy, enclosed protection panel systems. Nevertheless, the system effectively seals off the inner areas against the effects of the wind; at the same time, it is light-permeable. LPS is used as a vertically continuous climbing protection panel; alternatively, an integrated working platform provides access to the slab stopend formwork. Rail-guided climbing ensures a safe and fast moving procedure.

Fast assembly

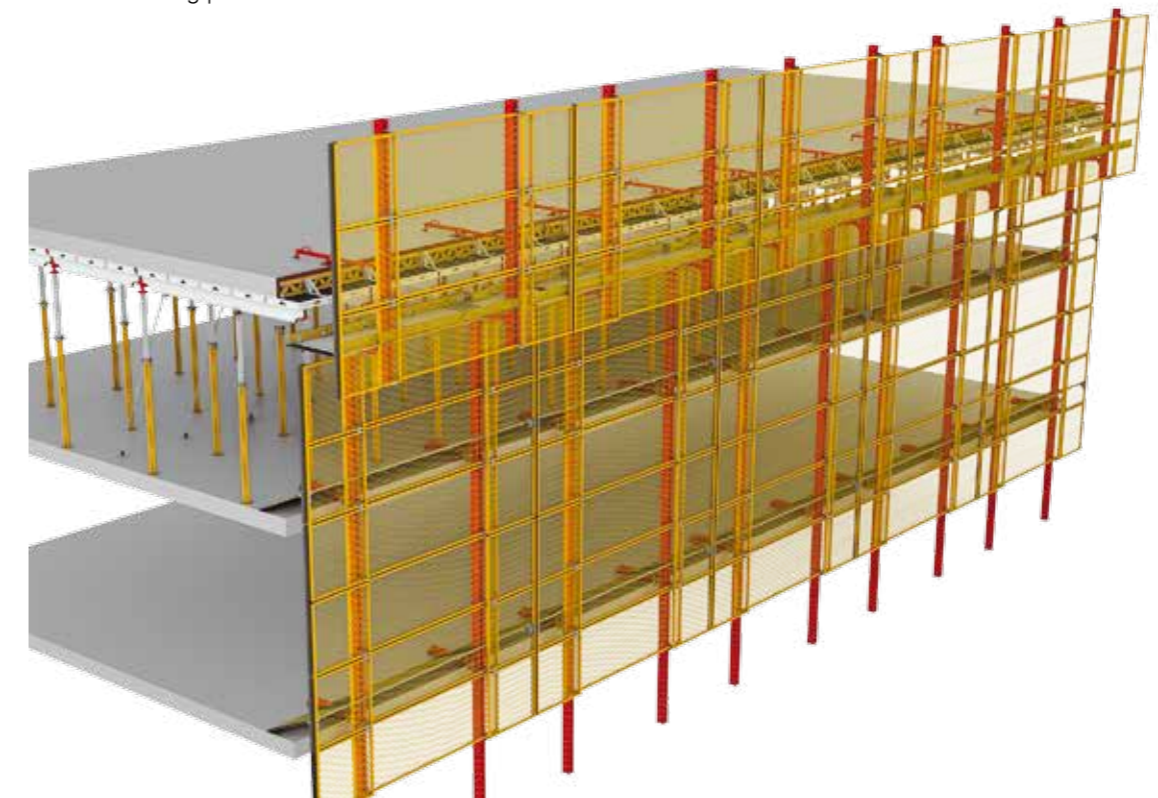
Mesh enclosure assembly without a crane in a very short time; alternatively, can also be delivered pre-assembled

Lightweight mesh panels

Reduced load on the building due to permeable structure; can therefore also be used for thinner slabs

Variable use

Can be used as protection panel as well as with supplementary working platforms; mesh panels can also be combined with RCS



- Lightweight enclosure with mesh panels, usable as a continuous straight assembly or alternatively with working platforms
- Mesh panels also with telescoping function for easy adjustment to accommodate complicated building shapes
- Rail-guided, safe climbing with crane or optional self-climbing with mobile hydraulics
- Alternatively, can also be used with the RCS Rail Climbing System
- Fast assembly by hand due to the low weights and simple clamping connection
- Adjustable slab shoe for mounting on the slab with variable cantilevers and extendable platforms
- As an option, can also be delivered pre-assembled



Safely moved upwards with hydraulic drive without a crane

The range of ACS self-climbing variants for facades, building cores, shaft structures as well as inclined bridge pylons make the construction of high concrete structures extremely fast, cost-effective and safe. The climbing units comprising wall formwork and platforms are moved from floor to floor by means of integrated hydraulic systems. The efficient sequence of operations facilitate a very high level of productivity and exceptionally short cycle times. Simultaneous climbing of several climbing units ensures fewer leading edges thus resulting in increased workplace safety.

Crane-independent, quick working operations

Shuttering, striking and hydraulic climbing in a very fast work rhythm

Weather-independent working

Comfortably-designed platforms with enclosures protect site personnel against wind and weather

Stable working platforms

Working platforms can accommodate high loads, e.g. arising from material storage or placing boom masts

■ **ACS R Self-Climbing System**

standard system with carriage and open formwork at the top for easy installation of the reinforcement

■ **ACS P Platform System**

for high-rise building cores constructed in advance and tower-like structures with generously-sized storage and working areas

■ **ACS G realization with Gallows**

for concreting walls and slabs in one pour or for circular structures; both formwork sides are attached to the cantilevered gallows

■ **ACS V adjustable version**

for inclined structures such as bridge pylons or piers, with platforms always in a horizontal position

■ **ACS S Shaft Formwork**

for stairways or small elevator shafts with a single climbing device positioned in the centre

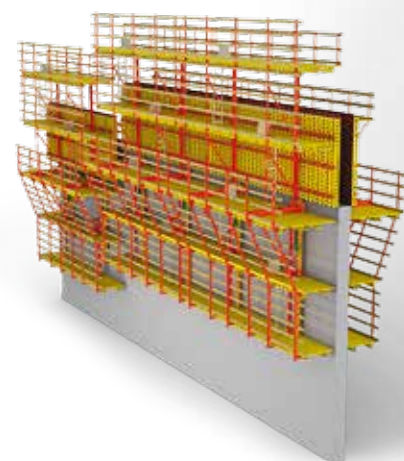
■ **ACS S Shaft Formwork**

for moving large-sized core formwork core including concrete placing boom and site equipment

ACS P – the solution for advancing cores of high-rise buildings and tower-like structures – combined with ACS G. Both formwork sides are movably attached to the cantilevered platform beams.



The Self-Climbing System ACS R with the one-sided reinforcement scaffold in advance.



For the external walls of this 47 m x 43 m building core, the ACS R variant provides the optimum solution.



With the ACS self-climbing technology, the concrete placing boom and suspended stair towers can also be moved upwards with any crane assistance.



For the construction of this 90 m high pylon, the RCS and ACS climbing systems were combined.



- Rail-guided, safe climbing procedure without a crane
- Climbing device with 100 kN lifting power
- Positively-driven and jerk-free climbing
- 0.4 m/min effective climbing speed
- Climbing can take place outside of normal working hours thanks to the almost silent climbing hydraulics
- Weather-independent working operations with enclosed working platforms
- Climbing shoes and anchor types optimized for project-specific factors such as building structure, load, wall thickness and required concrete strength
- Large climbing units reduce the number of lost anchor components



Civil Engineering Systems

for tunnel and bridge construction usually feature a combination of shoring and individually adapted formwork. The planning must include structural dimensions, construction method and the entire construction process.

In tunnel construction, the geology significantly determines the construction method as well as the construction procedure. This, in turn, determines the requirements for tunnel formwork. The shoring is usually executed in the form of a mobile formwork carriage.

For bridges, the geographical boundary conditions determine the construction procedure and thus the formwork solution. Realization of the superstructures can be carried out using shoring constructions, the incremental launching method, steel composite method, or

the balanced cantilever method. Parapets are subsequently concreted which have a technical protective function and form the architectural completion of the bridge superstructure.

Practical, sophisticated modular construction systems are designed to facilitate cost-effective solutions for the majority of all requirements in civil engineering. In the process, the focus is on a high proportion of rentable core and system components which cover the very wide range of applications used in tunnelling, bridges and general civil engineering.

The VARIOKIT Concept

Cost-effective realization of civil engineering solutions with the modular construction concept

VARIOKIT offers standardized components for a wide range of applications in civil engineering. The construction kit includes versatile core and supplementary system components with special functions. If required, specific special components are also designed. Due to the possibility of combining with PERI formwork and scaffolding systems, this results in customized, economical bridge and tunnel formwork as well as other civil engineering solutions.

Countless possibilities

Bridge, tunnel and civil engineering solutions with core and functional system components

Minimized assembly time

Fast working operations due to fitting pin connections and simple adaptation with spindles

Cost-effective solutions

High degree of efficiency due to rentable standard components and statically-optimized planning processes

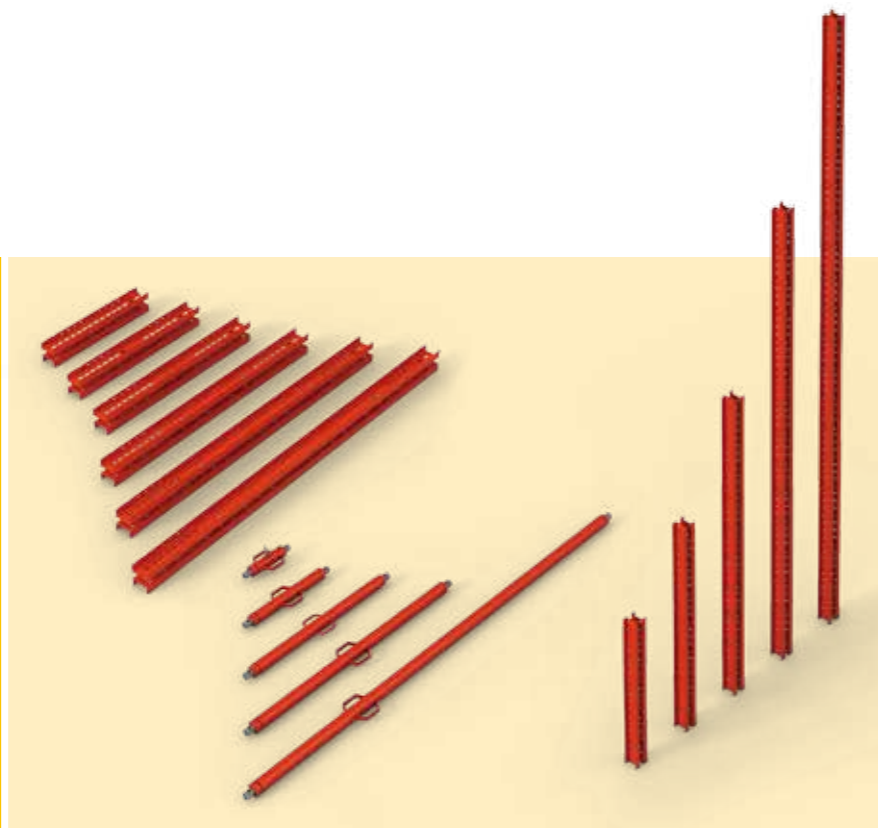


VARIOKIT solutions are typically comprised of 95 % rentable core and system components. In order to fulfil specific project requirements, only a few special components are needed.

Special components **System components**

5% 10% 85%

Core components
(SRU Steel Waler, SLS Heavy-Duty Spindles and RCS Climbing Rails in different lengths)



Support structures with VARIOKIT

For all geometries and all loads

With the VARIOKIT standard components, technically demanding trusses and load-bearing systems can be cost-effectively executed. In order to minimize on-site assembly times and maintain tight construction schedules,

PERI also provides – if required – pre-assembled units to the construction site. Being able to rent the components along with the assembly advantages makes VARIOKIT extremely economical especially with short utilisation times.



A customized unit and VARIOKIT heavy-duty shoring towers safely transfer the high loads of this over 4.00 m thick power station slab.

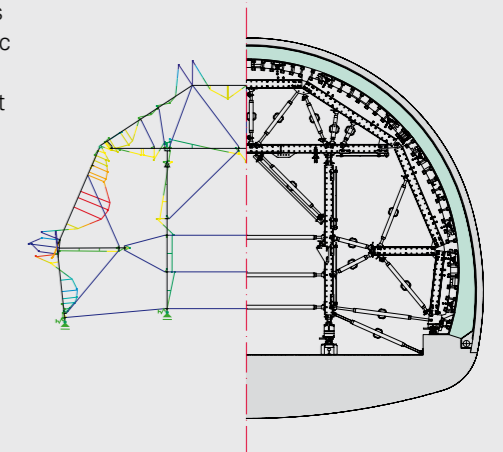


VARIOKIT components form the basis for the mobile, up to 90 t scaffold bracket for sand blasting and forming operations during a refurbishment project.

In addition to the required materials, PERI also provides a comprehensive range of expertise as well as the complete planning services from a single source.

PERI solutions take into account building and assembly processes along with the maximum functionality for the construction work. The planning focus is to ensure that the rentable core and system components are utilized as much as possible in order to provide the customer with the most economical solution.

The PERI service also includes the required technical documents such as assembly drawings, static calculations and instructions for use. Through the ongoing support provided for the customer – from the development of the most efficient formwork solution through to the processing of return deliveries – PERI supports the efficient realization of every civil engineering project.



The VARIOKIT Engineering Construction Kit

Project-specific solutions for tunnel construction

With VARIOKIT system components, cost-effective tunnel formwork carriages can be realized which are precisely adapted to meet the needs of the respective jobsite. Requirements such as drive-through openings for trucks or single-sided wall formwork are easily fulfilled. Additional components for lifting, lowering and moving are likewise available in the rentable PERI portfolio as are safe working platforms and access means. Required technical accessories, e.g. concrete pump connections, complement the VARIOKIT solutions.

■ **VTC Tunnel Formwork Carriage for the cut-and-cover method**
Solutions for the monolithic, semi-monolithic and separate casting methods

■ **VTC Tunnel Formwork Carriage when using mining techniques**
Solutions for the monolithic and separate casting methods

Continuously adaptable

Gridless, dimensionally-accurate formwork solutions for tunnel cross-sections of any form

Workload minimized

As an option, shuttering and striking, lifting and lowering as well as moving with hydraulic and electrical solutions

Save on reworking costs

High load-bearing steel walers reduce the number of anchors in the wall areas

- Standardized system components in the appropriate lengths for project-specific formwork carriage solutions
- Struts for continuously adjustable use from 4.00 m to 9.00 m
- Small number of type-tested connections with standardized loads per connection type
- Fast, site-compliant assembly
- Easy and simple modification procedure if changes are made to the tunnel cross-section
- Few anchors required in wall areas due to standard steel walers up to UU 200
- Optionally available hydraulic support for shuttering and striking as well as lifting and lowering
- Electrically-driven or mechanically-operated solutions for moving



Depending on requirements, components of other PERI systems supplement the VARIOKIT solution; with this formwork carriage, for example, HD 200 Heavy-Duty Props.



With this slab formwork carriage, a 3.00 m wide and 4.50 m high drive-through opening ensured unobstructed site traffic operations.



This tunnel formwork carriage on the basis of the VARIOKIT modular system is used for constructing the accessible cross passage between two tunnel tubes.

For moving the formwork carriage through a narrower cross-section, the formwork segments can be hydraulically folded.

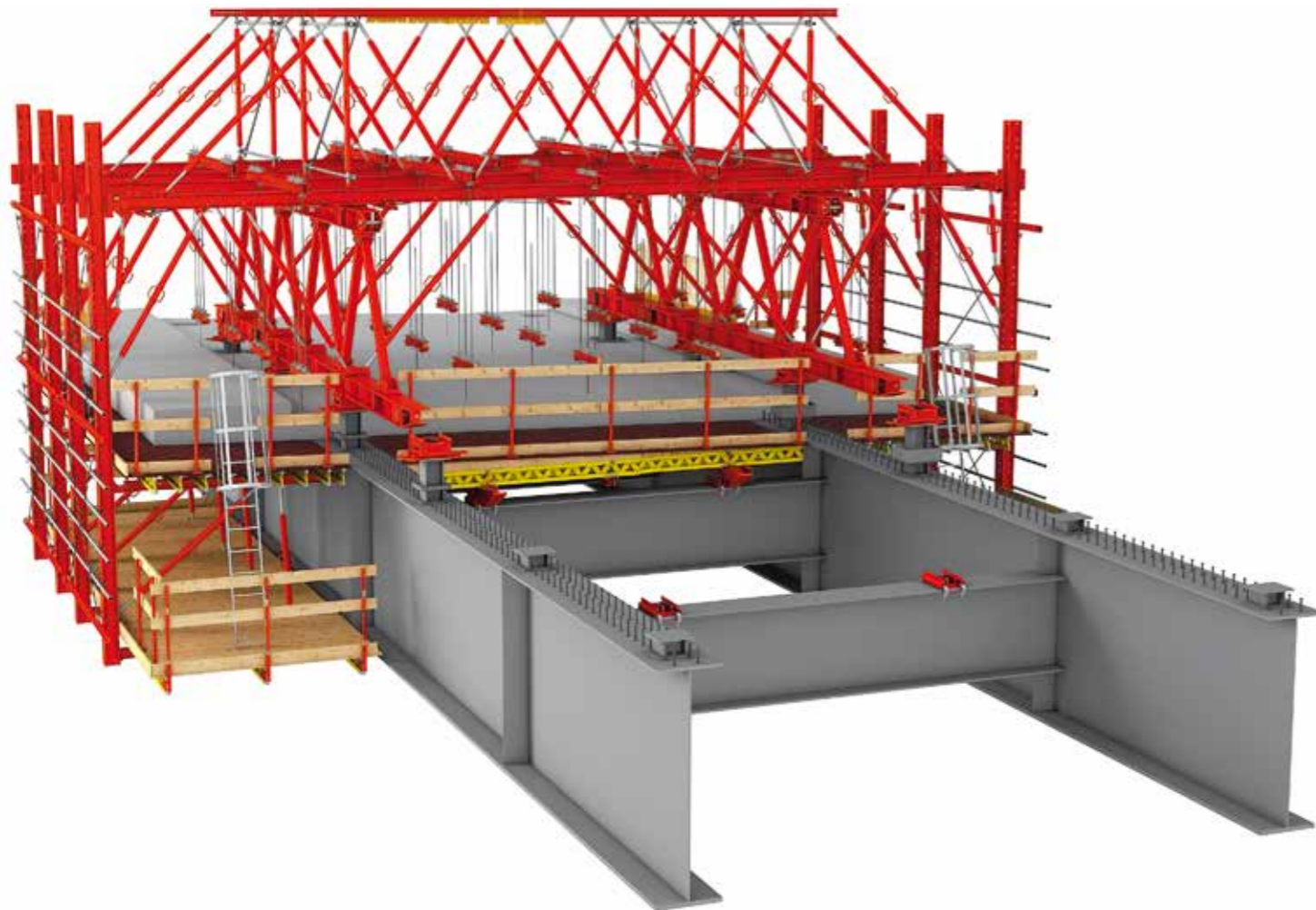


Concrete pump connections and vibrators are planned and supplied according to needs and requirements.



Up to 8 hydraulic cylinders can be connected to the rentable VARIOKIT hydraulic unit – quick and uncomplicated by means of quick release couplings.





The VARIOKIT Engineering Construction Kit includes suitable system solutions for bridge superstructures and cantilevered parapets. The portfolio ranges from lightweight brackets through to complete formwork carriage and equipment solutions.

Comprehensive range of applications

Versatile, rentable core and system components for superstructures and cantilevered parapets

Fast availability

The modularity of the construction kit system and the well-stocked PERI rental parks worldwide ensure short delivery times

Time-saving assembly

Fast assembly with standardized connections and fitting pins

- Standardized core and system components available in different lengths
- Standardized connection components
- Simple and easy on-site assembly
- Flexibly adaptable for different component dimensions as well as the arched shape of the superstructure
- Depending on the application, optional additional hydraulic or electrical components for accelerating the construction progress

■ VCC Composite Formwork Carriage

Formwork carriage used on the steel substructure for the construction of carriageway slabs with cantilevered slabs

■ VCB Cantilever Brackets

Scaffold-free cantilever formwork for steel composite and precast concrete bridges

■ VBC Balanced Cantilever Equipment

For section-by-section, symmetrical construction of the superstructure from the pier head; combination of a heavy frame for load transfer and system components for the realization of formwork, working scaffold and platforms

■ VGK Cantilevered Parapet Bracket

Lightweight bracket for refurbishment work as well as new construction for shorter bridges

■ VGB Parapet Track

For the construction and refurbishment of cantilevered parapets at the edge of bridges and between the superstructures

■ VGW Parapet Carriage

Movable carriage on the bridge superstructure which does not require any anchoring in the structure



This lock bridge is being constructed with 2 VARIOKIT Composite Formwork Carriages in 13 casting segments using the back-step construction method.



The Cantilever Bracket is used in steel composite or precast concrete bridges in order to concrete the edge areas of the bridge superstructure.



The Balanced Cantilever Equipment can be flexibly adapted to suit diverse superstructure geometries; traffic flow is not affected.



The VARIOKIT Cantilevered Parapet Bracket with a closed working platform is the ideal solution for refurbishment work and new construction.



The Cantilevered Parapet Track is secured to the underside of the bridge by means of rails and rollers. The bridge is freely accessible; the flow of traffic remains unaffected.



With the VARIOKIT Cantilevered Parapet Carriage, the horizontal loads are completely transferred via friction; anchoring is not required.

Heavy-Duty Trusses and Heavy-Duty Shoring Towers for high loads

With VARIOKIT core and system components, heavy-duty shoring towers and wide-span lattice girders can be systematically assembled. Also for other construction tasks where high loads are to be transferred, VARIOKIT is the optimal system. Providing the overall solution from one source ensures optimized processes during the course of the project. Through the connection possibilities for the PERI UP modular scaffold, secure access to all working areas as well as the required working surfaces is easily integrated.



VARIOKIT Heavy-Duty Shoring Towers as a temporary supporting structure during the assembly of a steel hall at an airport terminal.

These 23,60 m high heavy-duty shoring towers each carry loads of over 200t. 10 m high tower sections were pre-assembled which accelerated the construction process.

VARIOKIT Heavy-Duty Shoring Towers and Truss Girders serve as load-bearing falsework for the edge sections of a 412 m long motorway bridge.

Bolted connections reduce assembly time during installation. The centric bracing connection ensures a high load-bearing capacity.

VST Heavy-Duty Shoring Tower

Fast assembly

with bolted connections and pre-assembled tower segments up to 10 m

Simple height adjustment

through moving hydraulics with which the head spindle can be operated when under full load

Cost-effective solution

as all system components are available in the PERI rental parks



- For 4-legged towers, towers with additional legs, shoring tower frames, main beam frames and birdcage scaffolding
- For leg loads of up to 700 kN
- Standard applications up to 40 m high
- With the staggered lengths of the RCS Rails, two spacers along with the head spindle allow all heights to be continuously realized

VRB Heavy-Duty Truss Girder

Efficient use of materials

The high load-bearing capacity of the system components ensures optimized material utilization and thus cost minimization

Quick length adjustment

Simple adjustment of the truss lengths to suit changing span widths with a minimum of different frames

High degree of safety

Integrable solutions for working platforms and access means with the PERI UP modular scaffold



- Developed for spans up to 40 m and a permissible bending moment of 3000 kNm
- Through the combination of different frame lengths and the telescopic function of the support frame, all spans can be fully realized and any installation tolerances on the supports can be compensated



System-Independent Accessories

include a broad range of tools and equipment for carrying out daily activities. Often considered to be unimportant, these accessories play an important role on many construction sites. If the right equipment is not available, improvisation takes place – with all the disadvantages such as being time-consuming and inefficient, a risk of injury or poor execution results.

The proven formwork girders as well as practical stopend systems are examples of such products with which presumably secondary activities can be completed much faster. Temporary anti-fall protection for open slab edges along with pallets for tidily-arranged material storage additionally increase

safety levels. Furthermore, important for good execution results during reinforced concrete activities is the use of the correct formlining and appropriate release agent.

All accessories rely, in particular, on their quality which is put to the test in tough everyday use on the jobsite. New materials and production methods likewise lead to further developments such as innovative ideas for even easier handling.

GT 24 Formwork Girder

The versatile lattice girder with a high load-bearing capacity

The GT 24 Formwork Girder provides a high load-bearing capacity and rigidity. During use in wall, column and slab formwork systems as well as with special formwork, material requirements and workloads are reduced with the use of the GT 24 Formwork Girder.

High load-bearing capacity

with a 24 cm overall height and lattice construction for heavy loads and wide spans

Long-lasting durability

through its robust design and girder nodes with mini-dovetail jointing

Practice-oriented

through its proven design which simplifies the connection of site accessories



The struts penetrate the chords along the whole cross-section. There are no cavities which could collect and hold moisture. The girder nodes with mini-dovetail jointing guarantee the durability of the GT 24 lattice girder.



The Certificate of Conformity confirms that the GT 24 Formwork Girder corresponds to the technical rules of DIN EN 13377.



- Universal wooden formwork girder with a 24 cm overall height for wall, column and slab formwork, for setting of stopend formwork on slab edges and special applications
- 18 standard lengths from 0.90 m to 6.00 m in 30 cm increments; extra-long lengths up to 17.85 m on request
- Weight: 5.90 kg/m
- Permissible bearing force: 28.00 kN (at the nodes)
- Permissible bending moment: 7.00 kNm
- Bending stiffness: $EI_y = 887 \text{ kNm}^2$; $I_y = 8.064 \text{ cm}^4$



VT 20K Formwork Girder

The cost-effective solid web girder

The PERI VT 20K is the economical, 20 cm high solid web girder. Robust steel caps on the ends of the chords along with the concave web end provide the girder with reliable protection against damage. The 8 cm wide chords also provide sufficient width for plywood joints.

Robust

with steel caps on the chord ends and concave web ends

Site-compliant quality

with chords made of high-quality softwood and a highly compressed web board with a high proportion of synthetic resin

Cost-effective

particularly as a girder for use in slab formwork operations



The girder with a 20 cm overall height was developed specially for slab formwork operations. It can be used as a secondary and main beam.



Steel caps on the ends of the chords provide reliable protection against damage. Securing of the steel cap has been intentionally done in the unstressed area of the web.



The VT 20K girder also carries the mark of conformity – self and third-party monitoring are thus guaranteed.



- Universal wooden formwork girder with a 20 cm overall height, optimized for use in slab formwork operations, cost-effective use also for special solutions
- 11 lengths from 1.45 m to 5.90 m
- Weight: 5.90 kg/m
- Permissible bearing force: 22.00 kN
- Permissible bending moment: 5.00 kNm
- Bending stiffness: $EI_y = 460 \text{ kNm}^2$; $I_y = 4.181 \text{ cm}^4$



The safety system for temporary edge protection



PROKIT EP 110

The 1.10 m high, quickly assembled system provides anti-fall protection for open building edges. With posts and assembly feet as well as powder-coated side mesh barriers, flexible use is realizable without any extensive planning effort – also for complicated building geometries.

Technically sound

Reliable securing of open building edges on building shells (in accordance with DIN EN 13374 Class A) and on formwork systems (in accordance with DIN EN 12811)

Fast assembly

With a minimum of different, lightweight system components and self-securing posts

Flexibly mounted

Variable mounting possibilities to the building shell and PERI formwork systems

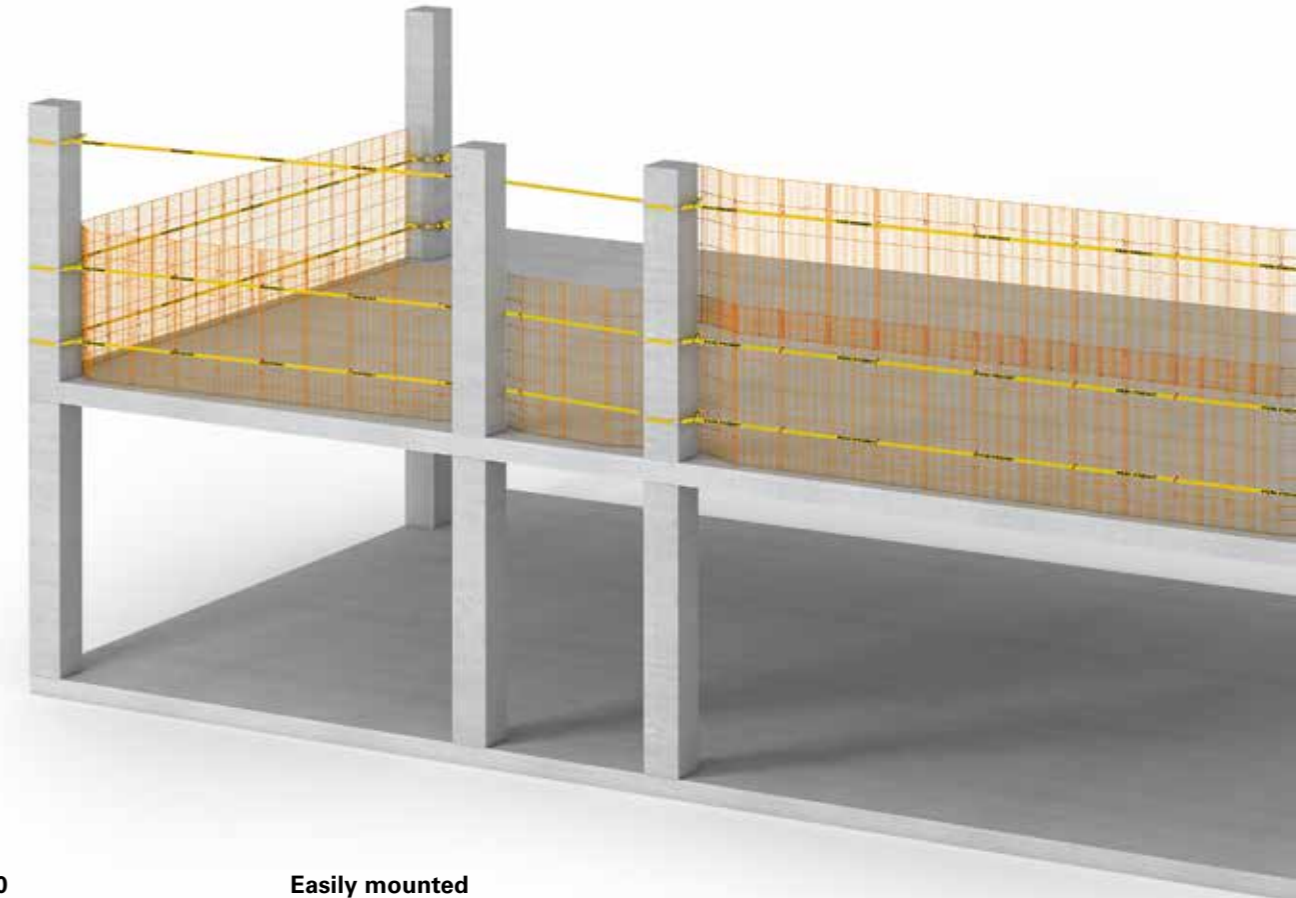
The PROKIT Side Mesh Barrier can be used with various PERI formwork systems, such as here with the VARIOKIT Parapet Bracket.



The Sheet Piling Clamp PSC allows quick and easy attachment of the Side Mesh Barrier to sheet piling and the Berlin-type pit lining.



- Temporary edge protection on open edges for walls and slabs in accordance with DIN EN 13374, Class A; can also be used on stairs with handrail boards
- Temporary side protection for PERI formwork and scaffolding systems in accordance with DIN EN 12811
- The 260 cm long side mesh barrier is ideal for open slab edges
- Side mesh barrier with lengths of 240 cm, 120 cm and 90 cm compatible with MAXIMO and TRIO panel formwork



PROKIT EP 200

The 200 cm high barrier is used for securing open edges on building shells. It provides large-area protection to prevent materials falling to the ground. The barriers are easily and securely mounted between the columns or bulkheads by means of tension belts.

Easily mounted

with tension belts and cable ties

Particularly high design

featuring a standard height of 2.00 m; with a third tension belt position, also available as floor height enclosure up to 3.90 m

The storey-high fall protection is fastened by means of tension straps to rising structural elements. The building remains undamaged.



The powder-coated mesh barrier can also be used as rear safety protection for climbing formwork.



- Protection against falling from open edges on building shells
- Verification of load capacity according to DIN EN 13374, Class A
- 66 cm wide, powder-coated folding barrier with a height of 2.00 m; can be used up to heights of 3.90 m through mesh barrier extensions
- Mounting with high-strength tension belts
- Can also be used as an additional side and rear protection on climbing systems
- With additional netting, optional use as dust protection

Construction Site Equipment

Stopend systems for slabs and bottom plates

With PERI stopend systems, the setting of stopends for slabs and bottom plates can be carried out quickly and reliably. The equipment can be used many times over and is extremely versatile. As a result, this stopend system is particularly cost-effective as well as being a lot safer than conventional solutions without system components.



For forming bottom slabs up to 60 cm thick, the Stopend Trestle is used; it is easily aligned by means of the adjustable strut and integrated clamping wedge.



With the plastic PERI Slab Stopend Angle, beams up to 60 cm high and slab edge stopends up to 40 cm can be formed. The Slab Stopend Angle is simply nailed to the wooden girders or formlining sheets.



With PERI Wall Clamps, small beams and up to 90 cm wide strip foundations can be realized. The Quick Jack Nut allows friction-locked fine adjustment.



The Formwork Bracket-2 is used for forming cantilevers of up to 45 cm with slab thicknesses reaching 30 cm.

Pallets and Crate Pallets

For safe transportation and optimized storage

System-Independent Accessories

PERI offers a wide range of robust, reusable transportation containers for ensuring cost-effective transport of materials. This includes system-free pallets as well as wire crates and hardware boxes in different sizes. In addition, the product spectrum includes system-related pallets and stacking devices – all specially developed transport aids for PERI system components.

All transportation containers and pallets facilitate orderly material storage and space-saving stacking. Further advantages are fast and convenient access to materials and, in particular, safe transport with the forklift or crane.



For fast and safe transportation with the forklift, PERI pallets are placed on top of each other.



With the easy to use pallet wheels, materials can be quickly moved by hand to the next place of use.



Galvanized crate pallets with covers are used for stacking and transporting various formwork and scaffolding components.

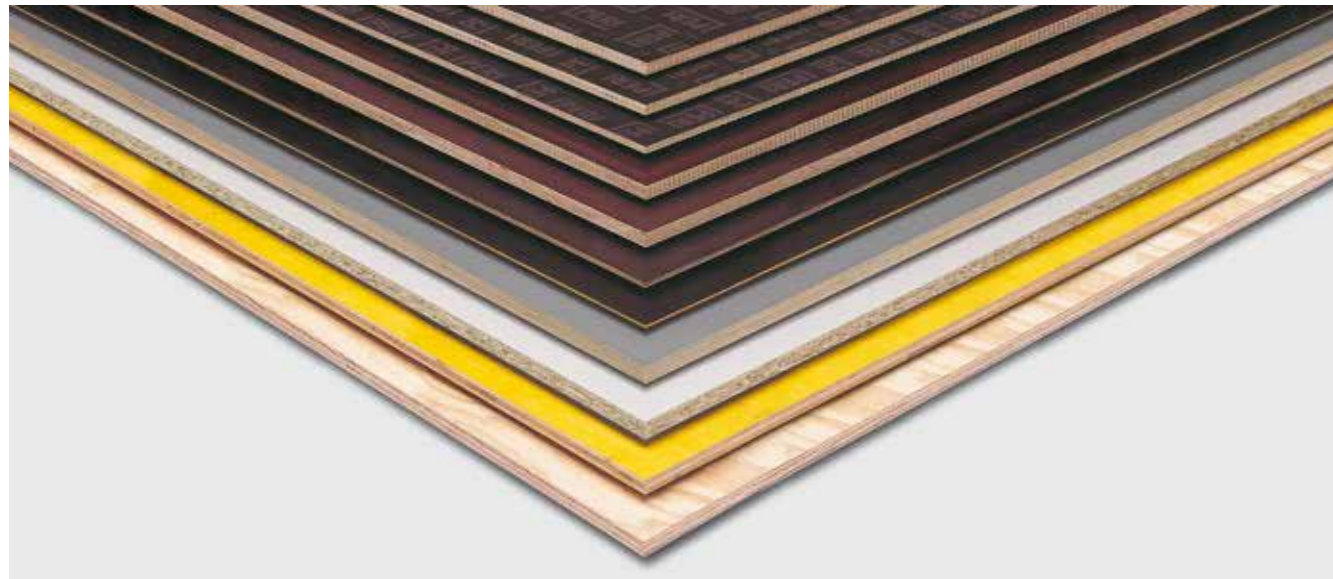


The hardware box is available in a galvanized or painted version. Among other things, it is ideally suited to store formwork ties.

Plywood Formlining

The right formliner for every requirement

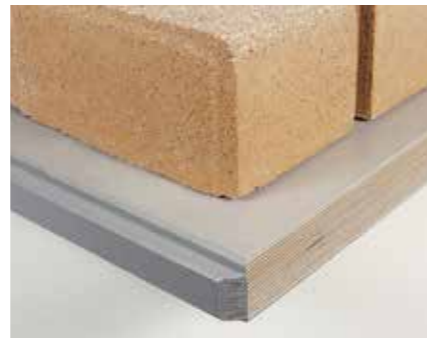
PERI offers a comprehensive range of formlining sheets in various dimensions and qualities to suit all requirements. On request, numerous other products and formats as well as plywood cut exactly according to needs and wood-based materials are available.



For architectural concrete surfaces, the PERI plywood programme offers high-quality, film-coated plywood sheets.



Individually tailored plywood sheets are accurately produced using modern CNC equipment.



PERI Pave is the production pallet used in the manufacture of concrete paving products. The coated plywood sheeting ensures uniform concrete compaction.

- PERI FinPly | PERI FinPly Maxi | PERI RusPly: coated plywood for fulfilling very high requirements and demanding concrete surfaces; consisting of cross-bonded birch veneers with reinforced phenolic resin on both sides
- PERI Spruce: coated plywood for a smooth concrete finish with a lightly structured appearance; 7-veneer composition comprised of Nordic coniferous wood with phenolic resin on both sides
- 3-Ply Plywood: large-sized sheets for concrete surfaces with high requirements and a slight timber finish in the concrete

PERI Clean, PERI Bio Clean and PERI Plasto Clean

Concrete release agent for all formwork and equipment

PERI release agent is a fluid, chemical-physical concrete release agent for all commercially available formwork and construction equipment. PERI Clean and PERI Bio Clean are used for absorbent as well as non-absorbent formwork sheets (e.g. boards, large-sized coated plywood, steel). PERI Bio Clean is a biologically degradable agent in accordance with OECD Guideline 301c. PERI Plasto Clean has been developed especially for plywood with plastic surfaces.



- PERI Clean and PERI Plasto Clean are manufactured on a mineral oil basis
- PERI release agent is solvent-free
- Creeping oil properties regenerate resinous formwork surfaces
- PERI release agent protects construction equipment and machines against rust



PERI Services

ensure that all processes related to formwork and scaffolding technology are optimized and, in so doing, significantly enhance the cost-effectiveness of the project implementation. In accordance with specific customer requirements, PERI provides comprehensive support by means of extensive, international project experience, vast range of specialist knowledge and highly trained experts, corresponding modern mechanical equipment and assembly halls as well as matching software solutions.

PERI's application technology analyzes the specific project requirements and then plans the most suitable, technically mature formwork and/or scaffolding solution. Specially designed PERI software solutions optimally support the planning activities with 3D representa-

tions and supplementary 5D information. The provision of materials from the PERI rental park, user training on the correct use of materials and the continuous optimization of on-site material requirements ensure maximum efficiency in the execution. Parallel to this, PERI supports commercially-related tasks, among other things, by providing important data and evaluations in the myPERI online portal.

Last but not least, the professional PERI cleaning and repair services ensure that the material and execution quality is maintained over the long-term.

Individual planning and advice from formwork experts, customized solutions from scaffolding specialists



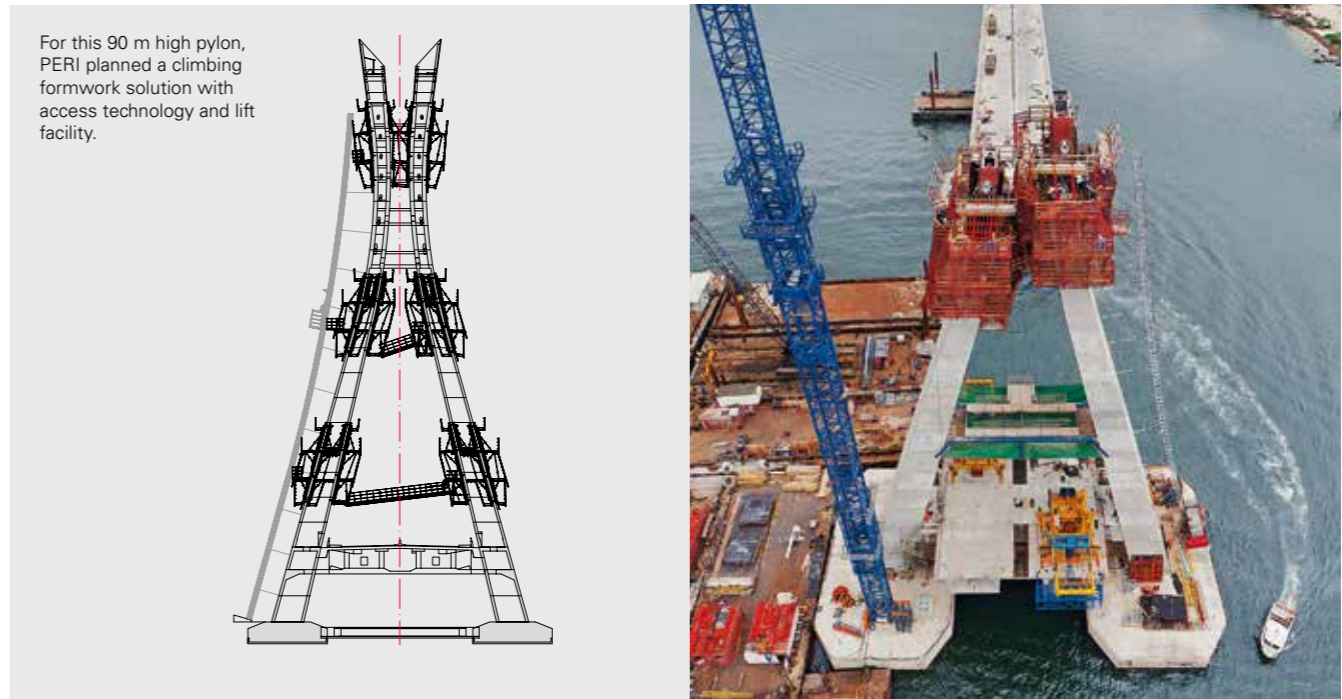
Over 1,200 PERI engineers at around 180 locations worldwide plan and calculate technically and cost-effectively optimized formwork and scaffolding solutions often already during the contract award phase. The detailed plans and exact parts lists simplify the calculation process as well as the job preparation, and increases cost certainty during the execution. The project-specific assembly plans comprehensively support the correct installation on site. In addition, PERI carries out the project-related structural calculations and, if necessary, also as verifiable static calculations.

Optimized solutions
with project-specific formwork and scaffolding planning including site-compliant drawings and parts lists

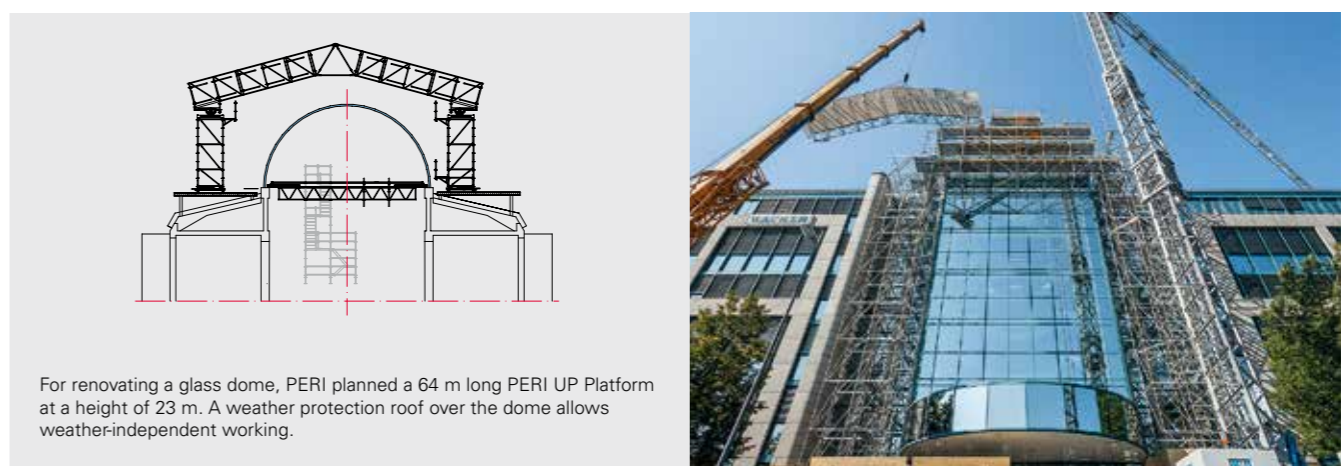
No interface-related loss
through continuous project support and technical advice from a PERI specialist - if required, also directly on the jobsite

Planning reliability
through regulation-compliant or verifiable static calculations

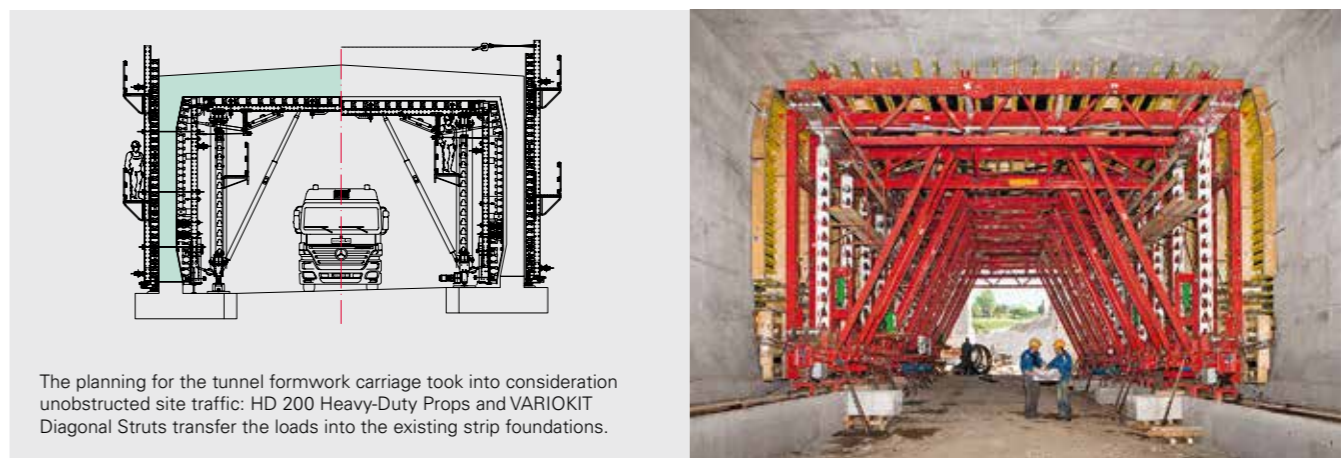
- 2D and 3D planning: ground plans, sections and details for cost-effective, safe and correct use of PERI products and systems on the construction site
- Operational and cycle planning: drawings for standard and special uses including the mapping of the processes; concrete cycle planning for optimal utilization of the products used
- Assembly plans: project-specific planning for supporting the professional assembly of special solutions
- Informal structural calculations: project-related static for a stable and reliable planning process
- Verifiable static calculations: static proof of a formwork and scaffolding construction for distribution to an external inspection engineer



For this 90 m high pylon, PERI planned a climbing formwork solution with access technology and lift facility.



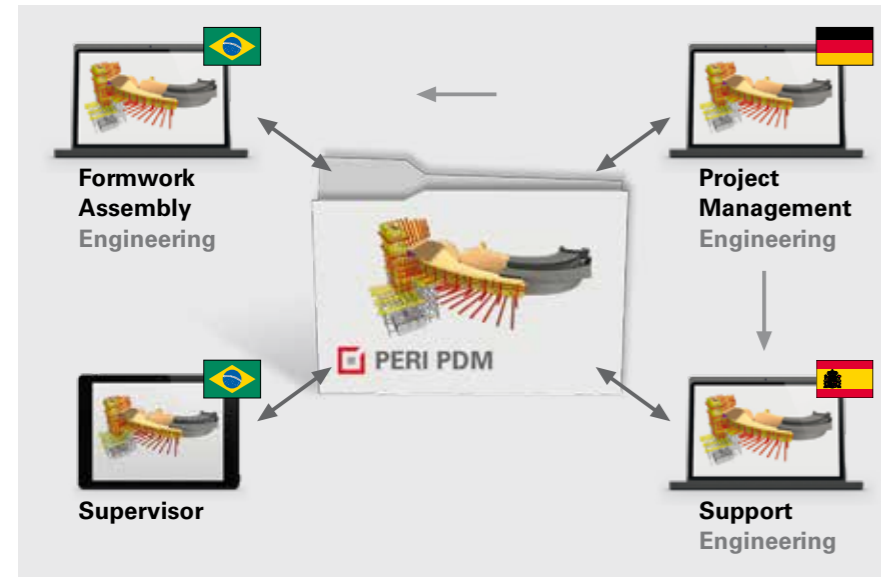
For renovating a glass dome, PERI planned a 64 m long PERI UP Platform at a height of 23 m. A weather protection roof over the dome allows weather-independent working.



The planning for the tunnel formwork carriage took into consideration unobstructed site traffic: HD 200 Heavy-Duty Props and VARIOKIT Diagonal Struts transfer the loads into the existing strip foundations.

Building Information Modeling (BIM)

Planning and management of construction processes in 5 dimensions



Worldwide, PERI uses the specially-developed PDM database for its project planning. All staff members have access at any time to the latest drawings and all project information.

PERI supports the BIM process and integrated process data for formwork and scaffolding technology in corresponding digital database systems. Among other things, the 3-dimensional visualization of the planning is linked to the dimension of time via the cycle planning. Additional process data such as any required plan changes are documented and tracked in a mobile building information administration option.

The cloud-based reporting features facilitate construction site and company-wide cooperation. The objective is the complete integration of formwork and scaffolding solutions in future BIM simulations. Thus, various alternative courses of action should be evaluated regarding their impact on costs, scheduling and quality in the early stages of the project as well as changes in the project itself being effectively pursued.

Improving the construction process through 3-dimensional visualizations and animated process simulations before starting the project

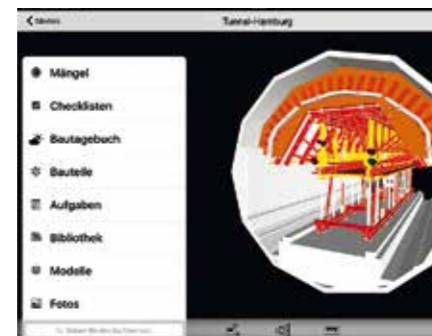
Efficient execution of construction work and cost transparency through optimized work preparation and the integration of additional process data

Coordinated processes resolved uniformly – from the CAD design and all change processes through to putting into operation

From the drawing board to BIM: the BIM process has changed the working methods of all project participants and leads to a closely networked cooperation.



In comprehensive databases, a construction diary can be set up, among other things, whereby all parties can track and document the planning process.



Current construction information management systems provide constant access to up-to-date project figures in real time; this accelerates the coordination in the construction process.



CNC cutting and formwork assembly

From cut-to-size plywood panels through to 3D elements – customized for every project requirement

PERI produces cut-to-size plywood panels and special formwork of all kinds – from simple formats and box outs to 3D formwork units for once-only applications. All customized elements are produced in the clearly defined quality and appropriate for the planned number of uses

Perfectly assembled for the individual component or structural shapes

With high quality executed by well-trained skilled staff in modern prefabrication facilities using the very latest machine technology

Just-in-time deliveries assembled and delivered to the construction site on-time according to the construction progress



- CNC cut-to-size plywood panels in any geometric shape
- Formwork units made of panel materials according to customer requirements
- Straight or curved VARIO special formwork
- Wall, slab and bottom slab recess units
- 2D or 3D additional infill spaces as well as complex formwork units according to individual requirements regarding shape, type of formlining and planned number of uses

Realization of the 3D formwork units is planned with PERI CAD. This results in CNC data and assembly plans for the formwork assembly.



PERI formwork assembly produces dimensionally accurate freeform formwork – precisely tailored to meet the project-specific requirements.



Rental Parks and Distribution

The best material in the right quantity, at the right time, in the right place

Through the renting of materials, peak requirements can be cost-effectively covered. In addition, renting the appropriate system equipment is the most suitable option for out-of-the-ordinary applications. Worldwide PERI has more than 120 logistics locations with large inventories and a consistently high level of material quality. Through an organized exchange of materials between the PERI rental parks, very large quantities of materials can also be made available for exceptional orders. As a result, PERI eliminates the capacity utilization risk for the building contractors.

Reduced capital and financing needs as the customer's own investment for materials and yard are lower or not necessary

Optimal material availability through a large, international rental equipment park network which is consistent with state-of-the-art technology

Uninterrupted construction sequences due to the flexible reaction times of the PERI rental parks



- Provision of formwork and scaffolding materials; management of required storage areas
- Logistical and commercial order processing
- Repair of normal material wear especially formlining replacement
- Assumption of the innovation risk in the rental equipment park by PERI

For rental orders, PERI employees ensure the best-possible order processing in close cooperation with the customers.



Delivery to the construction site is carried out just-in-time and reliably from more than 120 logistics sites worldwide.



The processes required for return deliveries are clearly defined. The continuous and complete documentation provides the customer with a high level of transparency.



Cleaning and repairs

Professional maintenance operations for high material and execution quality

Due to the high demands placed on formwork materials, regular maintenance is essential for ensuring good execution results. PERI provides professional cleaning and repair of customer materials at many locations worldwide thus safeguarding the upkeep of the material inventory over a long period.

Individually coordinated
Definition of the required services according to the state of the materials with the PERI experts

Professional repair service
Well-trained expert personnel and modern plant technology ensure the best results

Fast processing
Rapid processing and return deliveries thanks to PERI's network of service centres



- Scope of cleaning services: mechanical cleaning, removing concrete from plugged tie points and other holes, repairs to the formlining
- Scope of "small" service: individual coordination of the scope of service, exchange of formliner, cleaning of the bearing surfaces, installation of formliner with permanent elastic joints
- Scope of "large" Service – "small" repair service as well as additional frame repairs, sandblasting, application of original PERI powder coating

The PERI cleaning and repair service ensures optimal material characteristics according to defined quality criteria.



Smaller areas of damage to the formlining, mostly caused by concrete vibrators, are repaired with repair veneers.



If required, a general overhaul including new powder coating can be carried out.



Field Service

Professional on-site support by supervisors and project managers

Construction teams are provided with comprehensive on-site support by PERI supervisors to ensure efficient use of PERI system equipment from the beginning onwards. If required, a PERI project manager can also be appointed for large jobsites who helps, in close coordination with the site management, to continually adapt the amount of materials to the actual construction progress. The project manager thereby helps to further optimize material requirements and costs throughout the construction sequence.

Professional on-site briefings
through experienced PERI supervisors

Increasing the cost-efficiency
by means of individual on-site project management

Continuous control option
through target/actual performance comparisons for the continuous monitoring of material, time and costs

Transparency and planning reliability
thanks to site-compliant and comprehensible methods of payments



PERI supervisor

- Briefings for the operation and handling of PERI formwork and scaffolding systems
- Explanation of plans and parts lists
- Information on the maintenance, cleaning and storage of PERI formwork and scaffolding systems

PERI project manager

- Planning, delivery and management of cost-effective material use
- Organization and coordination of the formwork and scaffolding planning
- Supervising the on-schedule provision of materials
- Coordinating the movement of materials on the construction site
- Organizing the return delivery processes
- Compiling key figure reports on a weekly and monthly basis

myPERI Online Portal

Faster and easier access to project data around the clock

myPERI provides access to important construction site information on PERI formwork and scaffolding technology. For every project, a wide range of data and evaluations is available around the clock. Detailed lists of delivered quantities as well as return deliveries provide information, for example, on current material levels. Furthermore, myPERI has many other useful features such as the retrieval of illustrated return delivery notes and technical drawings. Comprehensive product information on PERI systems is available for download.

Provides an overview
Project data, materials and costs available at a glance with the help of clearly presented reports

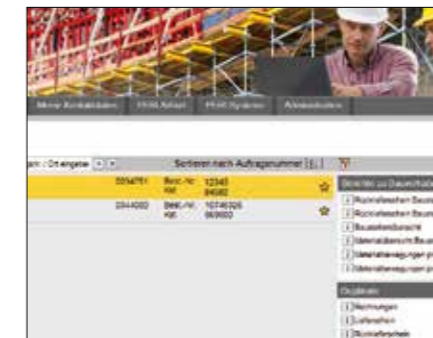
Saves time
Bundled information, useful working aids and templates for different project phases by means of a simple mouse click

Regularly updated
All information is always up-to-date



The online portal provides access to important project data of PERI construction sites – 24 hours a day, 7 days a week, 365 days a year.

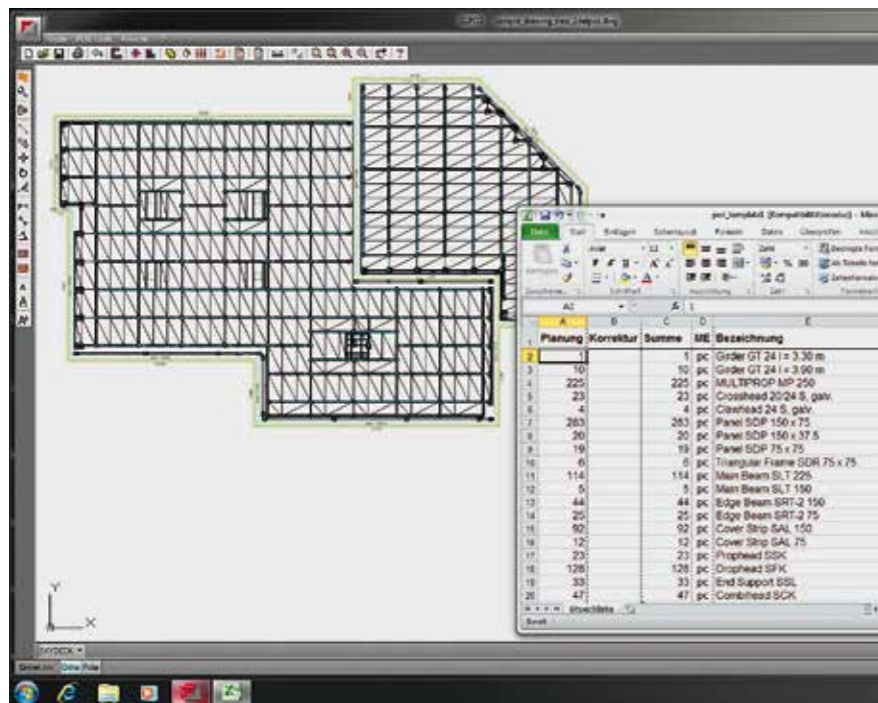
In myPERI, a wide range of technical documents is available – in PDF Format – files that can be directly and quickly downloaded.



- Reports on construction site controlling
- Return delivery notes complete with images
- Crucial reports as PDF and Excel documents
- Retrieval possibility of technical drawings
- Download copies of invoices, delivery notes and return delivery notes
- Download product brochures as well as Instructions for Assembly and Use
- Individually configurable access authorization

PERI ELPOS Software

The fast and simple software for daily formwork planning



- Quick and easy digital assistance for daily formwork and scaffolding planning with PERI systems
- Users only need basic computer skills
- Automatic support for PERI standard systems and basic functions for manual adjustments

With ELPOS, planning the use of PERI formwork and scaffolding systems can be carried out quickly and easily. Without any CAD knowledge, plans for simple basements or multi-storey buildings can be drawn up as well as the creation of practice-oriented drawings and project-related parts lists.

Less time required
through automatism and an electronic component catalogue

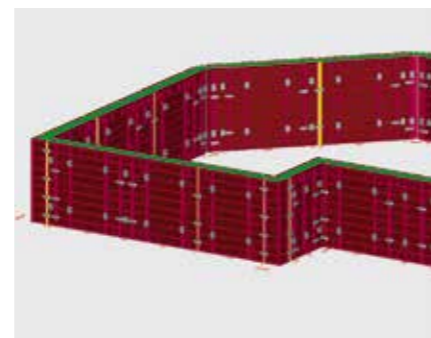
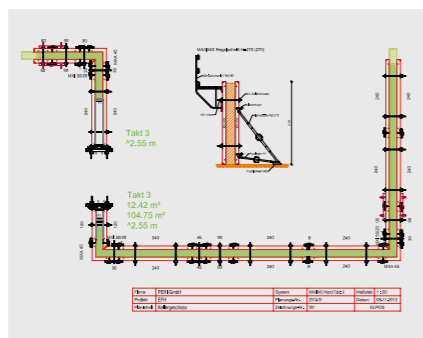
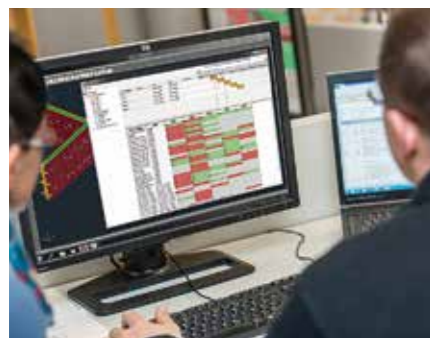
Optimized material utilization
through project-related adaption of material requirements to match cycle implementation

Safe execution
with easy-to-understand plans

After the planning and concreting cycles, ELPOS determines the maximum parts lists. The customer's own inventory can be entered into the system and is taken into consideration.

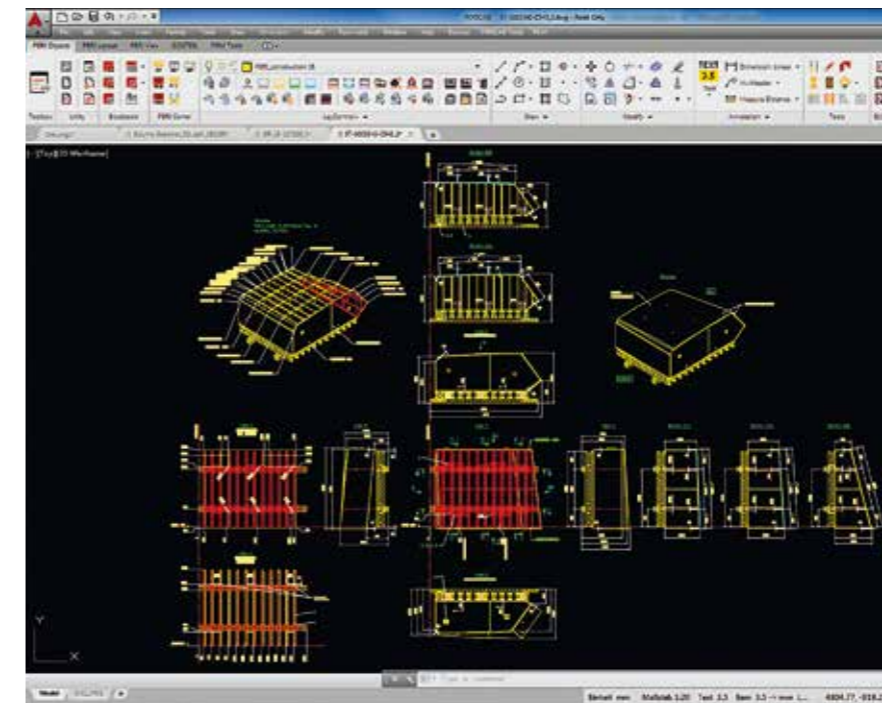
This extract from the ELPOS planning, illustrates the practical, easy-to-understand presentation on the drawings.

Planning with ELPOS is simple and fast; CAD knowledge is not required. Results also include 3-dimensional presentations.



PERI CAD Software

The CAD program for professional work preparation



- CAD solution for professional formwork and scaffolding planning by experienced CAD users
- AutoCAD Architecture-based application
- With diverse PERI tools for the planning of PERI formwork and scaffolding systems

PERI CAD is the ideal professional tool for the experienced CAD user in the work preparation. The software is used for a wide range of tasks in formwork and scaffolding planning – from simple ground plans with standard systems through to solutions for complex civil engineering structures.

Detailed planning
for simple and complex structures

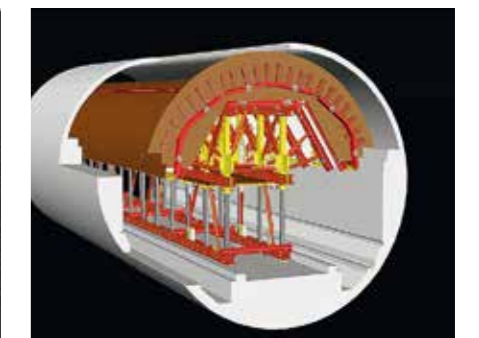
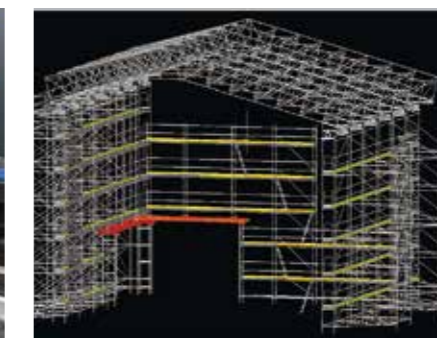
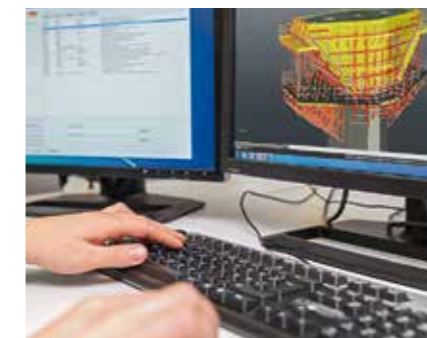
Clear presentation
with clearly-arranged and detailed plans thanks to the 3D elaborations and visualizations

Reduced costs
through the accurate planning of quantities and optimized construction sequences

With PERI CAD, all types of formwork can be depicted. Planning is carried out in 2D or also in 3D for complicated designs.

With PERI CAD, scaffolding solutions can also be planned – from simple facade scaffolds through to complex service scaffolding such as this weather protection roof.

PERI CAD formwork solution for tunnel construction; the image shows an extract taken from a 3-dimensional planning.





- 172 **Housing & Multi-Storey Projects**
- 184 **Skyscrapers and Towers**
- 210 **Cultural Buildings**
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- 268 **Water Retaining Structures**
- 282 **Industrial Structures**
- 294 **Building Redevelopment**

The following reference projects highlight the problem-solving expertise of PERI engineers worldwide. Specific execution examples from 2013, 2014 and 2015 could serve as a source of ideas for project implementation.



Housing & Multi-Storey Projects

are construction projects for realizing single and multiple family homes through to a modern shopping centres.

As a rule, multi-storey constructions are characterized by medium-sized down to smaller room units. For walls, columns as well as slabs, the concrete construction fulfils all requirements regarding functionality, cost-effectiveness and design. The slab construction and realization in particular play an important role. In residential construction, basement walls and floor slabs are usually cast in-situ – with individual building forms. Also in living areas, concrete is increasingly being used as a modern design element, very often combined with high architectural concrete requirements.



PROKIT provided gap-free enclosure of the building shell slab edges, including the transition area to the cantilevered-mounted RCS MP Landing Platform.



VARIODECK and PROKIT guaranteed a high level of safety during construction of the residential towers complete with triangular oriels.



The VARIODECK Edge Tables were moved as large-sized units including guardrails with the help of the PERI Transportation Fork.

Safety had the highest priority for the construction of this inner-city residential and business complex. Large-sized VARIODECK Edge Tables and PROKIT Edge Protection ensured safe and efficient work operations without any additional facade scaffolding.

The building complex with 260 apartments as well as office and hotel units is characterized by two 16-storey residential towers, each 53 meters high. The ostensibly irregularly-arranged, triangular oriels determine the external facade of the two residential towers.

The PERI Slab Table solution with generously-dimensioned, 6 m long VARIODECK Edge Tables took into account the construction of the up to 1.20 m cantilevered storey slabs. The system-integrated side protection ensured safe working conditions at all times. Additional facade scaffold was not required because the subsequently mounted PROKIT Edge Protection secured the slab edges of the complet-

ed floors in the building shell. The reinforced concrete slabs of the office and hotel building along with the basement levels were formed with SKYDECK.

MAXIMO and QUATTRO guaranteed short construction times for both walls and columns. For forming the walls, the use of the MX Tie Technology in the MAXIMO Panel Formwork – with ties inserted from one side only – meant spacer tubes and cones were not necessary, and thus required no extra man on the opposite side. QUATTRO Column Formwork guaranteed safe working conditions and crane time-savings. It could be moved as a complete unit including the push-pull props, platform and ladder access.

Contractor
Hochtief Building GmbH, Munich
Client/Project Development
LBBW Property Group, UBM Development AG,
Office Center Hirschgarten GmbH & Co KG
Field Service
PERI GmbH Germany, Munich



Tobias Knappe
Site Manager

“Workplace safety has always had the highest priority for us. Thus, the VARIODECK Edge Tables, including the anti-fall protection, as well as the PROKIT Edge Protection was a safe solution for all site personnel involved in the construction work, and also led to a positive overall impression of the jobsite. And with the one-sided MAXIMO tie operations, we could realize the bulk of the reinforced concrete walls in a short construction period.”



Saglemi Housing Project, Prampram, Ghana

Monolithic residential construction in 3-day cycles



Over 500 complete floors were completed with the UNO Housing Formwork using a monolithic construction method.

Formwork planning and fabrication was carried out individually, always adapted to match the respective building geometry. Window and door openings as well as the beams were also integrated in the PERI solution.



Contractor
 Constructora OAS Ghana Ltd
Field Service
 PERIcofragens, Lda. Portugal, Queijas



Fabio Luis Toldo
 Project Manager

“We opted for the UNO Formwork because the system is simple to use and very user-friendly. After a very short time, the floors could be concreted in regular 3-day cycles; as a result, we are able to stay ahead of the originally planned monthly schedule.”

In Ghana, affordable housing was realized in a very short period of time by means of the monolithic construction method with the UNO Housing Formwork system.

The Saglemi Housing Project includes the realization of around 5,000 residential units. In the first phase of construction, 180 apartment blocks comprised of over 1,500 flats were built within a very short time. Each of the 3-storey structures features 6 to 9 apartments, with 40 m² up to 85 m² living space respectively.

The buildings were largely constructed using the monolithic cast-in-situ method, i.e. a complete floor with 12 cm thick concrete walls and slabs concreted in one pour. For this, PERI provided the best solution with UNO Housing Formwork as the project-based prefabricated aluminum panels were easy and simple to install, and without the use of a crane. For connecting the elements with the UNO Wall Wedge Coupler as well as anchoring, a hammer and wrench SW19 were sufficient; in addition, the UNO tie technology features single-sided operations. After

hardening, first the walls were stripped followed by the slabs.

Altogether, 6 UNO formwork sets were in use in daily jobsite operations, designed for 3 different ground plan versions. After a short familiarization period, the construction crews achieved a regular 3-day cycle which meant 2 complete floors could be concreted every day.

The lightweight UNO elements together with only a minimum of different individual components simplified the handling and logistics.

The monolithic construction method with the UNO Housing Formwork allows the industrialized production of the building shell. Installation work takes place simultaneously with the installation of the reinforcement.

The support provided by the PERI specialists shortened the familiarization phase and accelerated the construction sequence.



Sasol Administration Building, Johannesburg, South Africa

Over 200.000 m² floor slabs brought into shape



Timothy Rowbottom
Contract Manager

“SKYDECK effectively addresses the issues of time, quality and cost. It is extremely versatile and can be adapted to accommodate just about any decking issue.”



The slabs were formed with the help of the SKYDECK system in rapid cycle sequences.



In spite of the complex building geometry, work could be carried out to a large extent with system formwork.



On the building corners, individually planned slab tables supplemented the cantilevered-mounted SKYDECK edge solution.

An extraordinary glass facade encloses the new Sasol company headquarters. With the help of SKYDECK, a 202.000 m² slab area was formed and brought into shaped.

Sandton is the financial and business centre of Johannesburg. It is here that Sasol, the international oil and chemical giant, chose to build their new headquarters. The futuristically designed building provides a state-of-the art working environment for around 7.000 employees, featuring seven basement levels of 114.000 m² and ten upper levels of 88.000 m². The different areas are grouped around a central core and connected to each other by means of bridges.

The floor slabs were formed with the SKYDECK Panel Slab Formwork in rapid cycle sequences. Furthermore, both time and costs could be saved by means of the systematic assembly sequence and lightweight elements while dealing with the challenging building geometry. SKYDECK platforms on cantilevered-mounted SLT 375 Main Beams ensured safe working conditions at the slab edges. Closing the infill areas of the partly inclined columns was also carried out with system components. In the area of the building's acute-angled corners, project-specific slab tables were used with great success.

In addition to detailed formwork planning for the floor slabs, which was individually tailored for each level, implementation solutions for the bridge constructions were also designed. MULTIPROP and PEP Slab Props served as the load-bearing system which could be connected by means of frames to form shoring towers. On the occasion of this major building project with a total construction period of almost 3 years, the contractor extended his existing TRIO portfolio with the SKYDECK system. By precisely matching material deliveries from the PERI rental park to suit the construction process, the on-site material requirements could be easily adapted and effectively managed the peak demands.

The new Sasol headquarters has seven basement and ten upper floors with a total of 202.000 m².



The administration building is characterized by obliquely-arranged building structure and cantilevered slabs.



Contractor
Aveng Grinaker-LTA
Field Service
PERI Formwork Scaffolding (Pty) Ltd,
Midrand, South Africa



“villanova” Residential Complex, Vienna-Schwechat, Austria

MAXIMO and SKYDECK set a fast pace



For forming the reinforced concrete columns, SRS Circular Steel Column Formwork was used – partly in combination with MAXIMO elements.

MAXIMO 270 and MAXIMO 330 complemented each other perfectly and, thanks to the MX Tie Technology, provided time-saving operations from one side.

The systematic assembly sequence along with the low individual weights of the SKYDECK accelerated the construction progress.



Karl Derler
Supervisor

“With MAXIMO and SKYDECK, we chose the right systems for this construction project. Through our collaborative efforts, we were able to maintain the tight schedule for the shell and saved on additional costs.”

Contractor
Swietelsky Baugesellschaft m.b.H.,
Hochbau Ost, Grp. Nußdorf o. d. Traisen
Field Service
PERI Austria, Nußdorf

Using the MAXIMO Panel Formwork and SKYDECK Slab Formwork, the shell construction was completed in only 12 months.

The name “villanova” embodies the Italian approach to life, a message conveyed by the new residential complex at the Alanovaplatz which is situated close to the town centre. The villa-like building complex was built on the site of the former brewery. Now, a modern residential building with a total of 100 apartments provides a reminder of the early Roman settlement in what is now the urban district of Schwechat.

4 apartment buildings, each with 5 upper floors, are connected by 2 basement levels. The basement walls were realized as far as possible using concrete cast in-situ. For this, MAXIMO Panel Formwork was used as was the 20 cm to 30 cm thick reinforced concrete walls of the upper storeys. The single-sided MX Tie Technology resulted in a reduction of required anchor points along with the simultaneous elimination of spacer tubes and cones, saved valuable construction time from the beginning onwards. This was a

great advantage as only 12 months was scheduled for the shell construction.

Consistent with the rapid progress through the use of MAXIMO for the walls, all storey slabs were systematically and therefore effectively formed with the help of SKYDECK. In particular, the logical and clearly specified assembly sequence as well as the simple handling due to the lightweight aluminum components reduced shuttering times. In addition, through the use of the SKYDECK Drophead System, the panels and main beams could be used at an early stage for the next concreting cycle in each case. This allowed cost-savings to be effected along with reductions made regarding on-site material requirements.

Jeddah Gate “E3 – Abraj Al-Hilal 2”, Jeddah, Saudi Arabia

3-day cycles with minimized crane requirements



Mohsen Ghoneim
Project Manager

“The PERI slab tables ensured easy striking and moving to the next level. Thanks to the RCS Climbing Formwork, we were also able to climb every third day. This accelerated the concreting work and shortened the cycle sequences for the core walls and floor slabs.”



Contractor
Azmeel Contracting & Construction Corporation
Field Service
PERI Saudi Arabia Ltd., Jeddah



Mobile RCS hydraulic aggregates and cylinders reduced the cost expenditure for crane-independent climbing.



PERI specialists supported the smooth construction progress with continuous project assistance and technical support.

The formwork concept with self-climbing formwork, large-sized slab tables and manually-operated column formwork ensured rapid cycle sequences with minimized crane requirements.

As part of the ambitious Jeddah Gate project a completely new city centre is being realized on an area of around 400,000 m² – complete with 6,000 apartments as well as office buildings, hospitals, schools, railway stations along with cultural and recreational facilities. The Abraj Al Hilal 2 residential complex features three high-rise buildings with a total of 326 apartments.

For the construction of the 17 to 21-storey residential towers, crane capacity was limited and the contractor

also had to maintain a very tight construction schedule. A coherent formwork concept, with its precisely-timed system utilization and competent on-site support, guaranteed fast and mostly crane-independent cycle sequences for the realization of the walls, columns and slabs.

The walls of the central cores were formed in advance using VARIO GT 24 whereby the girder wall formwork was climbed with the help of the RCS Rail Climbing System to the next level in each case. Through the use of mobile self-climbing hydraulics, no crane was required here. In addition, climbing operations could still be carried out with RCS even in strong winds as the formwork scaffolding was connected at all times to the building by means of

climbing rails and shoes. This allowed smooth and continuous construction progress in regular 3-day cycles.

With the help of LICO Column Formwork, the reinforced concrete columns could also be crane-independently formed. Then, the lightweight, 3 m high elements could easily be assembled and disassembled by hand. For forming the individual storey slabs, use of large-sized slab tables reduced the number of crane lifts required. As a result of the fast operating speed of the RCS Self-Climbing Formwork, the tables were also stripped after only 3 days and moved to the next section each time with the transportation fork.





Skyscrapers and Towers

impress through their size and are also increasingly being considered as architectural highlights and characterize the skylines of many cities around the world.

Modern-day types of construction and range of methods allow the realisation of sophisticated architectural designs. The use of reliable climbing technology rationalizes work operations and facilitates fast construction progress without any interruptions – weekly cycles can very often be completed much earlier. An integral part of a formwork and scaffolding solution is a project-specific safety concept: with anti-fall protection equipment for all stages of construction, safe construction site operations particularly when working at great heights, protection against wind and weather also when subjected to high wind speeds as well as instructing site personnel at the start and during the building project.

Alon Towers “BSR Center TLV”, Tel Aviv, Israel

3 climbing systems perfectly matched to one another



The self-climbing ACS P Platform variant was adapted to suit the central 8 m x 10 m core ground plan while suspended DOMINO elements served for subsequently constructing the intermediate walls.



The RCS Climbing Protection Panel units climbed crane-independently with the help of mobile self-climbing devices to the next floor each time.



For forming the oblique-angled building corners – due to the facade inclinations – specially designed corner platforms were used which were based on system equipment.

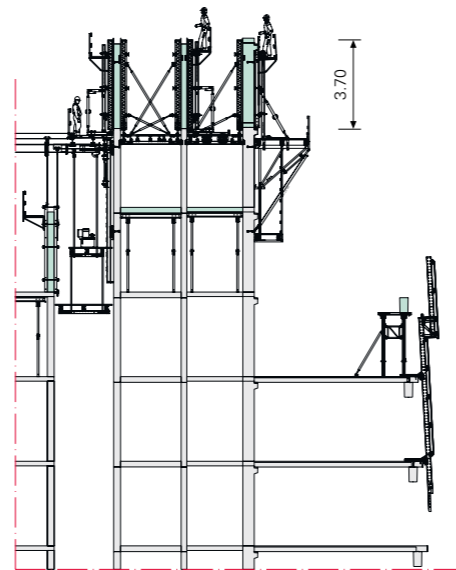
For a cost-effective execution solution, PERI engineers combined several climbing system variants. Here, climbing formwork and protection panels were perfectly matched to one another and tailored to meet the on-site requirements.

Alon Towers consists of two symmetrically arranged, 164 m high twin towers. They are part of the new, modern “BSR Center TLV” office complex and define the skyline of Tel Aviv. A special architectural feature is the X-shaped facade design which is perceptible from all sides: both towers taper to the halfway point and then widen again to the top.

PERI Israel provided an ideally matched implementation concept on the basis of the ACS and RCS Self-Climbing Systems as well as self-climbing CB Platforms. As a result, the construction crews could work very efficiently also at great heights – protected against the wind and concealed from view as well as being crane and weather-independent. The PERI comprehensive package complete with planning services, on-site support and logistics ensured, in particular, compliance with the high

quality and safety standards. In addition, the strict construction schedule as well as the limited crane capacity were taken into account.

The climbing formwork solution for the building core was a combination of ACS, RCS and CB in connection with VARIO GT 24 Girder Wall Formwork and suspended DOMINO Panel Formwork for subsequently completed intermediate walls. With the decision to construct the core in twin sequential phases in each case, the cycle sequence was adapted to match the execution of time-critical reinforcement work. The circumferential enclosure and anti-fall protection of the top floors of the shell construction in each case was realized with the RCS Climbing Protection Panel, geometrically adapted to suit the forward and reverse-inclined facade as well as being designed for the required change of inclination at heights of almost 80 m. An important part of the PERI Protection Panel solution featured the integrated landing platforms which facilitated temporary material storage and for the moving of loads with the crane.



Contractor
Ashtram Construction and Electra Construction Ltd. Joint Venture
Architect/Project Planning
MYS Architects/David Engineers Ltd.
Field Service
PERI F.E. Ltd., Rosh Ha'ayin, Israel



Dotan Hazan
Project Manager

“A starting point of any achievement is passion. Less passion will achieve fewer results, same as small fire will provide less warmth. At PERI we found passion for professionalism and providing the best service. Mutual passion for excellence creates success.”

SPRM Administration Building, Putrajaya, Malaysia

Know-how from a single source for all construction tasks

For safe and time-saving execution solutions for the construction of the elevated high-rise complex, planning and delivery were provided from a single source. As a result, the formwork and scaffolding could be optimally coordinated with one another.

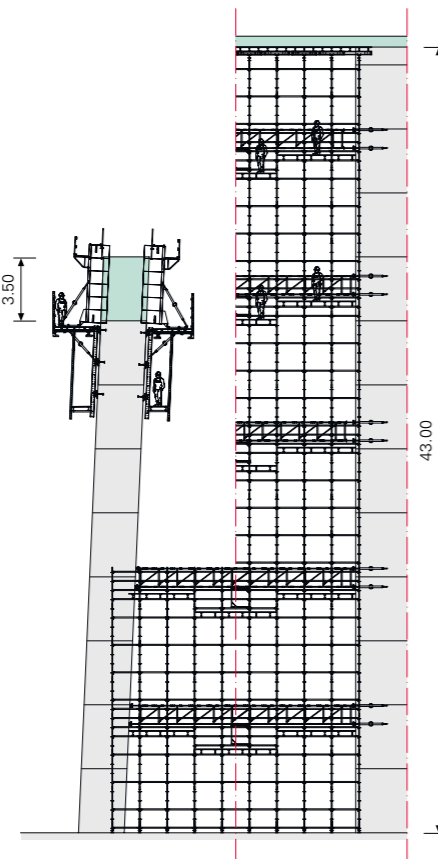
It would appear that the new administration building of the Malaysian Anti-Corruption Commission (Suruhanjaya Pencegahan Rasuah Malaysia, in short: SPRM) in the government district of Putrajaya stands on very shaky foundations, because the first 30 floors of the three building complexes are elevated on delicate inclined supports. A massive intermediate level seems to hover 40 m above the ground.

For a comprehensive service from a single source, PERI engineers planned and delivered the wall, slab and climbing formwork through to the most appropriate type of formlining. In particular, the spatial working and shoring solution on the basis of the PERI UP Modular Scaffolding system ensured the fast construction of a stable structure base from the beginning onwards.

With the help of RCS Climbing Formwork units, CB Working Platforms and BR Shaft Platforms, the vertical reinforced concrete components and circular inclined supports were constructed. As formwork, the VARIO GT 24 Girder Wall Formwork was mainly used. Following the fast working speed, PERI UP was assembled as birdcage scaffold in a 1.50 m x 1.50 m basic grid. As a result, safe working and access levels as well as corresponding intermediate supports could be realized in order to install ST 100 Stacking Towers as horizontal bracing for temporary stabilization of the inclined reinforced concrete columns.

The dimensioning of the PERI UP was especially coordinated to accommodate the subsequent load-bearing function in order to concrete the up to 1.80 m high intermediate slabs at heights of

over 40 m. Due to the 25 cm system grid, the scaffolding could be flexibly adapted to suit the building's geometry with different set-up heights and circular columns at inclined spatial angles as well as increased load concentrations. Furthermore, aluminium flights of stairs integrated in the birdcage scaffold ensured optimum accessibility.



On the basis of the RCS Rail Climbing System, the inclined circular columns could be efficiently constructed.

Working scaffold, bracing and shoring rolled into one: PERI UP subsequently followed as birdcage scaffolding within the cycle of the RCS Climbing Formwork.

Above, slab tables on a PD 8 basis served for forming the floor slabs; below, PERI UP ensured a safe transfer of loads.



Contractor
Mitrajaya Bhd., Puchong
Field Service
PERI Malaysia



Leslie Lim
Project Manager

“The know-how of the PERI engineers proved to be invaluable for our project. Their individual, innovative planning services resulted in safe, productive and time-saving execution solutions. A large proportion of the overall concept was the use of PERI UP which meant we could easily master the challenging shoring issues.”

Three elevated high-rise structures form the new SPRM administrative centre (Suruhanjaya Pencegahan Rasuah Malaysia); model image: Mitrajaya Holdings Bhd.



Safely to the top with optimally adapted climbing technology



The 220 m high, waist-like office tower with an elliptical ground plan is flanked by a 55 m high building on each side. The core elements of the comprehensive formwork and scaffolding solution were the self-climbing formwork for the core of the Warsaw Spire as well as the full-perimeter climbing protection panel.

Efficient and safe technology along with a number of additional services ensured that the tight construction schedule was successfully maintained. The PERI formwork solution took into account both the challenges of the complex building form as well as making it possible to comply with the strictly defined construction phase. The key element was the use of hydraulic climbing systems because the climbing formwork and climbing protection panel could move from floor to floor without the need of a crane: the ACS used a climbing device with 100 kN lifting power while the RCS P Climbing

Protection Panel was lifted upwards by means of mobile climbing devices.

One of the key challenges was adapting the RCS Climbing Protection Panel to match the variable elliptically-shaped storey slabs of the office tower. In addition, a weekly cycle per floor was necessary to maintain the planned short construction period. To ensure that the protection panel was always securely connected to the building, different cantilevered slab shoes were used for horizontally anchoring the climbing rails to the floor slabs thus compensating for the projections and recesses in place between the floor slabs. Three platforms provided access on all sides for pre-tensioning the reinforced concrete slabs.

For forming the core walls, two ACS self-climbing versions were used: the ACS P Platform system provided generously-sized storage and working areas for the core walls formed in

General Contractor
Ghelamco Poland Sp. z o.o. Sp.K.,
Warsaw, Poland
Contractor (Shell Construction)
Monting Sp. z o.o., Warsaw, Poland
Field Service
PERI Poland Sp. z o.o., Plochocin Office z o. o.

advance while the formwork for the semi-circular outer walls of the core was suspended on the ACS G Gallows variant. In the process, the VARIO GT 24 Girder Wall Formwork enabled a high degree of dimensional stability and exemplary concrete surfaces.

In combination with rentable system components taken from the VARIOKIT Engineering Construction Kit, an RCS Landing Platform served as an erection area for a PERI UP Stair Tower. It provided continuous access to the top floors regardless of how the assembly of the prefabricated stairs in the building core was progressing. For forming the slabs, the SKYDECK Drophead System significantly reduced on-site material requirements. A PERI UP working scaffold – a combination of frame and modular scaffolding – was subsequently used for the facade work.

For the two flanking office towers, SKYDECK was supplemented at the slab edges with slab tables.



Mobile climbing units lifted the rail-guided RCS Climbing Protection Panel from storey to storey.

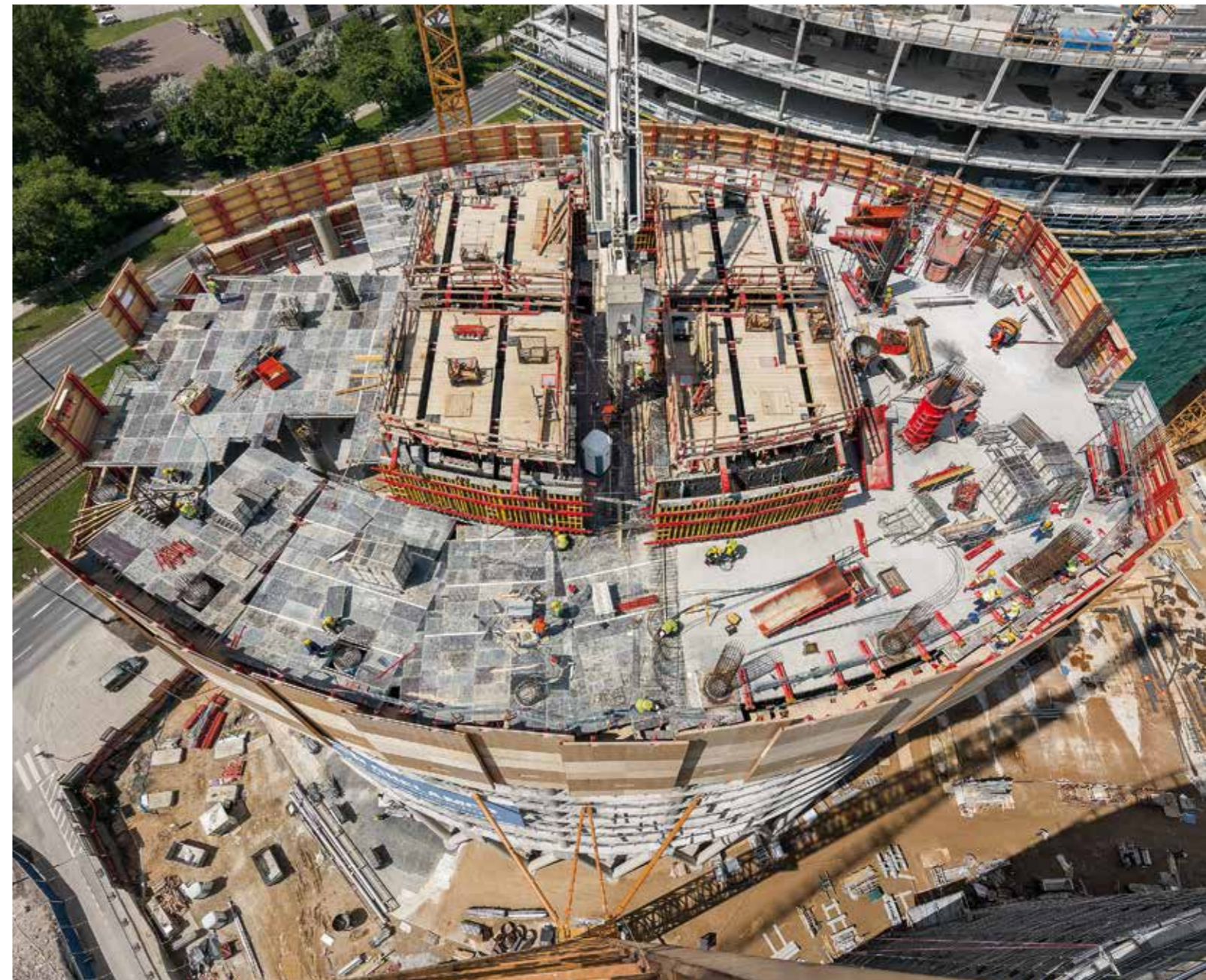


PERI UP Facade Scaffolding allowed fast and safe execution of all reworking operations



Ryszard Dąbek
Project Manager

“Long before construction began, we developed an efficient and customized formwork solution together with the planners, contractor and PERI. PERI’s special experience in high-rise building construction helped us to maintain the tight construction schedule. Also in this project, it confirmed once again that the know-how of the PERI specialists, in particular for hydraulic climbing formwork, had a decisive influence on the successful completion of a project.”



BraWoPark Business Center II, Braunschweig, Germany

Construction time reduced to 7 days per floor



Arwed Kähler
Project Manager

“With SKYDECK and RCS, we chose the right system combination. As a result, we could – together with our construction team – reduce our own deadlines from 12 to 7 days per floor.”



The 70 m high-rise building and the 120 m long base construction were completed in a concrete shell realization phase of only 10 months.

Contractor
Köster GmbH, Osnabrück
Field Service
PERI GmbH Germany, Düsseldorf

With the SKYDECK Panel Slab Formwork and RCS Climbing Protection Panel, the floors in the high-rise BraWoPark business centre could be completed in regular weekly cycles. The minimized shuttering times and crane operations accelerated the construction progress and ensured that the self-set schedule of 12 days for each floor could be reduced by an impressive 5 days.

With its slender, oval-shaped ground plan, the 70 m high Business Center II has put a definitive stamp on the BraWoPark complex at the Braunschweig main railway station. The 20-story high-rise building, together with the 5-storey, 120 m long and likewise only 15 m wide base construction, provides space for more than 1,000 excellently equipped office workplaces. The good and intensive cooperation between all

project participants resulted in a remarkably short implementation period: planning start was mid-2012, the first excavators arrived in April 2014 and, after only 10 months of construction, the entire building shell was completed with a total floor area of 19,000 m².

Together with PERI specialists, the site management team developed a formwork concept that ideally matched the ambitious construction schedule and project requirements. The two topmost floors under construction were completely enclosed with the help of the RCS Climbing Protection Panel. This enclosure served as protection against falling and reliably shielded the working area from the effects of the wind and weather. Thanks to the mobile RCS climbing hydraulics, no crane was required for the rail-guided moving procedure. An integral part of the PERI climbing concept was the RCS MP

Landing Platform which was used for moving and intermediate storage of formwork materials.

The storey slabs were also formed crane-independently. Lightweight aluminium SKYDECK components, systematic assembly sequence and the low number of props required accelerated the shuttering procedure; in addition, the SKYDECK Drophead System facilitated early striking. Also the fact that the total number of infill areas was below 5% ensured rapid moving procedures. During construction of the base level slabs, SKYDECK Platforms also guaranteed a high level of safety at the slab edges. PROKIT anti-fall protection ideally supplemented the PERI execution solution and consistently implemented the safety concept on all floors for shell construction operations and finishing work.



JKG Tower, Jalan Raja Laut, Kuala Lumpur, Malaysia

High level of safety – increased productivity



For the construction of the high-rise building complex – a 32-storey office tower together with a 13-storey parking facility – safety was given the highest priority. Part of the PERI formwork and shoring solution was, among other things, a corresponding training programme for the construction team. The high level of safety thus achieved ensured an increase in productivity: 3 floors were added each month during construction of this imposing tower.

The PERI complete solution consisting of formwork, scaffolding and related services guaranteed safety at all heights and rapid construction progress. The Climbing Protection Panel RCS P served as a gap-free enclosure for the top 3 storeys under construction in the building shell. As a result, the construction team could also work at great heights with more productivity. Mobile self-climbing devices reduced crane requirements on the jobsite. Integrated into the climbing system was an RCS Landing Platform which served as a temporary storage area and for moving the loads into the other storeys with the crane.

For constructing the core walls, VARIO GT 24 Girder Wall Formwork was connected with CB 240 Climbing Brackets to form large-sized units. The allowed

safe working conditions at all heights combined with easy handling with trouble-free adaptation to suit the different building geometries.

PERI UP flights of stairs for safe access of the higher-positioned working areas supplemented the comprehensive PERI solution as much as the formwork and scaffolding solutions for constructing the massive floor slabs with thicknesses of up to 1.00 m as well as the simultaneous concreting of the large-sized beams. An extensive range of planning services, along with a competent PERI supervisor on site, made a further valuable contribution for maintaining the tight schedule and budget requirements.

Contractor
IJM Construction Sdn Bhd
Field Service
PERI Formwork Malaysia Sdn. Bhd



Construction of the elevator and stairwell shafts took place in advance with the help of a CB/VARIO Climbing Formwork solution.

With protection provided by the RCS Enclosure, work could be carried out more safely and productively whereby the perforated steel sheeting prevented any heat accumulation.

PERI UP stair towers provided safe access for reaching the higher-positioned working areas.



Ngow Whoong Leong
Project Manager

“The level of safety which the RCS Climbing Protection Panel provided us is a great advantage on high buildings. Without worrying that something might fall to the ground, the construction team could concentrate better on the work at hand due to the complete enclosure. The good results we achieved is proof that we chose the right formwork provider for this unique project. We could rely on PERI’s huge experience for all the construction tasks.”

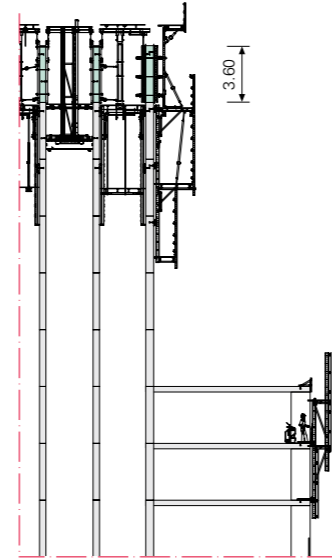


ISET Tower, Jekaterinburg, Russia

Circular structure with customized climbing solution



Contractor
Ekaterinburg-City, Ltd.
Field Service
PERI Germany, Weissenhorn
and PERI Russia, Noginsk



A customized PERI climbing formwork solution supported the rapid construction progress of the 209 m high ISET Tower. Both the crane-independent self-climbing formwork for the core walls as well as the climbing protection panel on the outer edges of the building could be adapted to suit the circular ground plan without requiring any special components.

The 52 floors of the high-rise building provide space for 250 private apartments and are characterized by the circular floor plan. The core of the building was also designed as a central circular structure. The PERI design concept was based on the ACS and RCS self-climbing technology and also took account the special arrangement of the elevator shafts as well as high wind loads. All working steps along with any required adaptation measures were clearly coordinated in advance in close

cooperation with the site management – with the focus placed firmly on site-compliant execution.

In the lower storeys, there are six centrally-arranged elevator shafts with internal dimensions of only 2.30 m x 3.00 m. For this, the construction crew used the self-climbing ACS S Shaft Formwork whereby the climbing device was positioned in the centre of the shaft. The TRIO Panel Formwork and the trailing working platform were suspended on the climbing device. From floor 28 onwards, the geometries change in the core of the building: six smaller elevator shafts merge into four larger ones. At this point, the shaft formwork was coupled together and an ACS Multi-Unit Aggregate then simultaneously lifted the complete sets of formwork from floor to floor.

The formwork for the circular core walls was based on the VARIO GT 24

Girder Wall Formwork System and was the result of a perfectly coordinated allocation of tasks. PERI engineers in Germany developed the range of assembly plans whilst the required cut-to-size timber formers were realized at the PERI facility in Moscow. After the individual components had been delivered, site personnel assembled the formwork units on the jobsite – an efficient and cost-effective execution solution.

The RCS Climbing Protection Panel completely enclosed the building edges of the uppermost floors still under construction. This protected site personnel against falling and facilitated safe, continuous working operations also at great heights – sheltered against the wind and regardless of the weather. This meant up to three stand-ard floors per month could be realized.



Evgeni Golovin
Chief Engineer (UGMK)
Andrei Putschkov
General Manager (Wisotka)

“We decided to use the proven PERI self-climbing formwork systems, because they are easy to handle and ensure complete safety in high-rise construction. PERI specialists have consistently provided us with operational support.”



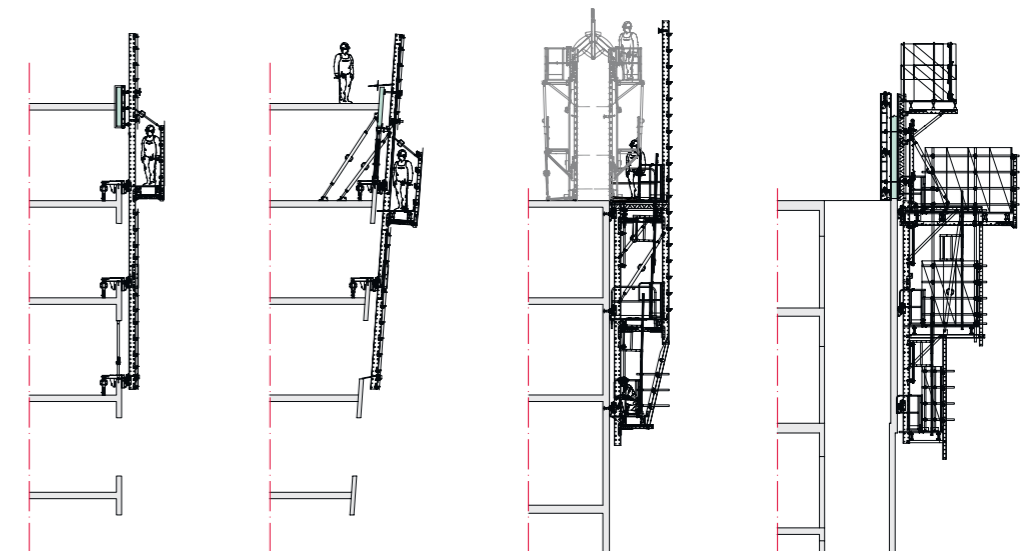
Contractor
Bateg / CBC,
Velizy-Villacoublay, France
Field Service
PERI SAS, Bureau central
de Meaux, France



Jean-Francois Delmas
Senior Construction Manager

“The Hotel Mélia itself is a real technical challenge whilst the site surroundings also provide severe restrictions. The PERI climbing formwork solution, based on the RCS system, fully meets our requirements – both in terms of safety as well as use.”

Thanks to the modular design of the RCS Rail Climbing System, the four bracket variants could be optimally adapted to match the complex building geometry. An integral part of the PERI solution were the landing platforms which provided quick and safe transport of materials.



The PERI climbing solution for the centrally located, new hotel building served as an enclosure as well as formwork support. It increased safety levels for the construction team and accelerated assembly of the precast parapets.

The 87 m high Hotel Mélia high-rise is in an exposed location directly at the entrance to the Paris business district, “La Défense”, the largest office district in Europe. Due to the confined conditions on the construction site, crane time for the formworking operations was to be minimized; in addition, unobstructed and safe pedestrian access for the entire construction period had to

guaranteed. The complex building floor plan with curvatures, offsets and different angled walls presented further challenges during the planning and execution.

For the different areas of the building, the PERI concept provided four different climbing versions on the basis of the RCS Rail Climbing System which fully complied with the requirements of safe and rapid construction progress through specially adapted platforms. One particular challenge was the design of the forward and reverse-angled protection panels for the arch-shaped facade. PERI provided an all-round enclosure adapted to suit the

ground plan which resembled a ship's bow; in addition, it facilitated the fast assembly of precast parapets.

As a rear protective wall on the RCS Climbing Formwork, the construction team used floor-to-ceiling side mesh barriers from the PROKIT Safety System. The PROKIT was additionally covered with tarpaulin so that pedestrians could safely walk past. In addition to the climbing solution, PERI also supported the rapid construction progress with the planning and delivery of PERI UP Shoring and GRIDFLEX Girder Grid Slab Formwork.



Several RCS Climbing Rails were anchored on the parapets and additionally fixed to the slab.



Construction of the floor slabs was carried out with help of GRIDFLEX Girder Grid Slab Formwork system.



Both the Hotel Méliá (in the foreground) and the 195 m high Tour Majunga (in the background with ACS Self-Climbing Formwork) were part of the ambitious new construction and renovation concept, “La Défense 2015”.



LPS Climbing Protection Panel optimises construction time



The protection panel units up to 18.50 m high climbed by means of mobile climbing hydraulics to the next floor without requiring a crane.



Two RCS Landing Platforms were integrated into the LPS enclosure on each tower and supplemented with additional protective meshes.



Over 700 linear metres of PERI LPS enclosure secured and accelerated construction work on the three high-rise towers.

In order to comply with the tight building schedule, PERI Australia engineers developed a comprehensive formwork and safety concept that was based on the LPS climbing system. The use of mobile hydraulic units saved valuable crane time and thus accelerated working operations on this major construction site.

General Contractor
Lend Lease Structures, Sydney
Field Service
PERI Australia Pty. Ltd. Glendenning



With the ambitious Barangaroo Redevelopment Project, Sydney's city centre was redefined in a westward direction on the 22-hectare former container port facility. The ITS (International Towers Sydney) high-rise complex forms the central element of the Barangaroo South sub-project. Three office towers, with 39, 43 and 49 storeys respectively, rise up to a height of 217 m.

The housing with the lightweight LPS climbing protection panel units reliably protected site personnel working in the upper floors under construction against falling. Very light grid elements ensured a high level of safety and wind-protected working areas due to the close-mesh design while the permeable structure allowed light into the building and simultaneously reduced the load on the anchoring in the building. Then, the protection panel units were an impressive 18.50 m high and provided extremely safe working conditions for up to 5 floors at the same time.

The LPS telescopic mesh screens could easily be adapted to suit the respective building floor plans thus pro-

viding complete protection at all times. Foldable covers at the base of the climbing protection panel guaranteed safe working operations in the areas below. In particular, the comprehensive PERI solution took into consideration the varying floor heights of between 3.80 m and 5.50 m while working platforms on the slab edges provided up to 75 cm working spaces for pre-stressing the reinforced concrete slabs. Integrated into the PERI climbing solution were two RCS landing platforms which served as temporary storage and moving of materials.

A high level of safety along with optimised construction processes was guaranteed through the mobile hydraulic climbing devices. As a result, no crane was required for moving the LPS protection panel units. This speeded up construction progress significantly as forming and concreting as well as climbing could take place at the same time early in the morning.



David Langford
Site Manager

"Due to the close cooperation between Land Lease Structures and PERI, a solution could be realized which accommodated our comprehensive range of safety requirements. In addition, the mobile climbing hydraulics of the LPS system enabled us to free up crane time and helped to maintain the tight construction schedule."

56 Leonard Street, New York, USA

Storeys stacked with PERI modular construction systems



Offset-arranged floors and countless cantilevered balconies required a detailed formwork and enclosure concept.



The Swiss team of architects, Herzog & de Meuron, designed the exceptional, 250 m high residential tower in Manhattan.



Tom McGeown
Project Superintendent

"The 56 Leonard Street project had over 300 cantilevered balconies that required a perimeter protection system with custom solutions – and PERI was able to meet the challenge."

Contractor
Sorbara Construction Corp., Lynbrook
Architect
Herzog & de Meuron, Basel
Field Service
PERI Formwork Systems Inc., New York, USA
and PERI Polska Sp. z o.o., Plochocin, Poland

Floor after floor, the exclusive residential tower gives the impression of being stacked from bottom to top. The staggered floor slabs and in part wide cantilevers required a detailed formwork and enclosure concept to be developed by PERI's American and Polish project team.

56 Leonard Street is both the name and address of an extraordinary skyscraper in Manhattan. The slender tower rises to a height of 250 m and features 145 luxury apartments and 10 penthouses on close to 60 floors. Swiss architects, Herzog & de Meuron, equipped the building with an eye-catching new design. More than 300 irregularly arranged balconies cantilever outwards from the glass facade while, in some places, the floors are offset inwards. As a result, the individual

storeys give the appearance of being stacked or pushed into one another.

For the realization of the floor slabs, including the countless recesses and cantilevers, PERI engineers developed a project solution on the basis of rentable modular construction systems. RCS Climbing Protection Panel units, in combination with wide cantilevered slab tables, guaranteed safe working conditions on all sides. In particular, transferring the loads to the external corners was a big challenge for all project participants. Here, aluminium MULTIPROP Post Shores together with core components from the VARIOKIT Engineering Construction Kit formed geometrically and statically adapted supporting systems which reliably carried the high loads into the lower-positioned floors of the building.

The diverse features of each floor required detailed formwork planning as well as static calculations for each stage during the construction. Safety for all site personnel and passers-by was given absolute top priority throughout. In addition, the PERI solution took into consideration the extremely cramped conditions due to the central inner-city location along with maintaining the tight construction schedule.



Safe working conditions without interruptions



Contractor
John Reddington Ltd., Borehamwood
Field Service
PERI Ltd. UK, Rugby

RCS rail-climbed the 45 floors of the Providence Towers and, as climbing formwork together with protection panel, facilitated efficient and safe working procedures without any interruptions.

Circular forms and cascaded building structures characterize the “New Providence Wharf” residential project on the much sought-after Thames Embankment location in London. In recent years on a 3.3 hectare, former derelict industrial site in the Docklands area in the eastern part of the capital, exclusive apartments as well as offices, retail stores, restaurants and various cultural and recreational facilities have been realized in several phases.



With its 45 storeys, the 136 m high Providence Tower dominates the surrounding buildings. The interaction of the apartment and high-rise hotel with the oval ground plan and balconies arranged in a wind vane fashion with the likewise circular-shaped ground floors features a characteristic architecture.

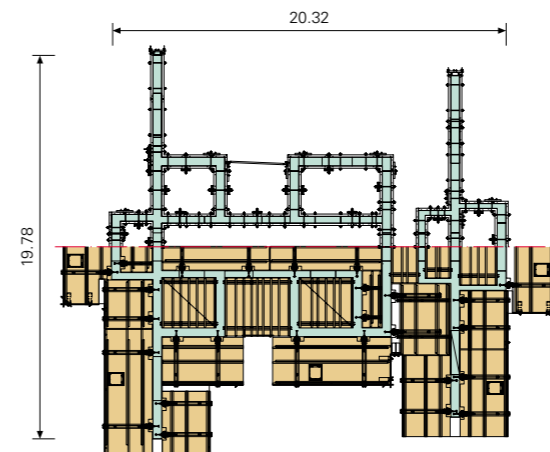
The formwork concept for the high-rise complex was based on the broad PERI product range. As a result, the most appropriate system was used each time to suit the different requirements. In particular, the strict schedule, stringent safety requirements and compact construction site with very limited storage and crane capacities required well thought-out and coordinated PERI implementation planning. For forming the reinforced concrete slabs, SKYDECK was used with MULTIFLEX supported through aluminium MULTIPROP Slab Props. With the help of RUNDFLEX and TRIO, the walls could also be concreted in fast cycle sequences and, if required, combined with SB Brace Frames and CB Climbing Platforms.



The RCS Rail Climbing System formed a cost-effective basis for efficient and safe construction of the high-rise core and floors. As formwork scaffolding for the in part narrow and angular shaft



geometry, RCS was combined with TRIO Panel Formwork. The variable core ground plan was likewise taken fully into consideration as well as the upwardly tapering wall thicknesses. In addition, the RCS System served as a climbing protection panel for complete enclosure of the building shell floors. This meant that site personnel were protected against falling and the effects of the weather at all times. This facilitated safe and very productive working conditions also at great heights.



Michael Riordan
Project Manager

“We used a complete range of PERI equipment, which have all been engineered towards our construction specifications. We saved time, ensured safety and the climbing systems enabled us stick to the project time scale without having to stop and start.”

Al Habtoor City Towers, Dubai, United Arab Emirates

3 high-rise buildings steadily rising in 5-day cycles

Contractor
Al Habtoor Leighton Group (HLG), Dubai
Field Service
PERI L.L.C., United Arab Emirates



Hayder Awni
Project Manager

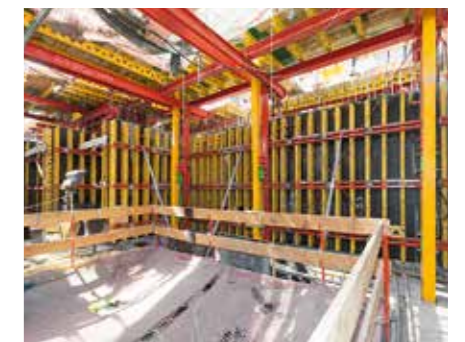
“PERI’s ACS system has once again proved its uniqueness. We can safely and quickly realize our very complicated core wall as well as in a very high quality with the ACS without having to utilize the crane. This is a big advantage on our construction site.”



Slab tables with the integrated Table Swivel Head and PEP Ergo Slab Props are an integral part of the comprehensive PERI complete solution.



The PERI Climbing Formwork solution is based on different ACS variants individually adapted to suit the project requirements. Centerpiece is the climbing hydraulics with the ACS Climbing Device.



The Al Habtoor City Towers are 3 high-rise buildings in Dubai which are simultaneously being realized, eventually reaching heights of around up to 300 m. The decisive factor for ensuring compliance with the short construction period is the formwork concept for the reinforced concrete cores. Here, the modular ACS Self-Climbing Technology facilitates high productivity and short cycle times.

The Al Habtoor City Towers skyscraper complex is currently one of the largest high-rise building projects in Dubai. Within the space of only 32 months,

two 307 m high skyscrapers and one with a height of 213 m are steadily reaching higher and higher into the sky. At the beginning of 2017, close to 1,500 new exclusive apartments will be available in the desirable and highly sought-after residential area on Sheikh Zayed Road. Massive reinforced concrete cores with very impressive dimensions form the respective centres of the three high-rise buildings, including the wing walls which feature outer dimensions of 40 m x 32 m. The focus of the PERI complete solution therefore is very much on the climbing formwork concept for the high-rise building cores. With the help

of the ACS Self-Climbing Technology and VARIO GT 24 Girder Wall Formwork, a systematic, continuous workflow has been achieved. Climbing, shuttering, concreting and striking can take place in regular 5-day cycles without requiring any crane support. In addition, the different ACS versions have been perfectly matched to each other so that two placing booms for every core respectively can be climbed at the same time. Due to the non-dependence on crane capacity as well as not being affected by the weather, there are no work stoppages.

The two 307 m high-rise structures each have 75 floors while the third building reaches a height of 213 m and has 52 floors. The core and supporting walls are climbed in advance and crane-independently with ACS and VARIO. For each high-rise core, two placing booms are carried with the help of the ACS Self-Climbing System.



Torre Banco Macro, Buenos Aires, Argentina

Bank high-rise building with elegant tower finish



The ovate ground plan of the high-rise building develops into an elegantly curved roof landscape more than 100 m high.



MULTIPROP shoring towers up to 16 m high were used to provide the form-giving load-bearing system for the reinforced concrete edge beams.



The edge beam construction for the tower finish placed very high requirements on construction operations.

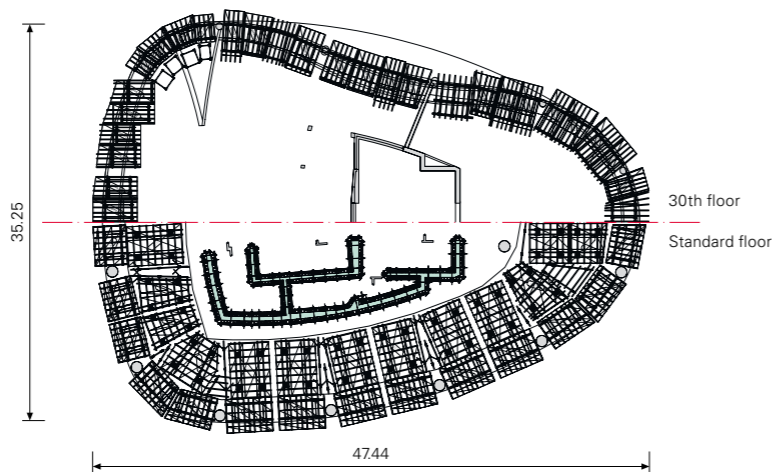
The modern architecture with its stylistic features placed high demands on the execution of the building work. For the construction of the bank high-rise structure, which was designed by César Pelli, the requirements could be met with the help of a customized formwork and shoring solution while simultaneously optimizing the work performance.

The Torre Banco Macro is the new headquarter of the Argentinian bank of the same name. Star architect, César Pelli, provided the 135 m high office tower in the centre of Buenos Aires with a very distinctive top section which features an elegantly curved rooftop landscape. At the same time, the otherwise oval almost egg-shaped ground plan tapers upwards with the outer edges of the longitudinal sides transforming from a convex to a concave shape in the upper quarter.

For construction of the 1.300 m² standard floors, PERI's Argentinian engineers designed a project-specific slab table solution. A total of 42 rectangular and trapezoidal slab and edge tables were individually assembled based on 4 different radii and subsequently adjusted to suit the oval ground plan

which then ensured fast cycle sequences. When forming the core walls, the PERI solution – on the basis of the VARIO GT 24 Girder Wall Formwork system – likewise fulfilled the high requirements. The core geometry was extremely complex but, in spite of this, the 3.90 m high core walls could be realized in architectural concrete quality. For the slabs and walls, the quantities of equipment required on site were determined so that efficient working operations were realized with cost-effective material usage.

In order to form the three-dimensional spiral reinforced concrete edge beams of the upper floors at a height of 135 m, lightweight MULTIPROP Alu Props with MRK Frames were connected to create load-bearing shoring towers. Here, the modular system allowed flexible adjustment and extension possibilities. The 4-legged and multi-legged MULTIPROP towers were realized with variable heights ranging from 5 m to 16 m – while taking into consideration different assembly areas and intermediate levels.

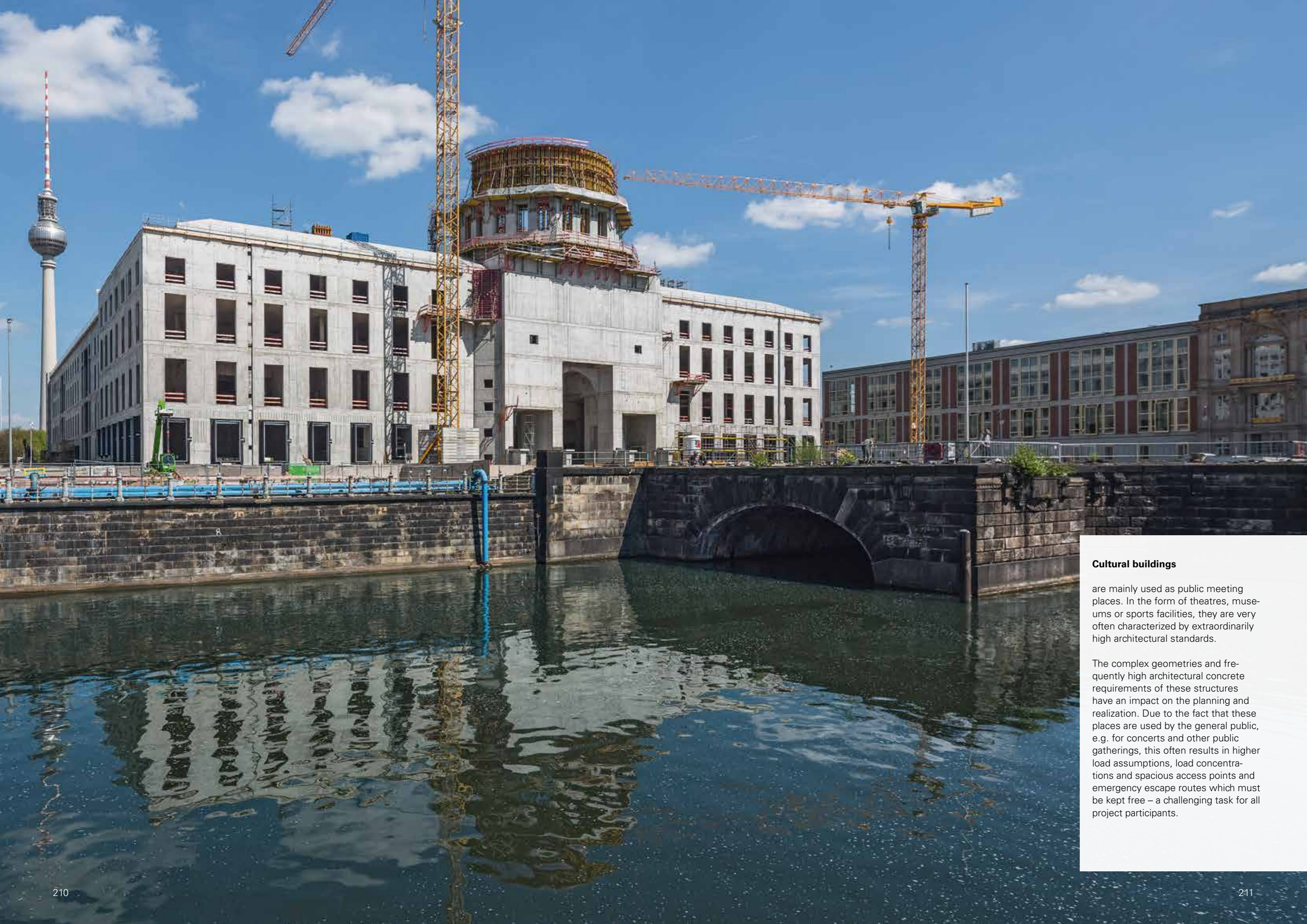


Contractor
Caputo S. A.
Architect
Pelli Clarke Pelli Architects
Field Service
PERI S.A., Buenos Aires, Argentina



Martín Bredda
Site Manager

"In particular, the upper part of the tower with its distinctive geometry and the varying inclinations as well as the load transfer to different assembly levels presented substantial challenges. The PERI solution adapted itself perfectly to suit the given requirements and allowed us to optimize the work performance. I would like to especially highlight the engineering performance of PERI – through their support and the constant exchange of ideas with our site management, we could work out the best solution."



Cultural buildings

are mainly used as public meeting places. In the form of theatres, museums or sports facilities, they are very often characterized by extraordinarily high architectural standards.

The complex geometries and frequently high architectural concrete requirements of these structures have an impact on the planning and realization. Due to the fact that these places are used by the general public, e.g. for concerts and other public gatherings, this often results in higher load assumptions, load concentrations and spacious access points and emergency escape routes which must be kept free – a challenging task for all project participants.

“Humboldt Forum” City Palace, Berlin, Germany

Cost-effective formwork and scaffolding solutions from one source



The planning and supply of formwork and scaffolding from one source created a synergy effect for the site management team.



Lightweight and flexible SKYDECK and MULTIPROP System Components made of aluminium saved both time and money when forming the storey slabs.



The 70 m high cupola roof towers above the 180 m long city palace which, behind its historical Baroque appearance, serves as a modern-style Humboldt Forum for exhibitions.



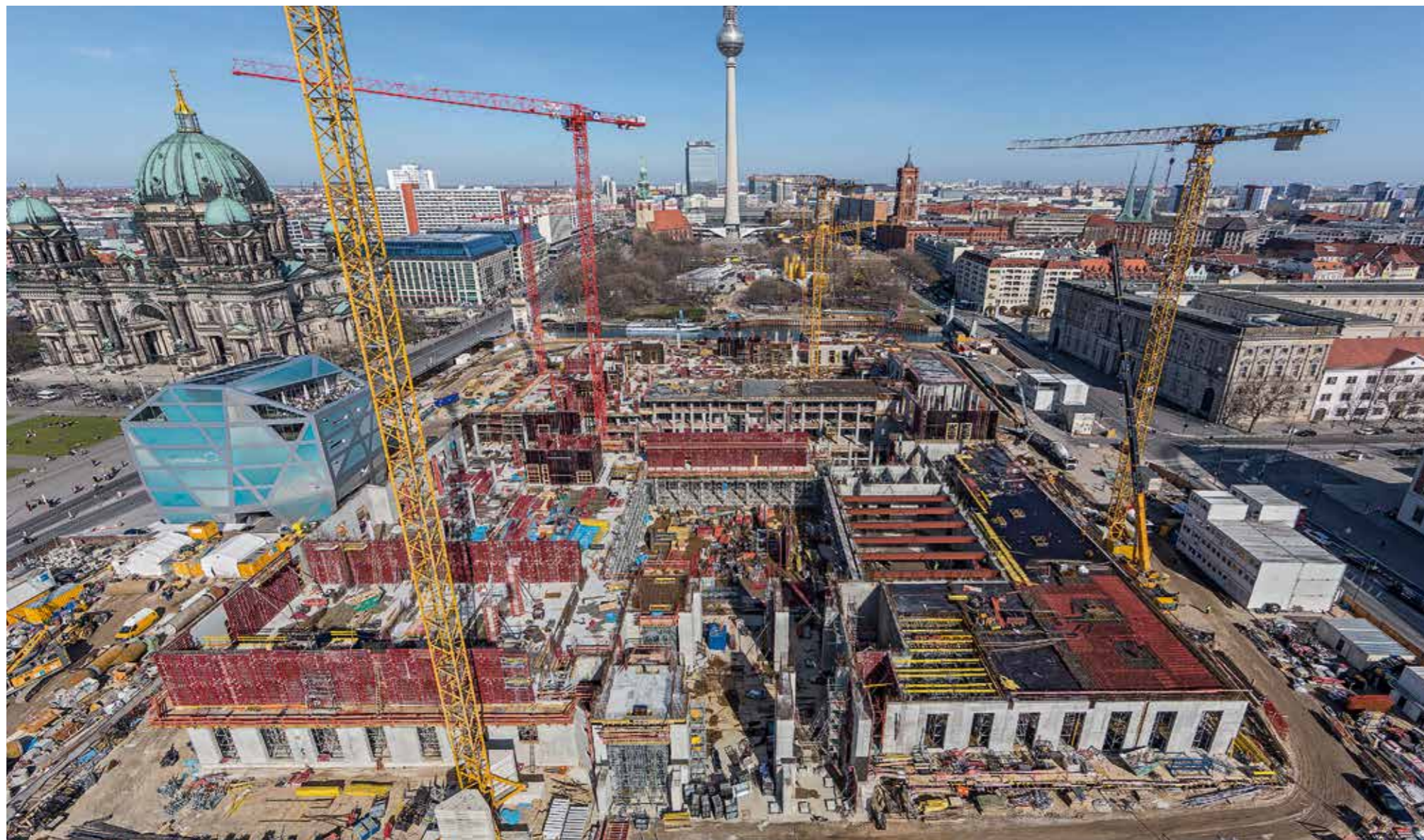
The PERI UP and VARIOKIT Modular Construction Systems ideally complemented each other for the temporary transfer of loads from the steel cupola.



Bernd Dommack
Senior Site Manager

“I rate the PERI contribution very highly. All requirements were completely fulfilled and the tight construction schedule was also maintained. In addition to the fast shuttering and moving times with MAXIMO and SKYDECK, I would like to especially praise the on-site project support along with the flexible, operative and process-oriented cooperation with the PERI engineers.”

Contractor
Hochtief Building GmbH, Rohbau/Industriebau Berlin
Field Service
PERI GmbH Germany, Berlin



For the reconstruction of Berlin’s City Palace, PERI supplied cost-effective formwork and scaffolding solutions from one source. In addition to fast shuttering and moving times, the on-site support provided by the PERI engineers in particular ensured that the very tight construction schedule could be maintained.

In order to ensure that rapid construction progress could be realized, large quantities of formwork and scaffolding materials were in everyday use. In addition to the provision of modern and time-saving systems, full consideration of all construction tasks in particular was an important element of the PERI overall solution. The well thought-out safety technology, provision of project-specific special formwork assemblies, project management by the PERI project leader as well as the planning and supply of formwork and scaffolding from one source had an extremely positive effect along with accelerating the work processes.

Over 6,000 m² of MAXIMO Panel Formwork with the one-sided MX tie technology guaranteed significant time

savings during all shuttering and striking operations. For forming the reinforced concrete slabs, systematic shuttering operations could be carried out with a total of 10,000 m² SKYDECK materials and – due to the low individual weights – easily stripped again. The Drophead System also ensured fast cycle sequences with a simultaneous reduction in material usage. Support for the large slab heights was provided by the lightweight MULTIPROP Aluminium Props which, in turn, could be supplemented by shoring towers created using MRK Frames.

Due to the PERI solution with external CB Climbing Platforms, no facade scaffolding for the shell construction was required. In the area of the main entrance on the west side, PERI Berlin also provided ready-to-use customized special formwork to the construction site. For the circular reinforced concrete walls of the cupola, RUNDFLEX Circular Formwork was used together with FB 180 Folding Platforms. The final stage of the cupola construction took place using PERI UP Shoring and Working Scaffolding.

SNFCC Cultural Center, Athens, Greece

Earthquake-proof shoring solution for new iconic structure in Athens



For earthquake-resistant implementation, PERI UP was supported on a load-distributing VARIOKIT construction.

CB Climbing Brackets served as a platform system for the VARIO Wall Formwork.

The retaining walls which separate the artificial hill from the rest of the park are up to 32 m high.



The new cultural centre in the south of Athens is based on the innovative design by the Italian star architect Renzo Piano. PERI supported the construction of this extraordinary project with a comprehensive formwork and scaffolding solution, continuous on-site supervision along with a well thought-out logistics concept.

The two distinctive main buildings – the National Library and Greek National Opera – are located at the rear of a man-made hill which is the side closest to the sea. The sloped roofs of the buildings form, as it were, an extension of the incline.

Similar to a flying carpet, the roof construction of the National Opera is suspended at a height of 40 m above the actual building roof, supported by 30 filigree steel columns. For constructing the 10,000 m² canopy, the PERI UP shoring solution fulfilled a wide range of functions. It served as a support for the prefabricated ferrocement elements and simultaneously allowed the fine adjustment of these modules in

transverse and longitudinal directions. In addition, full-surface working levels adapted to match the inclined course of the roof accelerated connecting and supplementary operations with in-situ concrete and provided maximum safety. Specially designed, floating supports minimized the movements of the scaffold construction and reliably provided the required earthquake protection also during the execution phase. Load distribution took place with the help of VARIOKIT system components taken from the PERI rental park.

The VARIO Girder Wall Formwork and the SRS Column Formwork fulfilled the high architectural concrete requirements for the walls and columns. The up to 32 m high reinforced concrete retaining walls which separate the artificial hill from the rest of the park were also realized in an architectural concrete finish. PERI engineers took into account the defined arrangement of the panel joints and anchor points in accordance with the design specifications whilst FinPLY formlining screwed on at the rear also ensured immaculate concrete surfaces.



Michalis Papafilippou
Site Manager

“We are extremely satisfied with the PERI systems as well as the comprehensive service – in particular, with the competent application engineering, logistics and the on-site project support. In the process, PERI has helped us to successfully realize this challenging project. Especially the PERI UP modular scaffold with its high degree of flexibility and lightweight components which could be optimally adapted to suit the complex geometry. PERI UP has supported us throughout all construction phases by guaranteeing fast working operations along with providing a high level of safety and efficiency.”

Stavros Niarchos Foundation Cultural Center (SNFCC) in Athens: designed by Renzo Piano, the construction of the cultural centre with the National Library and State Opera was provided with substantial support by the Stavros Niarchos Foundation (SNF) – an economic commitment for the future of Greece. The man-made hill with its steadily rising gradient in the direction of the sea forms an alignment with the building's roofs.

Contractor
JV Impregilo S.p.A – Terna S.A
Architect
Renzo Piano
Field Service
PERI Hellas Ltd., Koropi



3D formwork solution for meeting the highest architectural demands



Edilson Costa
Site Manager

“The combination of different PERI formwork and scaffolding systems as well as efficient engineering support was the key factor in ensuring that the concrete construction challenges we faced could be mastered. In particular, the on-time deliveries of the pre-assembled formwork units enabled us to realise Rio’s new landmark.”

Contractor
Consortio Porto Rio (Odebrecht Engenharia, OAS Engenharia, Carioca Engenharia)
Architect
Santiago Calatrava
Field Service
PERI Brazil, São Paulo and PERI Germany, Weissenhorn

A customized PERI formwork and scaffolding solution with 3,500 project-specific special formwork elements ensured that the realization of this extraordinary museum was carried out within the specified time-frame and budget.

Located on the highly prominent Pier Maua, this futuristically designed building was designed by the Spanish architect and engineer, Santiago Calatrava, and extends 300 m into the sea. The cantilevered roof and facade with moving elements ensure optimum air conditioning. Two storeys are connected by means of inclined ramps and have a total area of 5,000 m² which will showcase trend-setting exhibitions and technologies.

In order to allow the complex concrete design of the museum to become reality, PERI planned, produced and delivered more than 3,500 project formwork elements, mostly double-curved 3D formwork units. For the comprehensive formwork and scaffolding planning together with the assembly of the formwork elements, international PERI teamwork was responsible throughout.

For the 3D planning, the Weissenhorn engineers were supported by experienced specialists from the PERI subsidiaries in Spain and Poland. The respective assembly plans and data provided the basis for the dimensionally accurate CNC-controlled cutting of the formwork units and final assembly at PERI’s facility in Sao Paulo. Here, CNC wood working equipment was used to process around 60,000 m² chipboard to create the formwork units in two-shift operations for the single and double-curved formwork elements. 25 formwork erectors ensured that between 10-20 ready-to-use customised elements were delivered to the site every day – just-in-time according to the construction schedule – over a period of 13 months.

In order to be able to cost-effectively realize such exceptional formworking tasks, a high proportion of system components were used. In addition, VARIO basic elements were selected which allowed efficient handling on the jobsite – similar to system formwork. Furthermore, three supervisors provided support for the extensive on-site formwork operations.

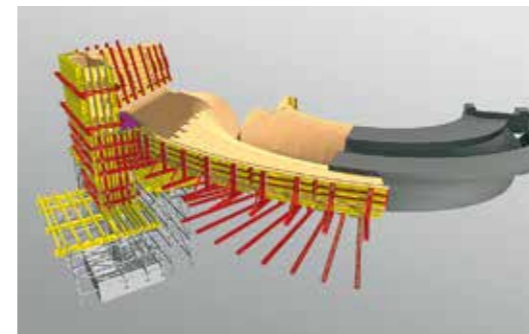


3D planning, assembly and material scheduling were well timed and carefully coordinated to suit the construction process.

At the PERI facility in São Paulo, over 3,500 formwork elements were accurately manufactured in very high quality.

Supported by PERI UP shoring and working scaffolds, as well as a VARIOKIT raised formwork unit, the customised elements could be assembled on-site to form a complete 3D formwork construction.

Realization of the museum was based on a well-thought out modular system concept and completed on time and within budget.



Mausoleum of Martyrdom in the Polish village of Michniów

Customized system solution for complex architecture



MULTIPROP shoring towers and VARIOKIT system components formed the up to 14.75 m high supporting structure – together with the TRIO panel formwork, the partly inclined, up to 1.50 m thick sandwich-type reinforced concrete walls could be cost-effectively realized.



For the characteristic, wood-like surface structure, a special plaster was applied by means of a roller template. This required a consistently high quality of the concrete surface finish which was achieved through the use of the TRIO panel formwork.



The PERI formwork concept minimized the use of special formwork – as a result, the wide range of reinforced concrete components with numerous offsets and inclined surfaces could be economically constructed.

The museum features a traditional village hut which gradually falls apart. Numerous offsets and inclined surfaces characterize the structure as well as the distinctive timber-like structure of the finished architectural concrete surfaces. A customized system combination of formwork and shoring was developed to match the complex architectural requirements which, in turn, minimized the use of special formwork.

The mausoleum symbolizes the interplay of architecture and history as pre-

sented through the gradual disintegration of the hut, and is a permanent reminder of the mass murder of the entire population of Michniów and other Polish villages during World War II. Changes in the forms along with the roof and wall inclinations are meant to show how the hut loses its original shape and slowly disintegrates "to sand and gravel".

The enormous offsets in the walls and roof presented a big challenge for the construction team. For cost-effective implementation, PERI's Polish engineers combined the formwork and

shoring on the basis of mainly rentable system components. The proven TRIO panel formwork provided the optimal solution for ensuring uncomplicated and fast forming of the inclined, up to 1.50 m thick sandwich-type reinforced concrete walls. Large-sized, up to 5.40 m high formwork units could be moved with the crane in a single lift. Together with SRU steel walers and SLS spindles from the VARIOKIT engineering construction kit, MULTIPROP shoring towers formed the up to 15 m high flexible supporting structure for the roofs. As a result, slab thicknesses of up to 80 cm and roof pitches of 40° to 50° could easily be realised.

Contractor
Budowlana Anna-Bud Sp. z o.o., Morawica
Field Service
PERI Poland Sp. z o.o., Krakow, Poland



Rafał Adamski
Project Manager

"Thanks to the professional collaboration and technical support from PERI, which was already provided in the planning phase, the building could be quickly and easily formed and concreted in spite of its complex design."

Pegasus Sculpture, Gulfstream Park, Hallandale Beach, USA

Super-sized bronze casting: 3D-puzzle on PERI UP Scaffolding



Günter Czasny
Project Manager

“PERI successfully provided the solution for this highly complex task. In the course of the entire project, it was possible for us to react and deal with new situations almost daily using PERI UP.”

Project Management and Coordination

Ernst Strassacker GmbH & Co. KG, Süßen, Germany

Construction/Static for Steel Construction

Ingenieurbüro Stark, Ludwigsburg, Germany

Scaffolding Contractor

Scafform Event Services LLC, Hialeah, USA

Field Service: Scaffolding

PERI Orlando, Groveland/Florida, USA

For the erection of the extraordinary Pegasus bronze sculpture near Miami/Florida, PERI UP Rosett provided optimal working conditions. The Modulare Scaffold System proved once again just how flexible and versatile it is, adapting to the complex geometry in 25 cm increments.

Since the end of 2014, a spectacular piece of bronze artwork has formed the centre of the new theme park at Gulfstream Park near Hallandale Beach in Florida, one of the most famous racetracks in the world: Pegasus, the fabled winged horse from Greek mythology. The oversized sculpture is an impressive 33 m high and – Pegasus together with the dragon – over 60 m long. In order to realize such magnitude, in connection with the organic shape in bronze, seemed a virtually impossible challenge at the beginning for all members of the project management team.

Within a period of 2 years, 250 t and 400 t of bronze and steel respectively were formed thus realising the cus-

tomers conceptual presentation in a larger-than-life format. A total of 1,250 bronze parts were ultimately needed in order to assemble the sculpture as a 3D puzzle around the supporting steel structure. The dimensions were truly enormous as each of the castings was approx. 3 m² large and weighed 200 kg.

In order to be able to safely realise the bronze sculpture on site as well as within the planned time frame, the metric 25-cm scaffold grid provided the required maximum level of flexibility in all directions. As a result, suitable working and access levels for the craftsmen and metal designers were created – adapted on the outside and inside to match the complex, organic form as well as continuously following the erection progress. In addition, auxiliary building sections simultaneously under construction which were to be joined to the sculpture also had to be taken into account during the scaffold planning and assembly. For this, PERI UP could be ideally combined with system components taken from the VARIOKIT Engineering Construction Kit – a big advantage, especially for large-span bridging.



VARIOKIT System Components supplemented the PERI UP Scaffold Solution in particular for the large-span bridging.

PERI UP provided very safe working conditions for the craftsmen and metal designers during the realisation of the 33 m high bronze work of art.

The Modular Scaffolding could be flexibly adapted to suit the organic form in 25 cm increments.

With the help of the PERI UP Scaffold Solution, more than 1,000 bronze castings for the Pegasus sculpture were joined together and welded on site.



Flexible system solutions for a range of different tasks



Contractor
SU-10 Fundamentstroy CJSC
Field Service
PERI Russia, Noginsk



PERI UP shoring towers support the MULTIFLEX Girder Slab Formwork in order to efficiently construct the cast in-situ slab at a height of almost 8 m.



The two modular construction systems, VARIOKIT and PERI UP, formed shape-generating shoring for realizing the inclined grandstand stringers.



Dmitry Kovalenko,
Roman Gaychenya,
Viktor Nazaruk;
Supervisors

“The Dynamo Stadium is unique. In order to successfully deal with the complex tasks, the close cooperation with the PERI specialists was particularly important for us. This teamwork, together with the corresponding supply of formwork and system equipment, supported us during the realization of the complex building construction. As a result, we could meet the deadlines and also achieved high quality of finish.”

The new construction of the multifunctional sports and event arena in Moscow required very detailed formwork planning as well as the combined use of versatile system equipment.

The VTB Arena is the new home ground for the Russian football club FC Dynamo Moscow. The 26,000 capacity stadium is an extraordinary multifunctional arena equipped with the very latest technology, and has been designed to host a wide range of events and thus ensure a high degree of utilization. The football pitch and ice hockey arena are accommodated under one roof and, within only a few hours, the facility can be converted into a basketball hall or concert venue.

The new football pitch is positioned 8 m above the old playing surface; this means an extensive underground area is available for parking and retail businesses. Only the listed west facade testifies to the existence of the otherwise completely demolished old Dynamo Stadium. For ensuring on-time completion of all in-situ concreting operations, PERI engineers developed a formwork and shoring solution based on multifunctional system equipment.

The reinforced concrete walls were formed with help of VARIO GT 24 Girder Wall Formwork and TRIO Panel Formwork. For the construction of the columns which featured a wide range of dimensions and ground plans, use of the VARIO and SRS Column Formwork Systems resulted in excellent concreting results. For forming the circular walls, the continuously adjustable RUNDFLEX Circular Formwork system was used. This was – as part of the reinforcement measures along the historic stadium facade – assembled together with SB Brace Frames for carrying out single-sided formwork operations.

For the realization of the massive reinforced concrete slab under the pitch, PERI engineers supported the MULTIFLEX Girder Slab Formwork solution with almost 8 m high PERI UP Shoring Towers. ST 100 Stacking Towers and MULTPROP Alu Props ideally supplemented the shoring concept, for example, through the temporary provision of re-shoring.

Museum and cave replica with complex shapes

“The Centre International d’Art Pariétal (CIAP)” museum complex in south-western France is the impressive result of a formwork concept designed in great detail. The rather complex shapes along with the highest surface quality requirements demanded an extensive range of planning services and continuous on-site supervision. In addition, the full range of safety equipment featured in the formwork solution met the very stringent requirements.

The world famous Lascaux caves has been a UNESCO World Heritage Site since 1979 and the around 17,000 year-old cave paintings found inside are among the oldest known artwork in the history of mankind. With a new, unique visitor’s centre, the exceptional historical heritage is presented as authentically as possible. The exact replica of the cave has been realised on a scale of 1:1 and allows visitors to move through the historic cave virtually by means of augmented reality; the valuable cave paintings are presented using a range of modern visual effects.

The complex is perfectly integrated into the hilly landscape as the building follows the contours and is pushed, as it were, under its surface. The very impressive design has been realized through a range of inclined walls up to 13.50 m high. The construction of the approx. 2,500 m² wall surface complete with varying inclinations was carried out using PERI standard systems and supplemented by safety equipment of the highest standard. FinPly formlining was used to cover the entire wall formwork which meant concrete surfaces could be realized in a high quality execution.

The numerous inclined walls were constructed with TRIO panel formwork. For concreting as well as anchoring and connecting the elements, the modular MXP Platform System provided safe access from all sides. With corresponding end platforms and guardrails, PERI’s French engineers provided safe and reliable end-to-end anti-fall protection. Customized elements on the basis of the VARIO GT 24 Wall Formwork System were used in particular in the corner areas which featured two wall surfaces with inclinations in opposite directions thus resulting in complex intersections.



The wall formwork combination using TRIO and VARIO allowed the construction of the 13.50 m high walls with variable inclinations.

Modular safety: the MXP Platform System exactly matches the element widths of the MAXIMO and TRIO Panel Formwork Systems.

The MXP Platforms are securely connected with the TRIO components. With only a single crane lift, complete large-area units could be moved.



Contractor
Sopreco – BTP Lagarrigue
Field Service
PERI SAS, Bureau central de Meaux and Agence Sud-Ouest, France



Joseph Bernardo
Site Manager

“Having taken all possibilities into consideration, we chose the TRIO and VARIO wall formwork systems for realising the inclined walls of the Lascaux project. The handling of the TRIO elements is simple and practical at the same time, and the inclined surfaces could be joined together without any problems whatsoever – in spite of the changes in inclination between the individual wall sections. After carrying out some adjustments, the VARIO formwork proved to be a very sensible choice for forming the adjacent walls with counter-positioned inclinations.”



The Italian Expo Pavilion was an architecturally extremely challenging assignment and had to be realized within a very narrow time frame. For this, special customized formwork elements were combined with TRIO Standard Panels which ensured simple and fast working operations.

For the World Expo in Milan, the host country presented an architectural highlight: the 35 m high "Palazzo Itali", a complex shaped reinforced concrete building featuring 6 floors and a photo-

voltaic glass roof, embraced by a delicate outer envelope ("skin"). Compared to the other pavilions, the structure was the only permanently piece of architecture at Expo 2015.

In order to meet the scheduled completion date, construction crews worked around the clock in 3-shift operations. In addition, the PERI project management team organized material logistics and technical support through its efficient on-site support activities with corresponding availability at short notice. In particular, however,

PERI Italy planned and produced in a TRIO-compatible special formwork within a very short space of time which, in connection with formwork and scaffolding systems taken from the PERI rental park, considerably accelerated the construction progress. On site, a PERI supervisor ensured efficient working operations right from the start.

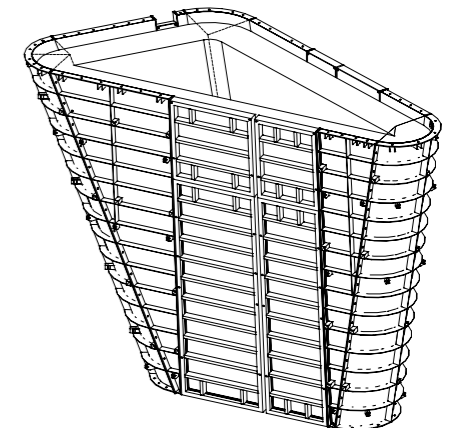
Slabs were formed with SKYDECK and MULTIFLEX with support using PEP and MULTIPROP Slab Props. The high loads were safely transferred by means

Contractor
Italiana Costruzioni S.p.A.
Field Service
PERI S.p.A. Italy, Basiano



Gianni Scenna, Site Manager
Stefano Riccò, Senior Site Engineer

"It was a big challenge to realize this geometrically demanding building in reinforced concrete within the extremely tight time frame. Thanks to the PERI solution, the combination of standard systems and customized elements which were specially produced for our project, we could work more logically and productively. In addition to this was the close cooperation with the PERI engineers and supervisors so that we were able to maintain the planned construction schedule and achieve the best results."



of aluminium MULTIPROP Props – also across the height of several floors – until the inherent load-bearing capacity of the structure had been reached. PERI UP Flex served as a modular load-bearing system for formwork support as well as the structural steel assembly, and optimally adjusted in 25 cm increments to match the com-

plex geometry and corresponding load concentrations.

For the quiver-shaped reinforced concrete components, precisely manufactured special steel formwork elements were connected with standard TRIO Elements. The modular formwork solution could therefore be used for the

range of heights, and ensured simple and fast work operations also for such complex building structures. For forming the walls, a total of 2,000 m² of TRIO Panel Formwork was used; in addition, the elements were also compatible for use with RUND FLEX Circular Formwork and TRIO Column Elements.



Lightweight aluminium MULTIPROP Slab Props were used to provide support over the height of several floors.



PERI Italy planned and delivered almost 800 m² of special steel formwork as well as 2,000 m² TRIO and 2,500 m² SKYDECK in a very short time.



The Palazzo Italia: from a total of 68 entries, Nemesi & Partners was selected as the winner of an international architectural competition.

Dubai Frame, Dubai, United Arab Emirates

Self-climbing formwork for angular core geometry



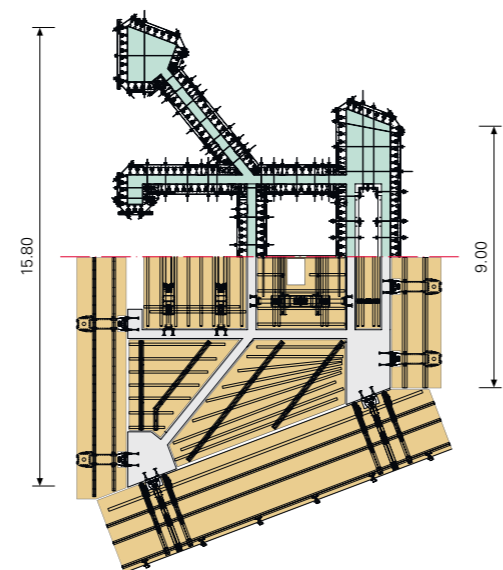
For realizing this iconic walk-in work-of-art structure, PERI formed a project team comprised of climbing and formwork specialists. From the very beginning right through to the end, they supported the complex shell construction with precisely matched execution solutions on a system equipment basis. As a result, the angular core geometry could be realized within the very tight dimensional tolerances; in addition, 30 days construction time was saved.

The Dubai Frame is a huge frame located in the middle of the green Zabeel Parks: 155 m high and 93 m wide – without doubt the largest picture frame in the world. The real backdrop of Dubai serves as the work of art. Glass elevators take visitors to the top where they can enjoy breathtaking panoramic views from the 75 m bridge structure which is fixed between the two towers – visitors see old Dubai on one side and to the other side new Dubai with its skyscraper architecture. In the centre of the bridge, a 120 m² glass floor provides an additional perspective of a direct view to the ground far below. Also at the base, both towers are connected by an accessible podium which optically closes the picture frame and creates additional space for exhibitions.

The frame profile itself has a very special shape. Both towers were built as reinforced concrete structure with a trapezoidal-shaped, extremely slender ground plan. Within the angular core geometry, the partly only 30 cm thick walls had to be concreted and climbed. For this, the PERI engineering team from Dubai designed a bespoke formwork solution in collaboration with ARP to suit the specific project conditions. They combined three different ACS Self-Climbing versions with VARIO Girder Wall Formwork and TRIO Panel Formwork. Within the narrow shaft dimensions, the elevated and suspended platforms along with the integrated access technology provided valuable working space and a maximum level of safety. Thus, work could be carried out crane-free achieving a 3½ days climbing cycle time which saved valuable construction time.

Numerous other execution solutions rounded off the PERI complete package – for example, for the tops of the two towers. In the transition area to the 2.100 t bridge steel construction, the cores had to be reinforced with the formwork solution being adapted accordingly. For transferring the loads of the up to 3.50 m cantilevered and 1.40 m thick intermediate slabs, SB Brace Frames were used horizontally.

Similarly, the inclined reinforced concrete columns could also be realized on the ground with the help of system components – by means of a load-bearing system based on the VARIOKIT Engineering Construction Kit and PERI UP Modular Scaffold System.



Contractor
Al Rostamani Pegel L.L.C. (ARP)
Field Service
PERI L.L.C., Dubai, United Arab Emirates



Tobias Heilig
Project Manager

“With PERI, we have already realized numerous projects and know the high-end solutions as well as the high standard of service. For this project, the complexity of the building’s structure was initially easy to underestimate but we were always supported on-site whenever needed. In the end, we could climb in 3½-day cycles thus saving a total of 30 days construction time.”

UTEC University Campus, Lima, Peru

Grandstand-style campus realized in a short construction period



Contractor
Graña y Montero S.A., Lima
Field Service
PERI Peruana SAC, Lima



Humberto Cueva Carrascal
Site Manager

“With the selected PERI systems, we have achieved an enormous work performance as well as the high level of execution demanded by the client.”

The provision of correspondingly large quantities of materials as well as the selection of the correct system in each case to meet the different requirements were decisive factors in order to complete the architecturally-demanding university campus structure within the given tight construction schedule.

The new campus building of the UTEC University (Universidad de Ingeniería y Tecnología) is in the shape of a huge arena: to the north in the direction of the motorway, the reverse-inclined outer facade has the effect of a steep, artificial cliff. To the south, the 10-storey, almost 50 m high structure cascades downwards in a series of steps – similar to that of a grandstand in a sports stadium.

In the space of only 15 months, 40,000 m³ of concrete and 4,500 t of steel were brought into the required shape. For this, PERI’s Peruvian engineers developed a comprehensive, project-specific formwork and scaffolding solution. Thus, it was possible through economical means to realize the shell construction within the very tight construction schedule in spite of having only three cranes available.

The lightweight – and mostly moved by hand – LIWA and DOMINO Panel Formwork Systems reduced crane utilization for shuttering the walls – whilst simultaneously guaranteeing fast forming times. For the construction of the numerous architectural concrete walls, VARIO GT 24 Girder Wall Formwork achieved optimal results. In combination with the CB Climbing System, the platforms and formwork were moved

as single climbing units in one crane pick – this shortened the crane and construction time respectively.

The MULTIFLEX Girder Slab Formwork was supported by aluminium MULTIPROP Slab Props as well as PERI UP Shoring Towers. As a result, the grandstand-style, staggered floor slabs with varying floor plans, slab thicknesses and floor heights could be optimally

constructed. Especially in the area of the reverse-inclined north facade, the high loads were safely transferred over several storeys by means of PERI UP. Here, cantilever-mounted VARIOKIT Bracket Units also served as erection areas for the shoring required for subsequent floors.



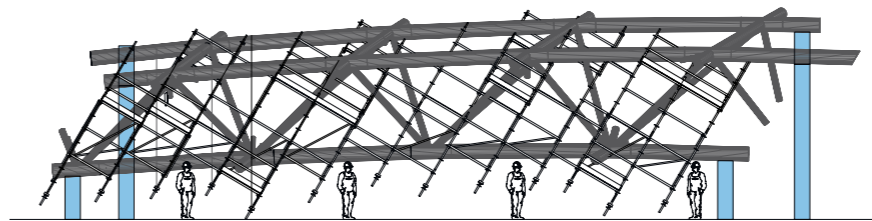


Suspended PERI UP Working Platforms ensured the safe installation of a spectacular stadium roof in Singapore.

Singapore's new national stadium accommodates 55,000 spectators and is designed to cater for more than 150 different sports as well as hosting concerts and holding parades. As one of the most modern sports venues worldwide, the sports complex also features a movable roof construction. In spite of the enormous dimensions, with a 312 m span and a height of 80 m, the roof can be completely closed in only 20 minutes and provides protection against the sun and rain in a very short time. The vaulted roof architecture prevents any heat accumulation inside the stadium itself and can be opened in a south-west direction which ensures optimum air circulation. In addition, this provides spectators with an impressive unobstructed panoramic view of Singapore's skyline.

For the assembly of the steel roof construction, PERI UP Flex Modular Scaffolding could be flexibly adapted to suit the spatially complex geometry of the steel framework and thus ensured safe working conditions. PERI UP had already been fixed to the roof trusses on the ground and subsequently lifted as a complete unit with the crane into position. SRU Steel Walers from the PERI rental pool served as the basis for the realization of the suspended scaffolds. All required working levels were therefore available from the beginning onwards – without any time-consuming assembly operations at great heights.

The basis for the exact arrangement and alignment of the suspended scaffolds was the detailed 3D planning by PERI scaffolding specialists with the help of PERI CAD. On site, the lightweight components along with the largely tool-free assembly operations accelerated the scaffolding work while the high node rigidity and the system-integrated protection against lifting of the PERI UP system decks guaranteed stability and a high level of working safety.



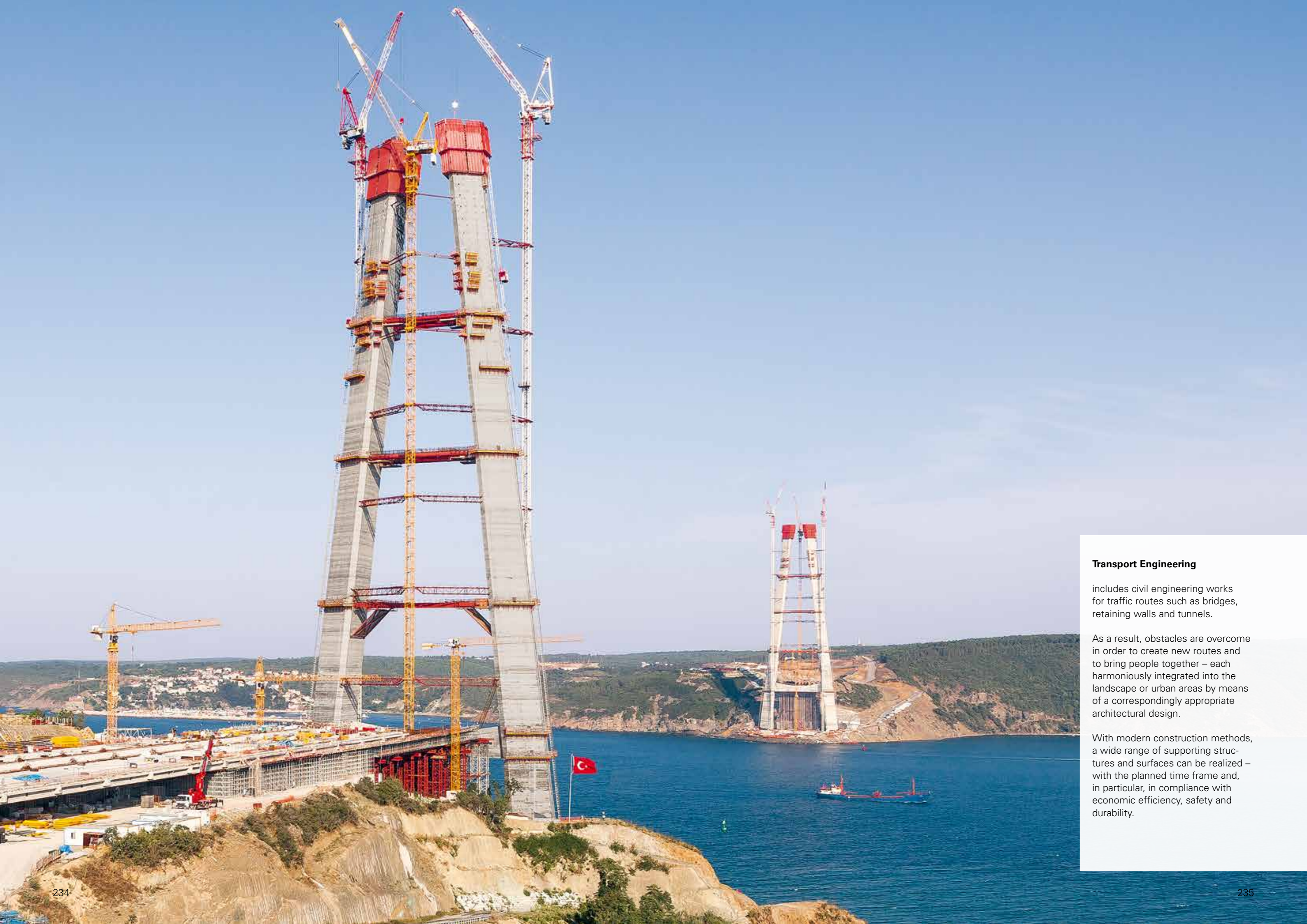
Bernward Stube
Director (Dulan)
Abhimandran Harendran
Project Coordinator (Yongnam)

“PERI UP Flex has proven to be a safe, flexible and productive system which supports and facilitates the installation of the structural steel roof for the stadium of the Singapore Sports Hub.”

General Contractor
Dragages Singapore Pte Ltd
Steelwork Company
Yongnam Engineering and Construction
Dulan Asia Pacific Pte Ltd
Field Service
PERI Asia Pte. Ltd., Singapore

75 cm wide aluminium staircases guaranteed fast and safe access to the PERI UP Suspended Scaffold Platforms.





Transport Engineering

includes civil engineering works for traffic routes such as bridges, retaining walls and tunnels.

As a result, obstacles are overcome in order to create new routes and to bring people together – each harmoniously integrated into the landscape or urban areas by means of a correspondingly appropriate architectural design.

With modern construction methods, a wide range of supporting structures and surfaces can be realized – with the planned time frame and, in particular, in compliance with economic efficiency, safety and durability.

Third Bosphorus Bridge, Istanbul, Turkey

Highest bridge pier in the world formed with ACS



The 1,408 m long suspension bridge across the Bosphorus is supported by two A-shaped reinforced concrete pylons – the highest in the world with a height of 326 m. The demanding geometries and complexity of the mounted parts required a very flexible planning process in the form of a complete solution.

The 59 m wide Yavuz-Sultan-Selim-Bridge carries 8 lanes and two railway tracks with a span of 1,408 m across the Bosphorus, and connects – as part of the new North Marmara Motorway – the European and Asian continents. For the construction of the two pylons, efficient workflow processes as well as very high productivity and extremely short cycle times could be achieved with the ACS self-climbing system and VARIO GT 24 girder wall formwork. In addition, the high requirements in terms of flexibility, surface quality and dimensional accuracy were maintained throughout.

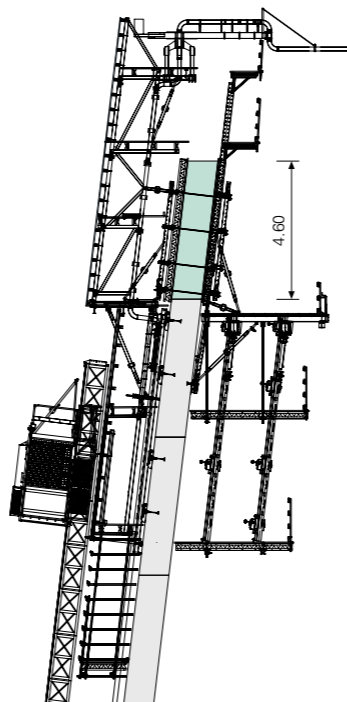
Construction of the upper area of the pylons was carried out in a total of 21 sections each with a 4.60 m concreting height. ACS V, the continuously adjustable version for all inclinations, could be optimally adapted to match the forward and reverse slopes of the side surfaces. For the almost vertically-positioned surfaces, forming was carried out using the standard ACS R version. The internal formwork was climbed with the help of the ACS V and ACS P

platform variant. All ACS climbing units were provided with completely closed trapezoidal sheet cladding which provided anti-fall protection as well as additional wind and weather protection for site personnel in the lower levels. For the reinforcement work carried out in advance in the upper platforms, the perforated sheeting offered a high level of safety and let in daylight.

The triangular-shaped base structure with broken corners tapered constantly upwards. Over the height of the pylon, the 3 long polygon sides are reduced by 1.40 m respectively. Formwork adjustment took place using compensation plates and bolted filler elements which were gradually dismantled as required, while working platforms were adapted by means of centrally positioned filler platforms.

On the forward-inclined ACS platforms, a rotary distributor for concreting was climbed at the same time while access to the elevator was also integrated in the self-climbing system during the planning phase. In particular, for the assembly of the large-sized steel mounting components for the stay cable holding devices, the PERI solution offered the required flexibility. Any collisions with the stay cable boxes could be avoided whereby their dimensions and positions had already been taken into consideration when determining the climbing axes.

General Contractor
ICA – Consortium IC İçtaş / Astaldi
Contractor (Shell Construction)
Hyundai Engineering & Construction /
SK Engineering & Construction J. V.
Field Service
PERI Kalıp ve İskeleleri San. ve Tic.
Ltd. Şti Turkey, Istanbul and PERI
Weissenhorn, Germany

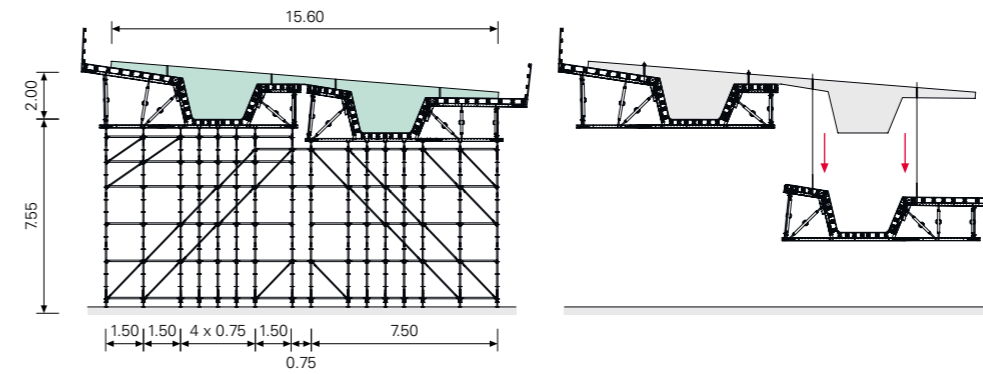


Samet Seyhan, Project Manager (ICA)
Evans Baek, Deputy Project Manager (Hyundai/SK)

“The pylons are unique and extremely complicated due to the inclined conical shape and the numerous embedded items. The ACS system was the right decision for this type of bridge project because of the huge experience of PERI. Getting competent and comprehensive support to suit our tight schedule and providing completely safe working platforms at all levels and at any height were other positive aspects of PERI ACS system.”

Ayalon Highway Bridge, Ga'ash/Shefayim, Israel

Modular bridge construction solution with short moving times



Contractor
T.O.N. Infrastructure Works Ltd.
Field Service
PERI F.E. Ltd., Rosh Ha'ayin, Israel



Rem Nahshon
Project Manager

“Building a bridge reveals many challenges along the way. PERI was the best partner for that matter, being focused on our requirements with innovative design and ideas, on-site support and excellent equipment: PERI UP as ‘stand-alone’ shoring and VARIO-KIT as stiff formwork units.”

For routing the highway over a railway line, PERI’s Israeli engineers ideally matched the superstructure formwork with the shoring. The fast assembly and fast cycle sequences saved working time and accelerated the construction progress.

The Ayalon Highway (20) is the main traffic artery of the region in and around Tel Aviv. It is being extended to the north and, at Shefayim, it joins Highway No. 2 which heads in the direction of Haifa running parallel to the Mediterranean coast. For crossing a railway line, the construction of a 450 m long bridge was required.

The 15.60 m wide superstructure of the 12-section bridge was constructed with T-beam cross-sections using in-situ concreting operations. Webs and plates could be concreted in one pour with the help of PERI bridge formwork – without requiring any additional horizontal anchoring through the webs. VARIOKIT raised formwork units were positioned on supporting scaffold based on the PERI UP Modular Scaffold system. For this, 1.50 m wide and 15.75 m long framework units were formed while load-optimized adjustments were carried out by integrating 150 cm and 75 cm field widths. For realizing the construction in only

4 cycles, the concreting cycle lengths were each 115 m.

The special feature of the PERI solution was that the generously-dimensioned formwork units could be fixed to the bridge superstructure by means of DW 15 tie rods after concreting and curing had taken place. As a result, the relieved PERI UP supporting structure could be quickly moved to the next cycle each time. The formwork units were subsequently lowered using winches and could likewise be transported to the next phase of construction without requiring any time-consuming dismantling work.

The two modular construction systems, PERI UP and VARIOKIT, could be flexibly adapted to suit the bridge geometry and loads.



The approx. 8m x 3m generously-dimensioned formwork units on the basis of the VARIOKIT Engineering Construction Kit could be moved using only one crane lift thus saving time.



The PERI formwork and shoring solution as well as the continuous on-site support accelerated the construction work on the 450 m long motorway bridge (Building Structure 301).



Harpe Bru Bridge, Sør-Fron, Norway

VARIOKIT balanced cantilever solution optimized construction progress



Contractor
JV Harpe Bru ANS
Porr Infrastructure Polska; Implenia Norge AS
Field Service
PERI Poland Sp. z o.o., Plochocin z o. o.



The VARIOKIT balanced cantilever solution resulted in dimensional stability while the formwork facing with its board structure provided excellent concrete surfaces.



The combinability with PERI UP facilitated the realization of safe working areas along with access to all areas of operations.

For the bridge superstructure, PERI civil engineering technology experts developed a balanced cantilevered solution based on the VARIOKIT System. The high degree of flexibility regarding the cross-section adaptation supported the rapid construction of the individual concreting sections while simultaneously ensuring optimized workloads.

The 320 m long cable-stayed bridge over the Gudbrandsdalen-Lågen in the Oppland province is part of the European Route E6 expansion project. The extradosed construction method, with the tendons positioned outside of the bridge cross-section, was used for the first time in Norway and allowed a low overall height of the superstructure and pylons. The span between the two

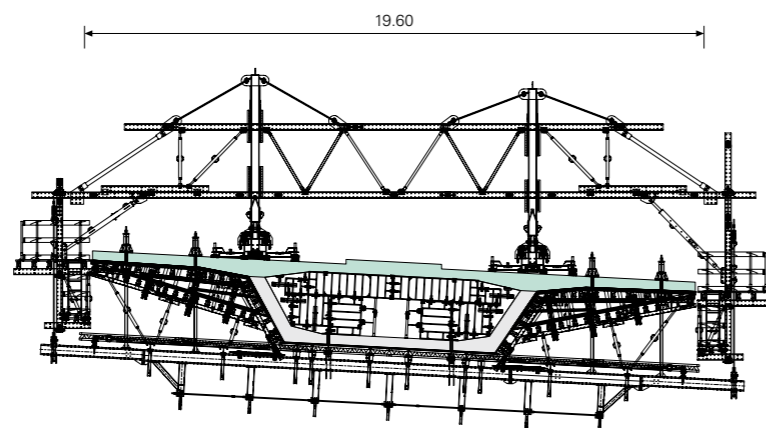
pylons is 100 m while two additional piers along with the abutments are positioned on the land.

The PERI solution for forming the 19.60 m wide superstructure consisted of 4 VARIOKIT Balanced Cantilever Carriages which were used to realize 5.55 m long segments in each case. In the process, the system was flexibly adapted to suit the geometric cross-sectional changes and the varying, in part, very high loads with constantly load conditions. In particular, the planning took into account the cable arrangement of the segment suspensions in order to prevent collisions with the balanced cantilever equipment. In addition, 1.30 m high transverse ribs were realized together with the bottom slab and side walls of the hollow box

girders. The carriageway slab was subsequently concreted in a second casting segment.

VARIOKIT minimized the required workload for each bridge section. For example, the independent moving procedure by means of the integrated hydraulics along with fully hydraulically-operable aligning and adjusting led to optimized cycle times. Furthermore, the detailed implementation plans and technical documentation ensured on-site formworking operations could be easily and efficiently carried out. The high proportion of system components from the VARIOKIT Engineering Construction Kit as well as the high availability of materials in the PERI rental park ensured a high level of cost-effectiveness.

A total of 4 VARIOKIT Balanced Cantilever Carriages ensured rapid construction progress with work taking place on the final gap closure in December, 2015.



Mariusz Urbanski
Construction Manager

“The chosen solution of using VCB Balanced Cantilevered Carriages proved itself to be correct. Thanks to the high flexibility of the system, we could optimize our project so that the workload necessary to pour each segment was as short as possible. It also had a measurable influence on the assumed schedule.”



Lanaye Lock Bridge, Belgium

Individual project solution with a construction kit system



The 136 m long main crossing was constructed with the help of two VARIOKIT Steel Composite Formwork Carriages using the alternate sequential method within the planned time frame.

The VARIOKIT Formwork Carriage could be flexibly adapted to match the geometrical and static requirements which included 4.50 m cantilevers.

Both construction variants – formwork carriage and cantilevered brackets – were based on the VARIOKIT Engineering Construction Kit.

The expansion of the Lanaye lock facility required the new construction of a 200 m long road bridge complete with two 90° bends on the river banks.



Pedro Da Guia
Technical Director

“Due to our positive experience with similar projects, we decided once again in favour of PERI. Their technical support within the framework of the tight schedule as well as the project solution using the formwork carriage and cantilever brackets have confirmed our decision.”

Contractor

BESIX Wallonia-Luxembourg, Brussels

Field Service

PERI NV Belgium/Luxembourg, Londerzeel and PERI GmbH Germany, Weissenhorn and Düsseldorf

For constructing the steel composite bridge, PERI engineers adapted the VARIOKIT System solution – formwork carriage and cantilevered brackets – to match the wide range of construction site requirements.

The new 200 m long road bridge crosses the navigation channels of the newly expanded border lock facility between Belgium and the Netherlands at right angles. The S-shaped, 15 m wide bridge structure was realized using the steel composite construction method. With the help of two independently-operating VARIOKIT Composite Formwork Carriages, the 136 m long main crossing was constructed using the alternate sequential method within the ambitious time frame – in 13 casting segments with cycle lengths of 8 m to 12 m.

The Formwork Carriages could be individually adapted to suit the geometrical and static requirements; this was particularly important as the bridge features an unusually large cantilever length of 4.50 m. In the area of the two bend radii – extremely tight at just 30 m – the PERI bridge solution inte-

grated the use of VARIOKIT Cantilever Brackets. In the geometrically and statically complex area of the circular columns, the brackets were arranged radially. Pressure supports transferred the concentrated loads of the external cantilevers into the available bridge piers. For this, system components from the VARIOKIT Engineering Construction Kit were complemented by MULTIPROP 625 Aluminum Slab Props to form the PERI complete solution.

Apart from the use of standardized system components, pre-assembled formwork units delivered to the construction site accelerated the final assembly and ensured rapid and problem-free construction site use from the outset. The dimensionally-accurate fabrication took place at the PERI formwork assembly facilities in Weissenhorn and Düsseldorf. In addition, the site management was provided with ongoing support by Belgian and German PERI engineers from the beginning onwards.

Brdjani Motorway Bridges, Čačak, Serbia

Modular falsework variants on a system basis



Cost-effective: the PERI bridge formwork concept was based on rentable modular construction systems with standardized components.



VARIOKIT Engineering Construction Kit: the head spindles of the 4-legged VST Heavy-Duty Shoring Towers could also be operated when fully loaded by means of mobile hydraulics. In addition, the modular system allowed modifications to take place on the bridge piers as well as the use as 2-legged main beam frame.

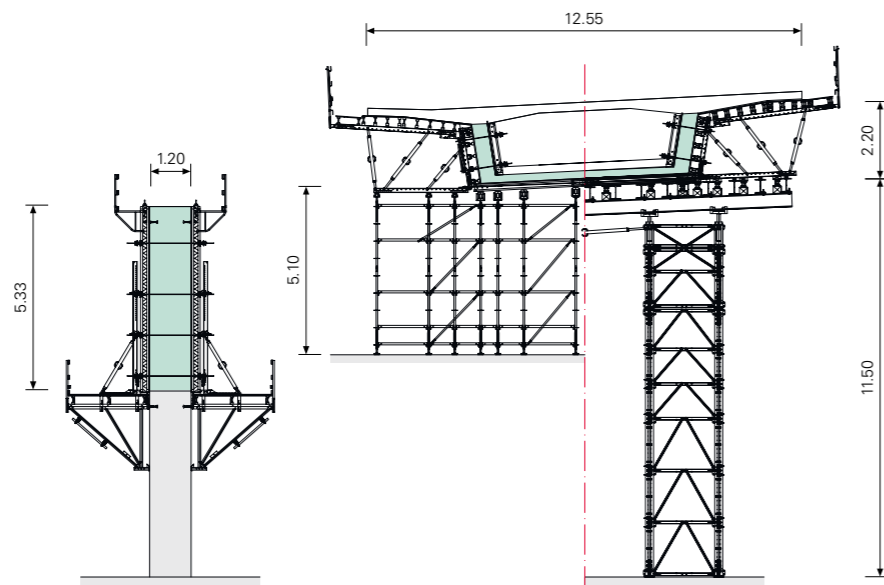
Construction of the two Serbian bridges was realized with the help of modular construction systems. As falsework, PERI UP and VARIOKIT were used according to requirements.

The European Route E 763 was expanded as a motorway link between Belgrade and the border to Montenegro. For the new construction segment north of the central Serbian town of Čačak, two bridges were built within a short section: 232 m and 424 m long respectively, with individual spans ranging between 32 m and 42 m. Both structures have a 12.55 m wide and 2.20 m high superstructure with hollow box cross-sections which rest on massive reinforced concrete piers.

For the load-bearing system of the superstructure formwork, PERI Serbia combined two falsework variants. As supporting scaffold for the standard fields, PERI UP Framework Units were used. Here, load-optimized adjustment within the shear frames could be real-

ized with bay widths of 50 cm, 75 cm and 150 cm. For the bridge sections in the area of the rivers, roads that were to be kept free along with ground of an insufficient load-bearing nature work was carried out with heavy-duty falsework. Here, VST Heavy-Duty Shoring Towers of the VARIOKIT Engineering Construction Kit transferred the high, concentrated loads into the ground.

All the customized formwork elements for the superstructure – as done previously for the bridge piers – were pre-assembled by PERI formwork assembly team at PERI Serbia's Simanovci facility near Belgrade and delivered ready-for-use to the bridge jobsite. This saved time-consuming assembly work on the construction site and ensured compliance with the extremely short construction schedule as well as a high quality of workmanship.



Construction of the reinforced concrete piers was carried out with CB/VARIO Climbing Formwork units. Adapted to meet the local conditions, the superstructure formwork was supported on PERI UP Framework Units and VARIOKIT Heavy-Duty Shoring Towers.

Contractor
GP Planum AD, Belgrade
Field Service
PERI Oplate d.o.o., Šimanovci, Serbia



Aleksandar Milenković
Site Manager

"PERI developed an excellent technical solution for our very challenging project. All systems used on the construction site were easy to use; in addition, PERI engineers provided us with regular and reliable on-site support."

Ohio River Bridge “East End Crossing”, Louisville, USA

Climbing formwork and shoring solution for complex pylons

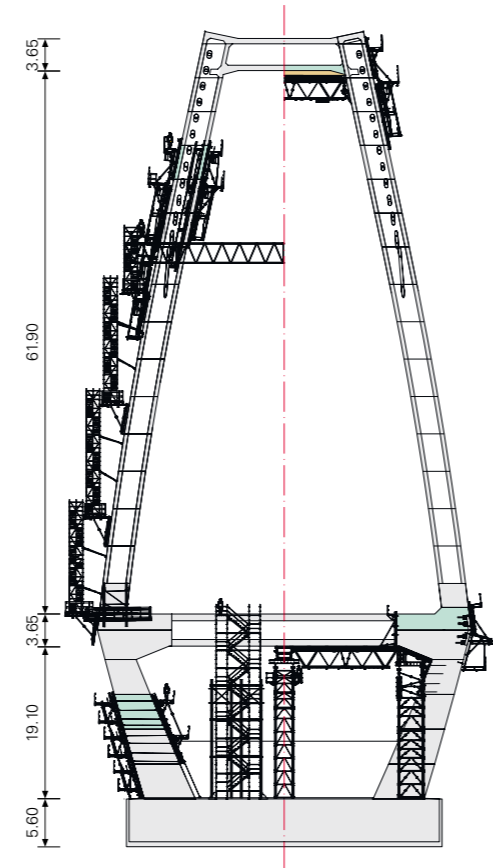


Heavy-Duty Shoring Towers and Truss Girders from the VARIOKIT Engineering Construction Kit provided a solid basis for forming the cross beams at the level of the road surfaces.



Continuous construction support and a competent planning service: the catwalk featured between the two pylon legs was also an integral part of the PERI complete solution.

Contractor
Walsh/Vinci Construction
Field Service
PERI Formwork Systems Inc., Chicago, USA, and
PERI Germany, Weissenhorn



Perfectly matched formwork, climbing, shoring and scaffolding systems ensured rapid construction of two bridge pylons with their complex shapes – within the specified construction period as well as dimensional tolerances.

The 762 m long cable-stayed bridge over the Ohio River connects the states of Kentucky and Indiana. The new bridge is part of the nearly 14 km long road construction project which is designed re-route the Interstate 64 to the north of Louisville.

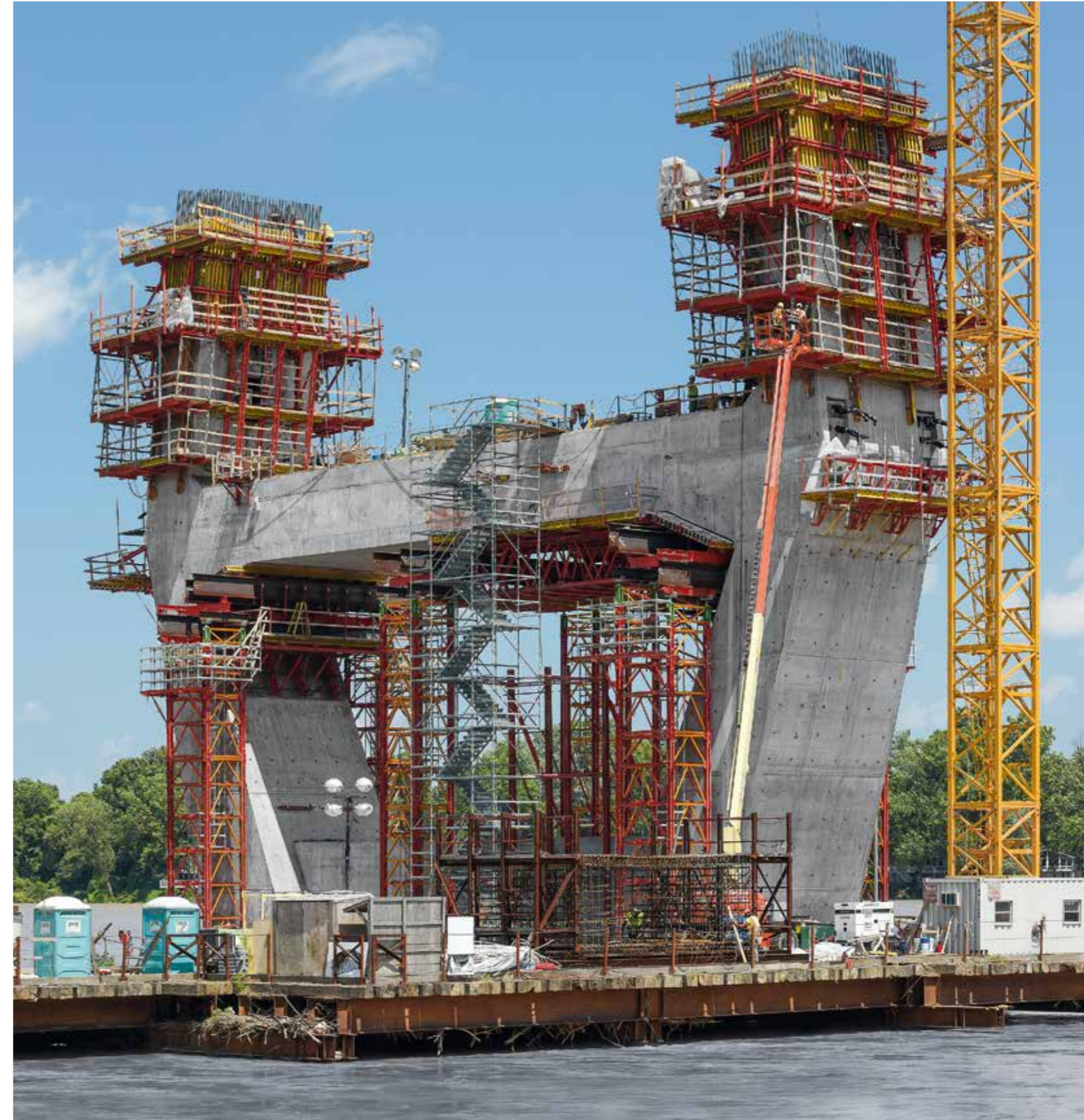
The span of the main bridge section reaches 365 m, and the carriageway is carried by means of stay cables supported by two reinforced concrete pylons, each 90 m high. The lower, outwardly-inclined pylon legs are solidly constructed while in the upper segment, the pylon legs are inclined inwards and feature hollow box cross-sections. The cross-sections taper in an upwards direction, and a slight curvature causes a continuous change in the angle of inclination from casting segment to casting segment. Two 3.65 m thick cross beams – one at road surface level and the other at the upper pylon reinforcement – were also realized using in-situ concreting operations.

From the bottom to the very top, each construction phase presented a particular challenge in terms of geometry and load transfer. For this, a German-American PERI project team developed and delivered a complete solution – on the basis of several formwork and scaffolding systems taken from the extensive PERI rental pool. VARIO GT 24, ACS and RCS Self-Climbing Formwork, the single-sided SCS Climbing System, VARIOKIT Shoring and the PERI UP Scaffolding Kit could be perfectly matched to one another – and ensured fast cycle sequences, high load-bearing capacities and a maximum level of safety during all stages of construction.



Mike LaSalle
Senior Project Superintendent

“The ACS Self-Climbing System and heavy-duty VARIO formwork have allowed us to meet the project’s tight tolerances and schedule demands. PERI’s extensive site service and engineering support have aided us in tackling the many project complexities.”



Chamiza Viaduct, Puerto Montt, Chile

Load-bearing system combination for massive pier heads



Ideally matched systems form the basis for efficient and cost-effective construction operations. In particular for the realization of Chamiza bridge piers complete with massive pier heads up to 40 m high, PERI Chile provided materials and know-how from a single source. The complete solution for formwork, supporting structure and access technology was based largely on standardized system components.

The Chamiza Viaduct is an important section which connects Route 7

(Carretera Austral) in the south of Chile near Puerto Montt to the well-known Pan-American Highway, Route 5. Together, both highways form a 4,700 km stretch of road from the Peruvian border in the north almost all the way to Tierra del Fuego.

Nine, up to 40 m high piers support the 410 m long bridge over a valley floor. For constructing the double piers with hollow box cross-sections, VARIO GT 24 Girder Wall Formwork and CB Climbing Platforms were combined to create craneable moving units. This

ensured – also in connection with successively height-extended PERI UP Stair Access – fast and safe work processes from the beginning onwards.

The 4.00 m deep and up to 2.20 m high pier heads widen to more than 23 metres. For this, PERI engineers designed an extended cantilevered bracket solution to form a stable contact area and high load-bearing surface for the formwork on the basis of the VARIOKIT Modular Construction System. With the help of VARIOKIT system components, the loads

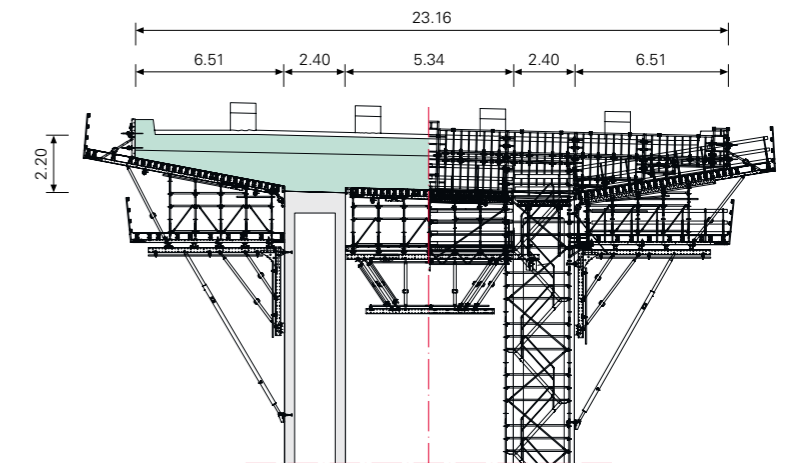
between the double piers could also be reliably transferred. Construction time was accelerated in particular by the fact that complete units were assembled on the ground which could then be lifted by crane into the intended position.

Contractor
Consorcio Viaducto Chamiza S.A.;
Besalco Construcciones S.A.; Arrigoni Montajes
Field Service
PERI Chile Ltda., Santiago de Chile



Carlos Rauch
Senior Project Manager

“For this unprecedented bridge project, with PERI we found a partner with the corresponding experience and technical support. For us, the formwork solution was perfect in all respects – it provided our site personnel with a high level of safety, was easy to install as well as being cost-effective. This positive experience can – and also due to the added value through competent on-site support and high product Quality – hardly be beaten.”



Customized system combination: above the VARIOKIT construction, PERI UP served as a shape-providing load-bearing system. TRIO Panel Formwork was used as side formwork while PROKIT Side Mesh Barriers mounted end-to-end provided a high level of safety when working at great heights.



The CB Climbing System and VARIO GT 24 Girder Wall Formwork formed crane-movable climbing formwork units for the up to 40 m high double piers.



Also for bridging the main road situated in the ramp area of Chamiza Viaduct, PERI UP and VARIOKIT supplemented each other perfectly.

Mur Bridge S 35, Frohnleiten, Austria

Large span with low weight and high load-bearing capacity



Heimo Egger
Assembly Supervisor

“The VARIOKIT heavy-duty truss system with the variable starting frame has set new standards in shoring operations. It reduces the amount of assembly work required especially for inclined supporting structures. The accuracy of fit as well as aligning the pairs of trusses also make a convincing case.”

For the construction of the Mur Bridge, the modular VARIOKIT Heavy-Duty Truss stood out through its extremely high load-bearing capacity with a comparably low weight. In addition, the system components could be quickly installed and had a very flexible use.

The altogether 406 m long new bridge construction near Frohnleiten is the centrepiece of the S 35 motorway modernization project between the Bruck/Mur and Graz intersections. The new structure completely replaced the existing 60-year-old bridge which runs alongside. The pre-stressed concrete superstructure was designed as a 11.75 m wide T-beam cross-section complete with 2.50 m web heights.

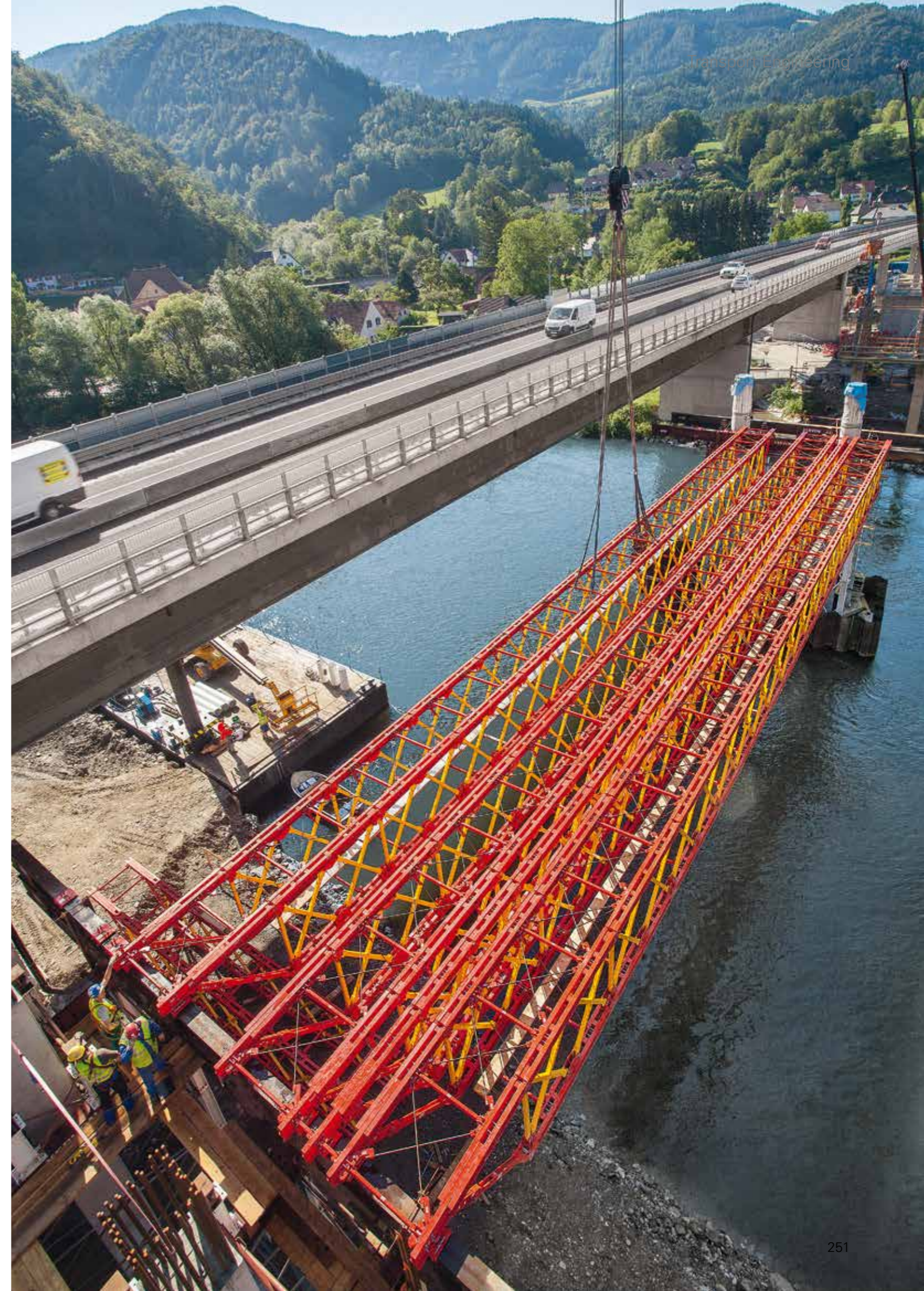
In spite of every respective 40 m spans of the two main bridge sections over the Mur, the construction of the superstructure on heavy-duty falsework by means of framework units was the most cost-effective solution. For this, a German-Austrian team of PERI engineers designed a customised project solution on the basis of standardized, rentable system components from the

VARIOKIT Engineering Construction Kit. The truss arrangement were flexibly determined in accordance with static requirements and featured truss spacings of 50 cm and 150 cm.

In addition to the benefits of the project-specific planning and verifiable static calculations, the rapid availability of materials along with the briefing of scaffold erectors on-site by a PERI supervisor ensured short assembly times from the beginning onwards. In spite of the difficult boundary conditions – assembly and storage areas were extremely limited – this still allowed the construction schedule to be maintained. The lifting of the more than 37 m long coupled trusses by means of a mobile crane parallel to the existing bridge also required an experienced assembly team and perfectly coordinated working steps. A big advantage here was the low weight of the VARIOKIT Heavy-Duty Truss. This resulted in time and cost savings especially during the lifting procedure.

Modular shoring assembly with standardized connections and a minimum of tool usage: VARIOKIT system components were pre-assembled on the ground to form truss segments, placed in intermediate storage, and subsequently coupled to create 37 m long truss units.

Contractor
Bidding Consortium Strabag/Habau
Scaffolding Contractor
XERVON Austria GmbH, Maria Lanzendorf
Field Service
PERI Austria, Nußdorf
and PERI Germany, Weissenhorn



Motorway bridge over the River Drava, Osijek, Croatia

Formwork solution for pylons and superstructure



**Ante Sabljic, and
Anto Vranjkovic,**
Site Manager Pylons and
Site Manager Superstructure

"The VARIOKIT solution perfectly combines functionality, flexibility, reliability and faster assembly. As a result, we could optimally fulfil all technical requirements of the project. As usual, the PERI solution took into account all required details. In addition, the climbing formwork solution is not only very cost-effective but it also allows very short cycle times. The PERI technology used is very practical and we could also achieve a high standard of safety. We would also like to praise the support given to our construction team by PERI engineers before and during construction operations."



As a competent partner, PERI provided customized solutions for constructing the piers, superstructure and pylons – adapted to meet a very wide range of requirements.

The A5 motorway bridge which spans the River Drava, is altogether 2,500 m long. Two 75 m high A-shaped pylons carry the three main sections of the cable-stayed bridge with 220 m and 100 m spans respectively. The approx. 1,000 m long foreshore bridges on both sides are located in the flooding areas, and were realized using pre-stressed prefabricated beams on massive circular columns.

The rectangular cross-section of the pylons is constantly changing – from 6.50 m x 3.50 m in the base area up to 4.00 m x 5.00 m below the converging pylon head. For the realization of this complex geometry, PERI engineers combined the CB and RCS Climbing Systems. On the front sides, the CB 240 Platforms together with the VARIO GT 24 Girder Wall Formwork were moved with the crane. For the up to 18° forward and reversed-inclined outer surfaces of the pylon legs, the rail-guided RCS Climbing Formwork provided the optimal solution whereby the units could be continuously climbed regardless of the weather and without requiring a crane by means of mobile hydraulic pumps. As a result, each of the 24 concreting sections could be completed within an average of 5 days.

RCS, CB and VARIO GT 24 formed the ideal climbing combination for constructing the two bridge pylons.

The new 2,500 m long bridge carries the A5 motorway across the River Drava in east Croatia.

The foreland bridges are supported on 180 cm thick circular columns – here, too, PERI supplied a customized formwork solution.

By means of simple rollers, the formwork and supporting construction could be quickly moved as one unit to the next concreting section.

Contractor
Skladgradnja d.o.o. Split (Superstructure and foreland bridges)
Viadukt d.d. Zagreb (pylons)
Field Service
PERI oplate i skele d.o.o. Hrvatska, Zagreb



The PERI solution for constructing the parapets of both carriage ways was based on the VARIOKIT Engineering Construction Kit. The VARIOKIT Parapet Carriage was used for constructing the external, large-sized parapets. As the loads were transferred via a gallows construction, anchoring in the superstructure was not required. For forming the parapets on the inner sides of the carriageways, VARIOKIT System Components were combined with the PERI UP Modular Scaffolding.

“Place de Martyrs” Metro Station, Algiers, Algeria

Tunnel formwork with record-breaking dimensions



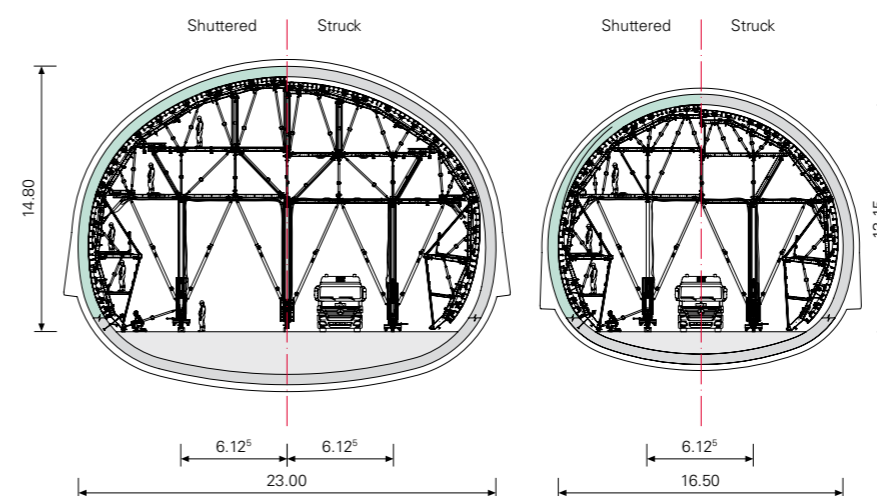
The “Place de Martyrs” metro station in the Algerian capital boasts some very impressive dimensions. For this, the PERI formwork carriage construction on the basis of the VARIOKIT engineering construction kit was customized to optimally meet the specific jobsite requirements, and was hydraulically operated.

144 m long and 23 m wide, the “Place des Martyrs” is one of the largest subway stations in the world. It is the northernmost but also most centrally-located Station – as well as closest-situated to the harbour area – of the extensive Metro expansion project within the city centre with numerous mosques and palaces as well as being directly below the historic old town (Kasbah). In a period of 10 years, the metro network of the Algerian capital is to be expanded and modernized from the current length of 9 km to a total of 55 km.

The imposing arch width of 23 m in the middle section, tapers in the northern and southern directions resulting in 16.50 m widths respectively. PERI engineers developed a formwork carriage construction based on the VARIOKIT engineering construction kit in order to be able to cost-effectively realize both cross-section variants whilst using the same system components and formwork segments. Due to the relatively short 5.10 m concreting cycle lengths, special attention was paid to the design of the bracing.

The VARIOKIT formwork carriage solution was ideally suited to meet all project requirements: user-friendly as it could be hydraulically operated with a control panel, cost-effective due to the rentable system components, as well as quickly assembled or adapted by means of standardized bolted connec-

tions. Supplementing this was a PERI UP working scaffold. This was optimally adapted to match the cross-sectional geometry of the arch and ensured rapid and safe execution of the waterproofing and reinforcement work in advance of the tunnel formwork carriage.



Formwork carriage construction on the basis of the VARIOKIT engineering construction kit: by means of the same system components and formwork segments, both cross-sectional variants could be cost-effectively realized.

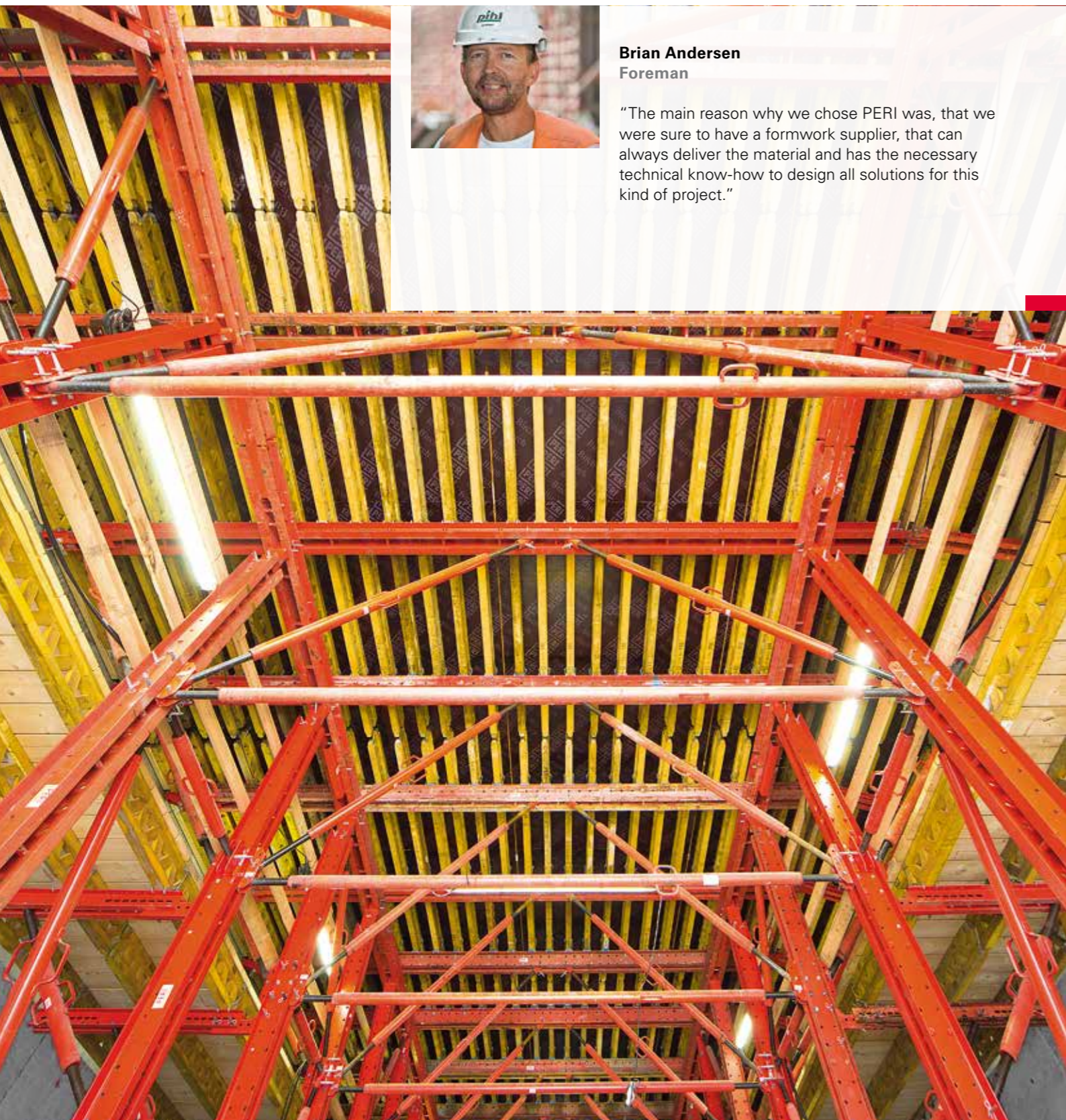
Contractor
GMAC (Groupement Métro d’Alger Centre):
Andrade Gutierrez; Teixeira Duarte;
Gesi TP; Zagope
Field Service
PERI Algeria, Portugal and Germany



Rui Correia
Technical Director

“The VARIOKIT system played a key role in mastering the challenges presented during the construction of the Station – the PERI formwork carriage adapted perfectly to suit the different geometries. With the fast concreting cycle sequence of 15 m per week, the project could be completed ahead of schedule in spite of the high technical and quality requirements.”

The formwork and scaffolding solution for the entire construction project was developed by a team of PERI engineers from Algeria, Portugal, and Germany. In addition to the VARIOKIT formwork carriage construction for the “Place de Martyrs”, a second project formwork carriage with a 9.30 m radius was utilized for the realisation of the “Ali Boumendjel” intermediate station. Two other project-specific tunnel formwork carriages were used for the construction of the 1,450 m long tunnel with its 9 m arch diameter.



Brian Andersen
Foreman

“The main reason why we chose PERI was, that we were sure to have a formwork supplier, that can always deliver the material and has the necessary technical know-how to design all solutions for this kind of project.”

PERI engineers developed a customized formwork carriage solution for the Copenhagen tunnel jobsite using components taken from the VARIOKIT Construction Kit and supplied formwork and scaffolding from one source.

Around 620 m of the altogether 1.65 km long Nordhavnsvej infrastructure project runs underground. In depths of up to 22 m, the two separate tunnel tubes each have 2 vehicle lanes. The double-tube tunnel with a rectangular cross-section was realized using the cut-and-cover construction method. PERI planned and supplied a tunnel formwork solution with wall formwork in advance and a trailing slab formwork carriage. With the customized project solution, the construction crew maintained a 3-week cycle for each of the 25 m long casting segments.

Bottom slab and tunnel walls were formed with TRIO Panel Formwork; in part single-sided against the sheet piling of the excavation pit. For this, TRIO elements were connected to form large-sized units which could be moved very quickly by crane. For the subsequent construction of the 80 cm thick slabs, 4 slab formwork carriages – each 13.50 m Long – on the basis of the VARIOKIT Engineering Construction Kit were used. In order to concrete the respective 25 m long slab sections,



The “Nordhavnsvej – Vej- og Tunnelentreprise” major infrastructure project connects the North Harbour in Copenhagen with the Helsingør motorway. The 620 m long tunnel route runs through a very densely built-up inner city area and also crosses a busy railway line.

2 formwork carriages were coupled one behind the other. A hydraulic solution simplified and accelerated the lifting and lowering of the tunnel formwork carriages. A clever solution: the subelement for the haunch to the centre wall could be folded down by means of spindles; for this, the VARIOKIT construction was equipped with cantilevered working platforms. The fact that well over 90% of the PERI Formwork Carriage solution consisted of rentable core and system components ensured maximum operating efficiency.

The working scaffolds and access stairways to the working areas were also part of the PERI formwork and scaffolding concept. PERI UP Stairs securely mounted on the formwork carriage served as integrated access to the slab formwork. For the walls, 7.50 m long PERI UP reinforcement scaffold complete with transportation wheels was quickly moved to the next place of use each time. This saved valuable crane time and also allowed moving operations to take place in the area of crossing the railway line even when no crane was available.

Contractor
Consortium E. Pihl & Son A.S. and Ed. Züblin AG
Field Service
PERI Denmark A/S, Greve and PERI Germany, Weissenhorn

The VARIOKIT Formwork Carriage solution took into account a 4.30 m wide and 4.00 m high access opening for unimpeded construction site deliveries as well as hydraulic support for simple lifting and lowering.



Enclosure Structure for the Tauern Motorway A10, Zederhaus, Austria

1.5 km long tunnel in 4-day cycles



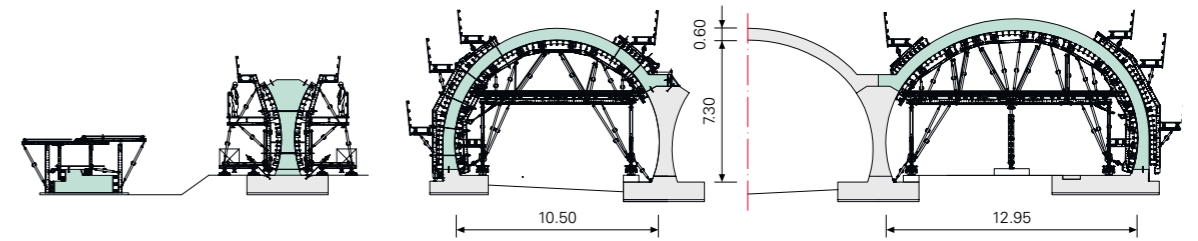
With help of the VARIOKIT Tunnel Formwork solution, 25 m long sections of the tunnel arch could be concreted in regular 4-day cycles.



The hydraulic operability of the VARIOKIT Formwork Carriage allowed fast and accurately-repeated shuttering and striking operations.



The external formwork for the tunnel arch was moved as large-sized units with the crane.



The VARIOKIT-based tunnel formwork system solution ensured that a 1,545 m long stretch of the Tauern motorway disappeared under an enclosure-type structure after only a very short construction period.

In peak periods, up to 40,000 vehicles use the A10 Tauern motorway every day. A comprehensive package of measures has considerably eased the situation for the Zederhaus community. Alongside the passing road traffic, the designated stretch of motorway was in part relocated and subsequently covered by a 1.5 km long tunnel structure. In almost 4 years, 405,000 m³ of earth was moved followed by the installation of 140,000 m³ of concrete and 7,300 t of structural steel. Only 18 months was available to realize the shell construction.

The construction of the double tube with arched cross-sections was carried out using the cut-and-cover method with the help of the VARIOKIT Engineering Construction Kit. Construction work on the second tube began at the start of 2016, in the planned time frame after completion and release to traffic of the tunnel on the mountain side. On the basis of standardized system components, the PERI complete solution ensured smooth construction

progress. Foundation formwork, centre wall formwork carriage and the trailing arched formwork carriage were perfectly matched in order to complete a total of 125 casting segments, each with 12.50 m standard cycle lengths. 2 cycles respectively could be formed and concreted in one working step.

The hydraulic support for lifting and lowering the formwork carriage as well as for folding of the wall elements proved to be especially time-saving. The large-sized external formwork was moved with the crane. Formwork units were accurately pre-fabricated in the PERI assembly facility. The reduced installation efforts on the construction site and ensured fast operational readiness from the start. The detailed sequential implementation concept took into consideration the integrated construction of the emergency and inspection bays at distances of 100 m as well as changing crossfalls and axis radii. As the standard VARIOKIT Formwork Carriage could also be used for the widening of the 70 m long breakdown bays in the the tunnel centre, this provided additional time and cost benefits.



Rene Glanzer
General Foreman

“From the very first day, everything worked as planned. The PERI Formwork Carriage solution is well thought-out and we were always given excellent support for the wide range of construction tasks. Everything made sense.”

Contractor
Felbermayr Bau GmbH & Co. KG, Wels
Field Service
PERI Austria, Nußdorf
and PERI Germany, Weissenhorn



Hongkong-Zhuhai-Macao Bridge (HZMB), China

Portal formwork carriage for tunnel transition in architectural concrete quality



300 m long ramp structures with high walls in architectural concrete quality serve as the entrance and exit points of the 6 km long HZMB tunnel.

Side walls and centre wall were constructed with the help of three PERI formwork carriages – with a fast working speed and high quality of workmanship.

Also for the massive breakwater, the construction team used a mobile wall formwork solution.



Meng Fanli, Project Leader West Island
Lin Ming, Project Director
Liu Haiqing, Project Leader East Island

“PERI played a decisive role in realizing this once-in-a-century structure; tunnel entrances and breakwater were extremely challenging due to maintaining the highest quality requirements. The formwork could be easily moved and provided the best possible safety and first-class architectural concrete quality. We came to appreciate the professional engineering, service and the striving of the PERI engineers for perfection.”

The construction of the high side and centre walls as well as the breakwater for two transitional structures was carried out using mobile PERI Portal Formwork Carriages – with a fast cycle sequence and high quality of workmanship.

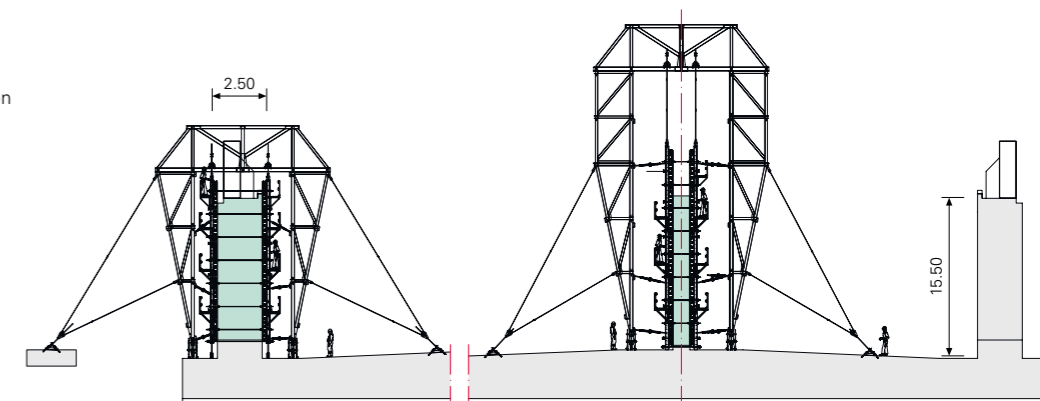
The 35 km long Hongkong-Zhuhai-Macao road connection is located in the area of the approach flight path of the Hong Kong International Airport, Chek Lap Kok, in an underwater tunnel. This 6 km long immersed tunnel had already been successfully built with PERI know-how – the shell construction for the east and west transitional structures was the next stage to be completed. For this, two artificial islands were created in the southern Chinese Pearl River Delta.

6 lanes lead into the two tunnel portals with a 3 % longitudinal gradient. The approx. 300 m long side walls of the up to 56 m wide ramp structures feature massive 2.50 m wall thicknesses. In addition, both driving directions are separated in the tunnel exits by a centre wall which will subsequently carry the roofing construction. The up to 15.50 m high reinforced concrete walls were to be realized in SB 4 architectural concrete quality with a clearly structured joint and tie arrangement as well as ensuring water impermeability on a sustained basis.

The construction of the extensive architectural concrete walls was carried out largely without crane support. For quick, safe and simple execution, PERI engineers planned mobile portal wall

formwork carriages which operated independently of each other. These were individually realized as a project-related and in part more than 21 m high special constructions. By including system components taken from the VARIOKIT Engineering Construction Kit, VARIO Girder Wall Formwork system and SK anchor technology, the PERI concept provided the most cost-effective and efficient solution option. As a result, concreting could be carried out in regular cycle lengths of 15 m while the entire height of each wall section was constructed in one pour.

Contractor
 China Communications Construction Company Ltd. (CCCC)
Field Service
 PERI Asia Pacific, Weissenhorn, Germany



Msheireb Metro Station, Doha, Qatar

Major construction site at a depth of 40 m

An individually tailored system concept and continuous on-site support facilitated the fast construction progress of the Msheireb Station, the key element of Doha's new metro system.

The Msheireb subway station is situated in the heart of Doha and is the lynchpin of the ultra-modern metro system currently under construction in the capital of Qatar. This is where the three most important connections converge: the "Gold Line", "Red Line" and "Green Line". By 2020, 82 km of tunnel routes and 25 stations will connect the residential and commercial centres with the suburbs and World Cup stadiums. In the final phase, the Doha metro system will feature a total of four lines and nearly 100 stations.

The metro station is located at a depth of 40 m and has 4 main levels. In order to effectively realize the 200 m long and 180 m wide major interchange with its massive component dimensions within the given construction period, PERI planned and delivered the formwork and scaffolding systems.

The complex structural geometry, with up to 3 m thick reinforced concrete slabs and wall thicknesses reaching 2 m, required a customized implementation concept. Within a very short space of time, 10,000 m² of wall and column formwork as well as 150,000 m³ of shoring were delivered to the construction site.

For forming the massive walls, the VARIO Girder Wall Formwork system was used. For the single-sided forming of the up to 9.50 m high walls, SB Brace Frames supplemented the PERI formwork solution. For the higher wall sections, VARIO together with CB Climbing Platforms formed crane-movable climbing units. The tie holes could be reliably closed with the help of the DK Tie System. The shoring concept developed by PERI engineers for transferring the high loads is based on proven PD 8 Shoring Towers, MULTIPROP Aluminium Slab Props and PERI UP Flex Modular Scaffolding System. Here, the 25 cm scaffold grid allowed easy adjustment of the PERI UP Standards to suit the wide range of load requirements.



Contractor
SOQ Joint Venture; Samsung C&T, OHL, QBC
Field Service
PERI Qatar LLC, Doha



Carlos Allepuz
Construction Manager

"PERI engineers have given us full round-the-clock technical support and reliable after sales service from day one. This close cooperation has enabled SOQ JV to use PERI cutting-edge solutions to build this very important station efficiently, safely and successfully."



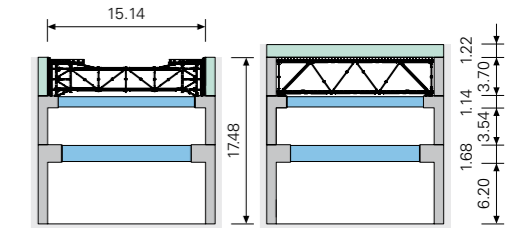
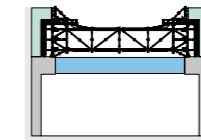


Contractor
Turner Construction, Seattle, USA
Field Service
PERI Pacific Northwest, Portland, USA
and PERI Germany, Weissenhorn



Kevin Whalen
Project Superintendent

“Working in collaboration, PERI and Turner Construction designed the Travelling Mono System which has met scheduling and budgetary constraints. We’ve increased the level of safety for our workers as well as reduced the number of man hours required to set up traditional formwork systems. This system was specifically designed to pour concrete from the ground to the roof giving us ability to maximize our labor force and allow subcontractors to work beneath the system, all while improving on the quality of the finished product.”



The PERI formwork carriage solution was the result of competent engineering and a project-specific construction kit system. The widest possible use of rentable PERI system components along with an optimized construction method ensured significant time and cost savings.

Capitol Hill is one of two subway stations constructed as part of the rapid transit project for the Greater Seattle region. The new station is almost 18 m deep and over 100 m long. Huge steel-composite tubes with 1.00 m and 1.50 m diameters respectively brace the underground structure on two levels. A very experienced team of PERI engineers from USA and Germany developed a cost-effective formwork and scaffolding concept with detailed solutions for all stages of construction, and was based on rentable system components available at very short notice. Thus, walls and reinforced concrete beams could be monolithically constructed in one pour. This avoided the need for construction joints and resulted in assembly cost savings.

The VARIOKIT formwork carriage construction for the deepest sections, each 12 m long and 8 m high, was

designed as a two-piece construction. As a result, it was possible to use the top half of the carriage for the remaining two levels after completion of the lower level. These were realized using 6 concreting cycles each time with heights of almost 5 m and 4 m respectively. The formwork carriage was completely hydraulically operated, and moved along on the reinforced concrete edge beams of the respective lower level by means of heavy duty rollers. HD 200 heavy-duty props were used as lateral supports in order to safely transfer the additional loads from the formwork carriage and the next concreting cycle. At the same time, the VARIOKIT unit served as temporary support during the assembly of the huge steel tubes used for bracing.

In order to transfer the high loads resulting from the concreting operations for the 1.22 m thick reinforced concrete slab into the longitudinal edge beams, the formwork carriage was adapted to suit the changed load situation. However, the hydraulic handling and easy movability of the formwork carriage unit were still available.

Midfield Terminal, Abu Dhabi, United Arab Emirates

Over 6,000 slab tables in continuous use



Delivery of enormous amounts of materials at short notice as well as competent engineering with related formwork and scaffolding planning made a convincing case during the construction of the airport terminal of unparalleled proportions. For ensuring strict adherence to the schedule, the comprehensive on-site support provided by a permanently assigned PERI project team consisting of very experienced supervisors and project managers played a key role; work and logistical processes were coordinated in close collaboration with the site management.

The new X-shaped Midfield Terminal was built between the north and south runways of the Abu Dhabi International Airport where 65 wide-bodied commercial aircraft can be accommodated

at the four piers and up to 30 million passengers can be handled annually. In peak periods, up to 17,000 workers were working in shifts around the clock on the giant construction site. For maintaining the tight schedule, more than 1,000 cubic metres of concrete had to be formed every day. As a result, around 700,000 m³ of concrete and 200,000 t of steel were processed in a mere 18-months construction period.



Centrepiece of the Midfield Terminal is the over 50 m high passenger terminal, the so-called Central Processor, for which PERI planned the formwork and scaffolding systems and delivered huge amounts of material in a short period of time. The concept of the PERI engineers was flexibly adapted to suit the different ground plan geometries and slab heights of the 7-storey high terminal complex.



More than 60,000 PD 8 Frames were assembled to form 6 m to 10 m high shoring towers which reliably accommodated the high loads from the floor slabs and beams, and could be re-positioned without requiring a crane for the next use each time. Approx. 6,200 slab tables were in continuous use on the construction site – with almost 65,000 m² of formwork materials, this was an area almost as large as 10 foot-



ball pitches. The slabs together with the massive, mostly 0.85 m wide and 1.10 m high beams were constructed in one pour. The use of lightweight LIWA Panel Formwork elements as side formwork accelerated site operations due to easy shuttering and striking by hand and also reduced formlining requirements.



Contractor
Joint Venture: TAV Construction; Consolidated Contractors Company (CCC); Arabtec Construction
Field Service
PERI L.L.C., United Arab Emirates



Fathi Abdul Muti
Deputy Project Manager

“We met all milestones ahead of schedule which can only be achieved with the right partner and solutions. PERI prove to be very responsive and handled the challenges of such a huge project like ours very well.”

4,000 massive, reinforced concrete columns with a wide range of dimensions were constructed with the help of VARIO GT 24 Column Formwork as well as project-related SRS Circular Column Formwork elements. VARIO GT 24 Girder Wall Formwork reliably accommodated the high concrete pressure of the up to 12.50 m high reinforced concrete walls.



Water retaining structures

serve to promote the utilization of water as well as the regulation and control of stretches of water in order to create or protect habitats – whilst taking into consideration the environment and resources.

Water construction projects are often associated with complex structures comprised of massive structural elements. For the execution of the construction work, this often means single-sided forming operations without the use of ties. For also ensuring a watertight execution over the long term, the selection of the appropriate anchor and sealing system is frequently of particular importance.

Foz Tua Dam, Alijó / Vila Real, Portugal

Comprehensive engineering services for impressive dam structure



With a package of solutions consisting of formwork, scaffolding, logistical and technical services provided throughout the project, PERI engineers effectively supported the construction of the dam and the associated pumped storage power plant.

The double-curved dam wall has a height of 108 m while the length of the 5 m wide dam crest reaches 275 m. The main focus here was to coordinate the wide range of formwork configurations, with a tight schedule and high

material requirements in particular to take into consideration. In addition to planning the formwork and scaffolding solution for the complex geometries and high loads, strict compliance of the construction schedule and staying within the planned budget for the imposing dam project were the major challenges. For ensuring smooth construction progress, all planning, logistical and formwork assembly processes were therefore precisely coordinated by the PERI project manager on site and adapted to match the actual construction sequence.

The combination of the SCS Single-Sided Climbing System and VARIO GT 24 Girder Wall Formwork was ideally suited to accommodate the single-sided load transfer without formwork ties. Due to the high load-bearing capacity of the SCS Brackets, large-sized and crane-movable units could be formed. SCS modular concept with multi-piece brackets allowed optimal adjustment to match the structural geometry which featured different inclinations – and ensured horizontal alignment of the 1.90 m wide working platforms at all times.



Paulo Libório
Site Manager

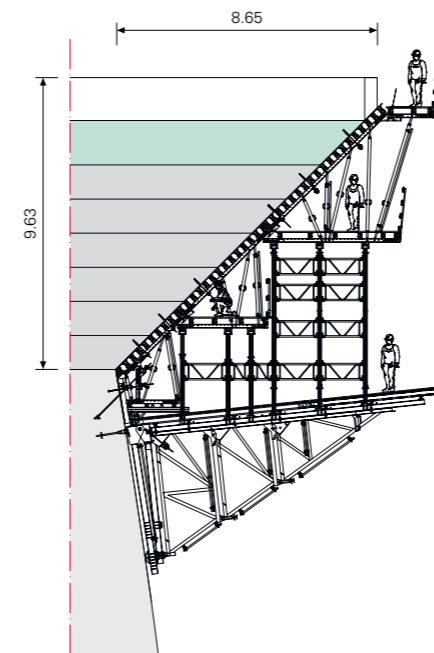
“The support provided by the PERI design engineer directly on the jobsite along with the constant contact to his technical office ensured that all project members could work together in order to develop the best formwork solution for this complex project. Without this close collaboration, it would not have been possible to maintain the construction schedule. PERI ensured the best on-site formwork and project management through constantly adapted material quantities and schedules as well as close coordination with all construction crews for carrying out the wide range of formwork operations. This helped us to guarantee project profitability in terms of time and costs.”

Contractor

Consortium Barragem de Foz Tua, ACE: Mota-Engil S.A., Somague S.A. and MSF S.A.

Field Service

PERIcofragens, Lda. Portugal, Queijas



The well-thought out climbing and supporting frame construction for the overflow area at the top of the dam were also comprised of PERI system components: SB Brace Frames and system components taken from the VARIOKIT Engineering Construction Kit formed large-sized platforms for the up to 8.65 m cantilevered casting segments. MULTIPROP Shoring Towers and SLS Heavy-Duty Spindles supported the inclined VARIO GT 24 Formwork Units.

The 108 m high and 275 m long dam has a very complex geometry. By means of a customized formwork, scaffolding and service concept, it was possible to maintain the very tight construction schedule and keep within the planned budget.

PERI UP was used for a range of shoring and working scaffolds as well as the access solutions. PERI UP Stair Towers with erection heights of up to 55 m provided quick and safe access means to the working areas.

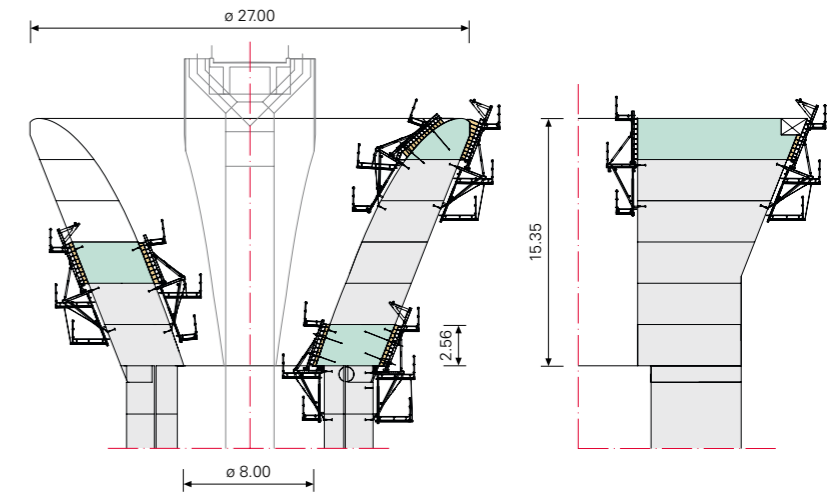


Bagatelle Dam, Port Louis, Mauritius

3D climbing formwork individually adapted



Special suspension points ensured that the formwork elements could easily be lifted into the respective final position with the crane.



The SCS Climbing System could be flexibly adapted to suit the variable inclinations and reliably transferred the high loads from the fresh concrete pressure into the previous casting segment.



Wang Peng
Project Manager

“We have completed numerous projects together with PERI. For CWE, PERI has always been a reliable partner; with the very high quality and efficient service, we are extremely satisfied.”

The overflow funnel of the Bagatelle Dam features a complex curved shape. Based on system components and 3D formwork units, the climbing formwork solution was individually adapted by PERI specialists to accommodate the structural geometry and the single-sided load transfer.

Although the island nation of Mauritius in the western Indian Ocean registers abundant rainfall, the rainwater quickly flows – mostly unused – into the sea due to the relatively small surface area of the island as well as the numerous steep gradients. The Bagatelle Dam Project has improved the water supply with the realization of this approx. 14 million m³ storage capacity. A 2.5 km long and up to 48 m high dam transforms a tributary of the Grand River North West into a reservoir at almost 400 metres above sea level.

Contractor
CWE China International Water & Electric Corp.
Field Service
PERI Asia Pacific, Weissenhorn, Germany

Construction of the overflow funnel for the flood spillway was supported by PERI engineers with a 3D formwork solution. The diameter of the circular shaft construction featured in the ground plan widens from 8 m to 27 m in at the crown of the funnel in the form of a chalice – outside with a uniform and internally with variable inclinations respectively. For realizing the complex geometry, SCS Climbing

Brackets along with three-dimensional formwork units based on VARIO Girder Wall Formwork elements were used. With the SCS Climbing System, the forward and reverse-inclined sections could be concreted single-sidedly, i.e. without ties. The adaptation to suit the given geometry was no problem; in addition, the bracket platforms always ensured horizontal working areas and access points even when having to deal with differently inclined walls.

The formwork for the funnel walls with curved surfaces on all sides was individually manufactured. The detailed 3D planning and dimensionally-accurate CNC timber formers were realized in the formwork assembly facility at PERI headquarters in Weissenhorn. Final assembly and installation of the formwork took place on the construction site – under the expert guidance of a PERI supervisor, and based on VARIO basic elements. An integral part of the reverse-inclined climbing formwork solution were the inner-mounted brackets which ensured that the elements could be easily and quickly shuttered and stripped with the crane.

CNC-machined timber formers were assembled on VARIO basic elements under the guidance of a PERI supervisor to form dimensionally accurate 3D formwork units.

Contractor
 New Assiut Barrage Joint Venture (NABJV):
 Vinci Construction Grands Projets,
 O.A.O. Arab Contractors, Orascom Constr. Ind.
Field Service
 PERI Egypt, Cairo



In order to ensure that the ambitious hydraulic engineering project on the Nile will begin operations within the planned time frame, PERI formwork and scaffolding systems as well as competent on-site support provide easy handling and fast cycle sequences.

The new barrage between Luxor and Cairo replaces the old existing dam

built in 1902 which is located 400 m further downstream. The weir system supplies the 350 km Ibrahimiyya main irrigation canal and thereby 700,000 hectares of farmland with water from the Nile – a valuable natural resource for 1 million farmers and the Egyptian population. Integrated in this complex hydraulic engineering project is a 32 MW hydroelectric plant for generating electricity, two locks and a bridge

crossing. With a construction period of 5 years in total, more than 1,700 skilled personnel are working to achieve the planned 2017 completion date.

Altogether, 8 sluiceways with 17 m widths respectively and a maximum damming height of 4 m ensure that a minimum 445 m³/s of water from the Nile can be discharged into the canal. In addition, the extensive concreting

work includes two locks, each 120 m long and 17 m wide, as well as construction work for the power plant. For forming the mainly massive reinforced concrete elements, PERI has provided the most cost-effective solution based on VARIO Girder Wall Formwork and the CB Climbing System.

Over 8,000 m² of VARIO Girder Wall Formwork is in daily use at this major

construction site. In combination with the CB Climbing Platforms, the formwork and scaffolding can be moved as a large-sized unit with the crane. Here, both systems can be flexibly adapted for the construction of the challenging structural geometry and accommodating the required fresh concrete pressure. For accurate realization of the curved elements, customized formwork units within the VARIO elements

are being used; in addition, the subsequent installation of the technical equipment requires compliance with very high quality standards. The PERI formwork solution is complemented by planned needs-based use of PERI UP and PD 8 Shoring Towers.



VARIO Formwork, CB Climbing Platforms and PERI UP access technology guarantee easy handling along with a high level of safety.



The PERI system application was matched to suit the massive reinforced concrete components with slab thicknesses up to 2.50 m and large supporting heights of up to 10 m.



PERI UP Frame Scaffolding is being used for the time-consuming reinforcement work.



Hisham Khattab
 Site Manager

“For such projects, the choice of the right formwork system is a very important decision. After very careful consideration, we decided in favour of PERI due to the high level of safety, easy handling and fast cycle sequences. As expected, the PERI team has provided us with very professional support.”



The new Nile barrage is used for water regulation and electricity generation; for ensuring smooth shipping operations, a 120 m long double sluice bridges the 4 m difference in height.

Blue Lake Dam, Sitka (Alaska), USA

Dam construction with voluminous cantilever

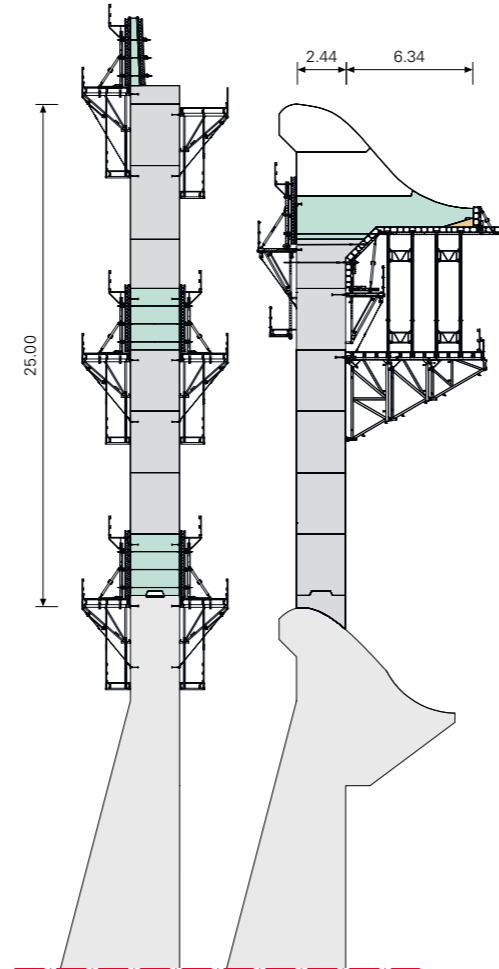


Shawn Perrin
Site Manager

“The formwork provided by PERI for the dam, especially for the cantilevered spillway, was critical to the success of this remote project. Customer support and logistics were top notch in delivering formwork via a 5 day trip by barge.”

The heightening of the dam at the Blue Lake ensures an autonomous power supply for the citizens of Sitka in the US state of Alaska. An important part of the PERI climbing formwork solution was the transfer of the high loads resulting from a massive cantilever in the area of the dam crest.

The increase in height and expansion of the existing dam for the Blue Lake reservoir by 25 m increases the efficiency of the hydroelectric power station by 27% to 15 MW. The new arch dam now has a 70 m overall height with the dam crest more than 80 m long. In addition, new intake structures and penstocks for power plant operations were realized.



Contractor
Barnard Construction, Bozeman
Field Service
PERI Pacific Northwest, Portland, USA

Difficult site accessibility and a complex geometry presented the construction team with major challenges. The formwork concept was based on the CB and SCS Climbing Systems and was perfectly complemented by the use of VARIOKIT system components.

The VARIO formwork for the vertical edge areas was climbed on CB Platforms. For the spillway section with its massive cantilever, the SCS Climbing System was combined with SB Brace Frames and MULTIPROP Shoring Towers.



The construction of the massive, 2.44 m thick and rounded reinforced concrete wall with a 35 m radius, in particular, required a formwork concept that was exactly matched to the construction progress and challenging structural geometry. The PERI implementation solution was based on a number of different systems which could, however, be combined with each other. For realizing the vertical edge areas, the CB Climbing System along with VARIO GT 24 Girder Wall Formwork were used. For this, platforms and formwork could be moved

with the crane as large-sized units respectively in regular concreting cycles heights of 3.05 m.

On the dam itself, the overflow structure has a length of around 40 m. Here, the crest of the dam cantilevers 6.34 m in a downstream direction. Transferring the enormous loads was carried out by means of horizontally-positioned, connectable SB Brace Frames. As a result, an intermediate level could be formed which simultaneously served as a generously-dimensioned working platform and high load-bearing basis for sup-

porting MULTIPROP Shoring Towers. simultaneously. SCS Climbing Formwork units ensured the efficient transfer of loads during the single-sided forming operations; here, the brackets could be flexibly adapted to match the complex geometry.

Nant de Drance Pumped-Storage Power Plant, Martigny, Switzerland

Modular formwork concept for underground large-scale construction site



At the Nant de Drance pumped-storage power plant, changing from pump to turbine operations can be carried out within minutes. For the construction work, PERI and MCE offered a well thought-out formwork concept, continuous on-site support as well as assembly support by a supervisor.

An integral part of the PERI solution was the formwork carriage and wall formwork for constructing the two intake structures with up to 3 m thick reinforced concrete slabs.

Dimensionally-accurate prefabricated formwork elements allowed the transition from circular to square-shaped tunnel cross-sections.



Ulrich Anschutz
Site Manager

"My compliments to the Swiss PERI team and to MCE for this extraordinary, customized formwork solution. With up to 300 m³ of concrete per section, we only had a minimum of deformations."

Contractor

ARGE GMI (Groupement Marti Implenia), Marti Tunnelbau AG and Implenia Bau AG

Field Service

PERI AG Switzerland, Ohringen and MCE GmbH, Eschenz

The construction of the underground machine cavern as well as two intake structures required an elaborate formwork concept along with competent jobsite support

The Nant de Drance pumped-storage power plant, with a total output of 900 MW, will begin operating at the end of 2018 after 10 years of construction. The power plant is being built to a large extent underground at a height of 1,700 m above sea level between the Emosson and Vieux Emosson reservoirs. For this, 1.7 million m³ of rock will be removed while creating a tunnel and gallery system totalling 17 km long.

The machine cavern for the installation of the pump turbines is 194 m long, 32 m wide and 52 m high, and is one of the largest underground constructions in Europe. For the final excavation work, the arched slabs along with the abutment beams were concreted in advance. In close cooperation with MCE Engineering, PERI Switzerland planned and delivered a modular formwork carriage solution. The construction of the 32 m wide and initial 12.50 m high tunnel cross-section was carried out in 18 casting segments, each with a

10 m cycle length. For fast cycle sequences, the tunnel formwork carriage was equipped with an electric drive system which meant it could be hydraulically raised and lowered. The lateral anchoring clamps were likewise concreted in advance with the help of a hydraulically operated PERI formwork carriage construction.

An important feature of the project was also the intake area on the higher Vieux Emosson reservoir at a height of 2,200 m. For the two intake structures and headrace tunnels, PERI likewise provided efficient formwork carriage solutions. The varying longitudinal gradients up to 12%, the transition from a circular to a square-shaped tunnel cross-section as well as the trumpet-shaped portal widening were taken into consideration here. For the extensive surface and underground construction work, TRIO Panel Formwork in connection with SB Brace Frames and Climbing Brackets were also used in order to form and concrete the up to 14 m high walls.



The power plant construction of the Daugava barrage required extensive concreting work. The formwork and scaffolding concept was based on versatile system equipment, detailed execution and cycle planning as well as competent construction site support.

The 22 MW hydroelectric power station near Polotsk in the north of Belarus is the first one of a total of four planned barrages on the Daugava river. 140,000 m³ of concrete was used in 6 years of construction on the 61 hectare construction site. The complex design of the building with its massive reinforced concrete structures and heights

of up to 29 m placed enormous demands on all project participants.

The proven wall TRIO and VARIO Formwork Systems, MULTIPROP and PERI UP modular load-bearing systems as well as CB Climbing Platforms and VARIOKIT System Components formed the basis for the PERI formwork and scaffolding solution. These fulfilled the wide range of requirements in all phases of construction and, in particular, ensured the reliable transfer of heavy loads during the realization of the cantilevered concrete components. Project-specific 3D formwork ensured a high degree of dimensional stability for the discharge structures.

Through the very detailed PERI cycle planning, optimization of the system utilization was achieved. Thus, material requirements and costs could be minimized and simultaneously boost efficiency. For example, wall formwork elements were initially used single-sided then subsequently double-sided and anchored, as well as utilized as tunnel formwork. System components of the tunnel formwork were used, in turn, in the load-bearing system for the pier cantilevers. The basis for this was provided by the flexibility and modularity of the PERI systems in combination with technical support by PERI specialists throughout the entire construction phase.

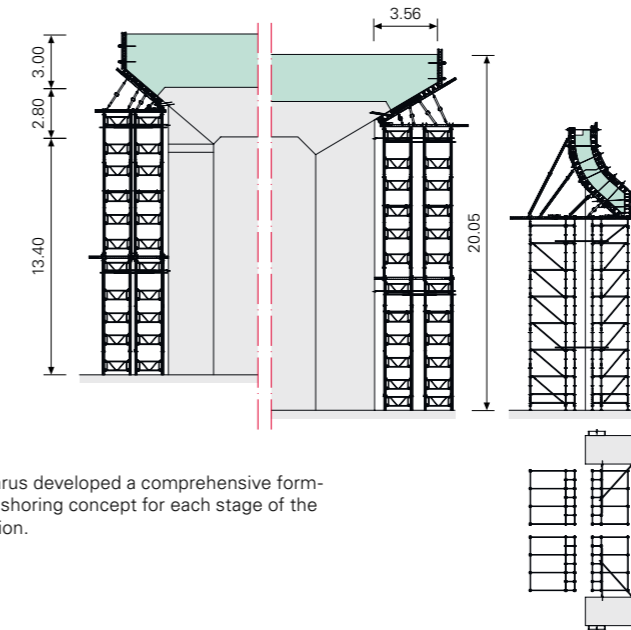


Yuri Cherniak and Andrei Smouzh
Site Managers

“The VARIO, TRIO, MULTIPROP and PERI UP systems used on our jobsite allowed us to realize very challenging concrete structures in superb quality and the shortest possible construction time. Many thanks to PERI for many years of partnership-based cooperation.”



The massive reinforced concrete piers widened out in the head section. MULTIPROP and PERI UP reliably transferred the high loads from great heights into the ground.



PERI Belarus developed a comprehensive formwork and shoring concept for each stage of the construction.

Contractor
Minskpromstroy, Minsk
Field Service
PERI Belarus, Minsk



The 3D tunnel formwork construction on a VARIOKIT system basis allowed the dimensionally-accurate realization of the transition from square-shaped to circular discharge structure cross-sections.



PERI planned and delivered customized solutions for the complex building geometries.



Industrial Structures

includes the new construction, modernization and maintenance of structural facilities in industry.

Planning and execution is determined by the demands of current and future production processes. The functional and economic aspects outweigh any architectural requirements which usually are of secondary importance. The actual execution is often associated with stringent safety regulations. Furthermore, structural work to be carried out and technical equipment installation also simultaneously require close coordination of the construction sequences. Approvals, type tests and technical documentation serve to verify the quality and reliability of the system equipment used.

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

PERI UP and VARIOKIT: 2 systems – 1 grid



Scaffold Contractor
Intering GmbH, Scaffolding Department, Leuna
Field Service
PERI Germany, Leipzig and Weissenhorn



The loads from up to five additional scaffolding levels were transferred into the external scaffolding via the supporting intermediate level which consisted of VARIOKIT core components. PERI UP therefore served as both working scaffold and shoring.

For the execution of the insulation work, the consistently high safety standard of the PERI UP Flex along with the almost unlimited combinability with VARIOKIT system components convinced scaffolding erectors and users alike.

ThyssenKrupp Steel Europe operates four company-owned blast furnaces at the Duisburg facility. For the most recent extensive modernization measures, Blast Furnace 9 was taken out of service and brought in line with the very latest technical standards. Part of the work included the re-insulation of the casting house dedusting system. For this, PERI scaffolding specialists planned a project-specific working scaffold which was based on two compatible modular construction systems: PERI UP and VARIOKIT. Both systems follow a uniform metric basic grid.

The PERI UP Flex Modular Scaffolding provided optimal working conditions for all insulation work. The high degree of variability allowed any adjustments in 25 cm increments – resulting in completely safe working platforms.

Through the consistent use of system scaffolding components, the decking areas were free of gaps and tripping hazards. Guardrails and toe boards could be installed end-to-end also without any gaps. Safe and quick access to all levels was provided by integrated stair towers complete with 75 cm wide aluminum flights of stairs.

In order to access the plant sections to be worked on via the non-supporting flat roof, a girder grid for transferring loads was integrated into the PERI UP scaffolding solution at a height of 12 m – formed using rentable steel walers taken from the VARIOKIT Engineering Construction Kit. Due to the 12.5 cm grid system, the VARIOKIT could be ideally combined with PERI UP Flex. Standardized connecting means facilitated continuous installation with system components – without any time-consuming adjustment work with tubes and couplers.



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.”

Kozienice Power Plant, Poland

Combined power package for optimized load transfer



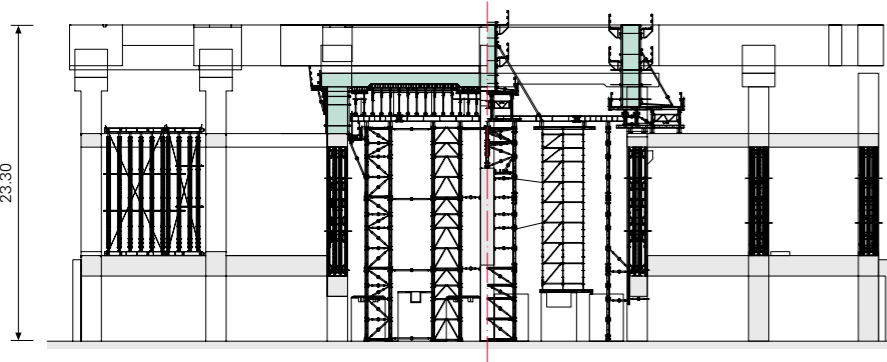
Sławomir Bogucki
Supervisor

“One of the most important criteria was the tight schedule for the structural work required on the turbine building. The tremendous commitment shown by the PERI project team as well as the professional processing and materials provision made compliance possible.”



Modular supporting systems made it possible to easily adapt to the complex building structure.

General Contractor / Contractor
Polimex-Mostostal S.A. / IDS-BUD S.A.
Field Service
PERI Poland Sp. z o.o., Plochocin



The PERI shoring concept for transferring the high loads was based on standardized construction kit systems: MULTIPROP, HD 200 and VARIOKIT. With the help of the PERI UP Modular Scaffolding System, the required access means was realized.

A PERI shoring combination for transferring high loads – adapted beforehand to suit the complex building geometry – facilitated the efficient construction of the massive reinforced concrete components for the power plant.

The new Block 11 at the Kozienice facility is the largest-fired coal power plant unit in Europe with an output of 1.075 MW, and worldwide one of the most modern of its kind. For the structural work on the turbine foundations, massive reinforced concrete components had to be realized. This required the transfer of very high loads from great heights, combined with the highest safety and quality requirements.

PERI Poland developed and delivered a comprehensive formwork and scaffolding solution that was perfectly matched to the strictly scheduled construction process with tight execution deadlines. In particular, the wide range of load supporting systems made it possible to form and concrete the complex building structure within the given tight dimensional tolerances – from the 5.50 m thick bottom slab and massive columns and beams through to the 3.30 m thick foundation slab at a height of over 20 m.

With the combination of MULTIPROP Shoring Towers, HD 200 Heavy-Duty Props and VARIOKIT Heavy-Duty Shoring Towers, the detailed shoring con-

cept could optimally fulfil the wide range of requirements. The use of standardized system and connecting components ensured short assembly times – rapid availability and high level of cost-effectiveness was guaranteed through the immediate availability in the PERI rental parks.



Flexibility during modernization operations

Parallel to the construction of Block 11, the existing infrastructure of the

Kozienice power plant was also modernized. For example, Blocks 1-8 were equipped with a new flue gas desulphurization system. For carrying out the insulation work, safe working plat-

forms for up to heights of 30 m were realized with the help of the PERI UP Flex Modular Scaffolding System.



Marcin Tymiński
Site Manager

“For rapid realization of the project, we found the right scaffolding provider in PERI. PERI Poland demonstrated great commitment during the technical and logistical support.”



General Contractor / Insulation Work
Instal Kraków S.A. / Kaefer SA, Polaniec
Field Service
PERI Poland Sp. z o.o., Plochocin

Northwest Redwater Project (NWR), Edmonton, Canada

Time and cost factor lowered, safety levels increased



The detailed 3D scaffold planning along with early consultation and coordination with all project participants increased both work safety and efficiency. In addition, PERI supported the project management with a control software for large-scale projects and optimized the interlinking between scaffold planning and execution.



Safe working platforms: the consistent use of system components not only accelerates the assembly work required on the scaffolding. Through the gap-free installation with system decking, this means there are no overlapping planks thus avoiding the presence of any tripping hazards during later use.



Project-specific PERI UP industrial scaffolding solutions accelerate work operation speeds and increase the level of safety.

For the construction of a Canadian industrial plant, the PERI UP Scaffold System and integration of 3D scaffold planning at an early stage reduced the time and cost factor while simultaneously increasing safety levels.

North-east of Edmonton/Alberta, the world's most advanced oil sand refinery is currently being constructed. The facility will produce 150,000 barrels per day, i.e. close to 2.5 million litres of oil. Since 2013, plant components have been installed on the 2 km² area, and the first of a total of three sections will become operational in the autumn of 2017.

PERI's North American scaffolding specialists are planning and supplying PERI UP industrial scaffold solutions as well as ensuring the on-time availability of correspondingly large quantities of materials. 1,500 t of scaffolding equipment is in daily use while around 1,500 people are working on the construction site at peak times. Safety is always of paramount importance: one of the most important objectives for all project participants is to ensure that no accidents occur during the estimated 1 million working hours.

For this, PERI UP provides system-integrated advantages during scaffold assembly and use. For example, due to

the perfectly coordinated metric grid arrangement of the scaffolding components, plant sections can be systematically scaffolded in 25 cm increments without any on-site tube-coupler assembly, and thus form very safe working platforms. Furthermore, the detailed 3D scaffold planning with PERI CAD on the jobsite allows solutions to be approved in advance with all the project partners. As a result, all problem areas can be identified at an early stage and the working scaffold is then optimized for further usage. This avoids improvisations during the actual scaffolding phase, thus accelerating operation speeds and providing maximum safety for site personnel.

In addition to the system-related assembly- and safety advantages provided by PERI UP, the competent on-site Project support is an important factor for realizing time and cost reductions.

Integrated staircases allow convenient and rapid access to all scaffold levels.



General Contractor
Fluor Canada Ltd.
Field Service
PERI Canada and PERI USA



Kyle Morden
Project Superintendent

"There are a number of challenges in the industry, period just in regards to cost. With PERI UP system scaffold we get the usually in the scaffolding market high direct labor cost down. The partnership and the support has been absolutely phenomenal – to ensure that the productivity and efficiency has all been met and our targets are on track."

Stanari Thermal Power Station, Dobo, Bosnia-Herzegovina

Test of strength for formwork and scaffolding



The base area of the turbine structure measures 30.50 m x 12.00 m, and is characterized by its massive walls, beams and slabs. PERI UP Modular Scaffolding formed the shoring for up to 5.30 m high slab in the turbine building. The legs were simply bundled together in areas of high load concentrations – the system could therefore be optimally adapted to suit the loads.



9 circular concrete piers with 3.60 m external diameters and 40 cm wall thicknesses carry the steel platform for the air-cooled condenser at a height of 26 m. On each pier, 12 CB 240 Climbing Brackets carried the customized VARIO GT 24 Wall Formwork elements. Construction of the pier, including the pier head, took place in 9 cycles using 3.00 m concreting heights respectively. PERI UP Stair Towers provided safe access to the designated working areas.



PERI's contribution for realizing the 300 MW power plant was a project-specific overall concept – consisting of formwork, scaffolding and engineering from a single source. With a just-in-time supply of materials, detailed plans and static calculations, PERI engineers continuously provided on-site support for the implementation and thus compliance with the short construction period.

The Stanari coal-fired power plant produces around 2 million megawatt hours (MWh) of electricity annually and fully complies with EU environmental standards by means of continuous waste gas treatment including flue gas

desulfurization and dust separation. Approx. 3,000 people were involved in the construction of the power plant over a time frame of 45 months with trial operations taking place at the end of 2015.

PERI planned and supplied the formwork and scaffolding systems for two construction areas: a climbing formwork solution for the 9 piers of the steel platform for the condenser as well as a combination consisting of a stable shoring construction and complex arched slab formwork for the turbine building. The heavy massive components with a high degree of reinforcement as well as the large heights to be accommodated placed exacting demands: high load-bearing capacity, great flexibility in the application and the provision of large amounts of material in a short construction schedule. At the same time, the formwork and scaffold constructions for the realization of the power plant were to be individually calculated and developed.

Thus, the complete turbine structure is, for example, characterized by its very impressive dimensions: the

columns have a cross-section of up to 1.40 m x 2.10 m while the beams measure up to 2.10 m x 5.30 m. Moreover, the up to 5.30 m thick slab also featured arched sections in some areas. PERI engineers developed an 11.60 m high shoring solution on the basis of the PERI UP Modular Scaffolding System. Through the 25-cm grid arrangement, the leg spacings could be optimally adapted to suit the load requirements found in the different areas. For the flat slabs, MULTIFLEX Girder Slab Formwork provided the necessary versatility; for the arched construction, a supporting structure comprised of rentable VARIOKIT system components was formed.

Contractor
DOO "MD-Perić Company", Bijeljina (Condensator Platform)
GP Gradip AD, Prnjavor (Turbine Building)
Field Service
PERI Simanovci, Serbia and PERI Weissenhorn, Germany



Luka Popržen and Miroslav Usorac
Project Managers

"PERI developed a very safe and fast formwork solution for us. The technical solution together with the excellent assembly plans, as well as the easy application and high load-bearing capacity of the system, were particularly helpful in ensuring that the in part complex formwork and concreting work could be efficiently realized. From the planning and static calculations through to on-going support during the construction phase, PERI proved that its service is of the highest quality."



Building redevelopment

includes the conversion as well as the refurbishment and modernization of existing buildings from a value-preserving and urban development point of view.

Building redevelopment is increasingly gaining importance – from energy-conserving renovation of a detached house or the modernization of municipal buildings through to upgrading an industrial site which is then used for a new purpose. Construction measures for gaps between buildings on mature street facades are also included here, frequently under the aspect of preservation issues. In order to be able to also work quickly in restricted spaces and without a crane, the equipment used should be lightweight and preferably easy to move by hand. As a rule, supporting structure concepts and working platforms are required on a project-specific basis, respectively adapted to match all geometrical and static requirements.

Hotel Le Royal, Luxembourg

Cantilevered system combination for refurbishment measures



Cantilevered platforms accelerated the complete refurbishment of the Luxembourg luxury hotel. The customized project solution was based on two compatible PERI Modular Construction Systems – VARIOKIT and PERI UP.

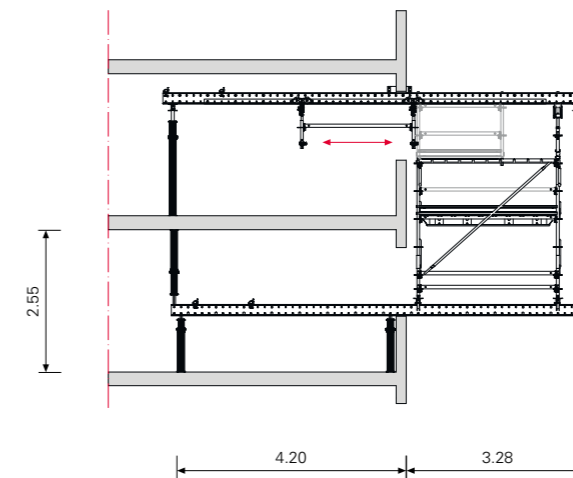
The 5-star Hotel Le Royal in the centre of Luxembourg underwent extensive renovation work in 2015. For this, complete sections of the structure had to be gutted and totally renovated in the space of only 9 months whereby a total of 165 rooms were completely emptied and stripped down to the building shell. The safe and quick disposal of the rubble as well as removing

large-sized wall and slab panels was carried out by means of an offset arrangement of cantilevered load platforms on each floor. Due to the expansion construction work on the ground floor, erecting a working scaffolding on the facade side was not possible; furthermore, anchoring on the hotel frontage was also not permitted.

The planning and assembly involved a total of 8 working platforms using two PERI Modular Construction Systems: VARIOKIT and PERI UP. In addition, MULTIPROP Aluminum Slab Props reliably supported the RCS Climbing Rails – which ran inwards through the window openings – against the floors

and slabs. Externally, the cantilevered VARIOKIT Supporting Formwork was used to form generously-sized working and material platforms with the help of the PERI UP Scaffolding System. Each of 6.25 m long and 2.50 m wide load platforms fulfilled two tasks: the intermediate level under the right window was dimensioned for positioning a bulk materials container; large-sized materials could be moved out through the left window by means of a suspended Formwork Carriage.

The customized PERI solution was geometrically adapted regarding the structural dimensions and statically with regard to platform usage requirements. Equally helpful for the planning and installation was the uniform 25-cm modular grid arrangement of VARIOKIT and PERI UP as well as the standardized connecting means. The exclusive use of rentable standard components resulted in considerable time savings and, in particular, numerous cost advantages.



At the same time as the construction measures on the ground floor, the 165 hotel rooms in the floors above were completely refurbished with the help of cantilevered PERI Platforms.

Using RCS Rails and Trolleys from the PERI UP System allowed bulky components to be easily moved through the window openings to the outside.

Contractor
Soludec S.A., Differdange
Field Service
PERI NV Belgium/Luxembourg,
Londerzeel and PERI GmbH
Germany, Weissenhorn



Thomas Bronquard
Site Foreman

“The great strength of PERI is that system components of different product ranges can be coupled with one another in virtually any combination. Especially for complex and atypical building projects, this is particularly advantageous. The result are reliable and safe solutions – whilst always taking into consideration the economic aspects.”



Hvězdonice Motorway Bridge, Czech Republic

Flexibly adapted building safeguards from the modular construction kit

For temporary support of an unsound motorway bridge, the PERI solution was quickly available due to the use of VARIOKIT system components, and ensured reduced material and assembly costs as well as a reduction in cost expenditure.

The D1 stretches eastwards from Prague via Brno and on to Poland. With a length of 375 km, it is the longest but also the oldest motorway in the Czech Republic. Construction was started 75 years ago and, accordingly, some sections are in urgent need of refurbishment. In order to safely maintain road traffic operations, a motorway bridge which had fallen into disrepair 30 km southeast of Prague had to

be temporarily supported up to the time of the planned new construction. The 90 m long structure was built in the 1970s using prefabricated components.

With regard to the building safeguards, the concept developed by PERI's Czech engineers provided 44 VST Heavy-Duty Shoring Towers using components from the VARIOKIT Engineering Construction Kit. The system allowed flexible geometrical and load adjustments to suit the predetermined points of support with tower heights up to 11.30 m. For transferring the increased load concentrations in the bridging area of the main road, the load-bearing capacities could be doubled by means of additional legs. The

fine adjustment of the head spindles and the activation of the support were carried out with the help of mobile hydraulic units while the pre-tensioning forces were continuously monitored. VARIOKIT saved on both costs and time due to the availability in the PERI rental park: the rental of standardized system components provided, on the one hand, a cost-effective structural solution and, on the other, the required materials could be quickly delivered to the jobsite. Further time-savings could be achieved through the easy and simple VST assembly procedure using standardized fitting pin connections. In addition, the construction team was supported by an experienced PERI supervisor.



Compatible: the PERI UP Scaffolding System ensured safe access and accelerated the VARIOKIT assembly.



Load-bearing: VST Heavy-Duty Shoring Towers on the basis of the VARIOKIT Engineering Construction Kit safely carry up to 700 kN per leg.



Concentrated: with the help of additional legs, the load-bearing capacity was individually adapted to accommodate the increased load from the carriageway bridging.

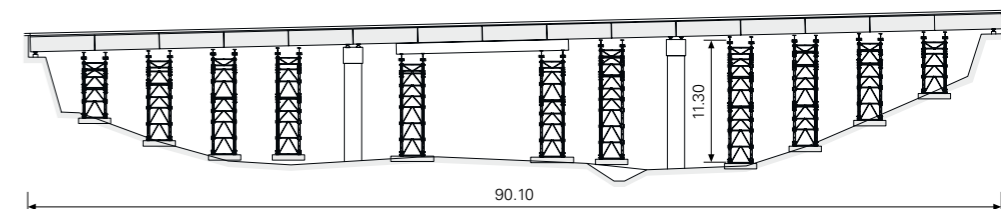


Jakub Synek
Site Manager

"With the VARIOKIT Heavy-Duty Shoring Towers, we were able to quickly and accurately carry out all site-related height adjustments. In addition, activation of the support by means of hydraulically-operated head spindles was extremely simple."

Contractor
Stavební firma Hobst, a.s., Zeleneč
Field Service
PERI spol. s r.o., Jesenice and Prahy, Czech Republic

Flexible: with staggered leg lengths, two compensation pieces and head spindles, all heights could be continuously realized.



Refurbishment of the Inntal Bridge A12, Radfeld/Tirol, Austria

All clear: bridge renovation without any jobsite traffic jams



The VARIOKIT carriage for suspending the PERI UP suspended scaffold by means of DW 15 tie rods could be moved within the existing crash barriers.



The moveable units were attached via rollers and rails completely to the underside of the cantilever which meant the superstructure remained freely accessible.



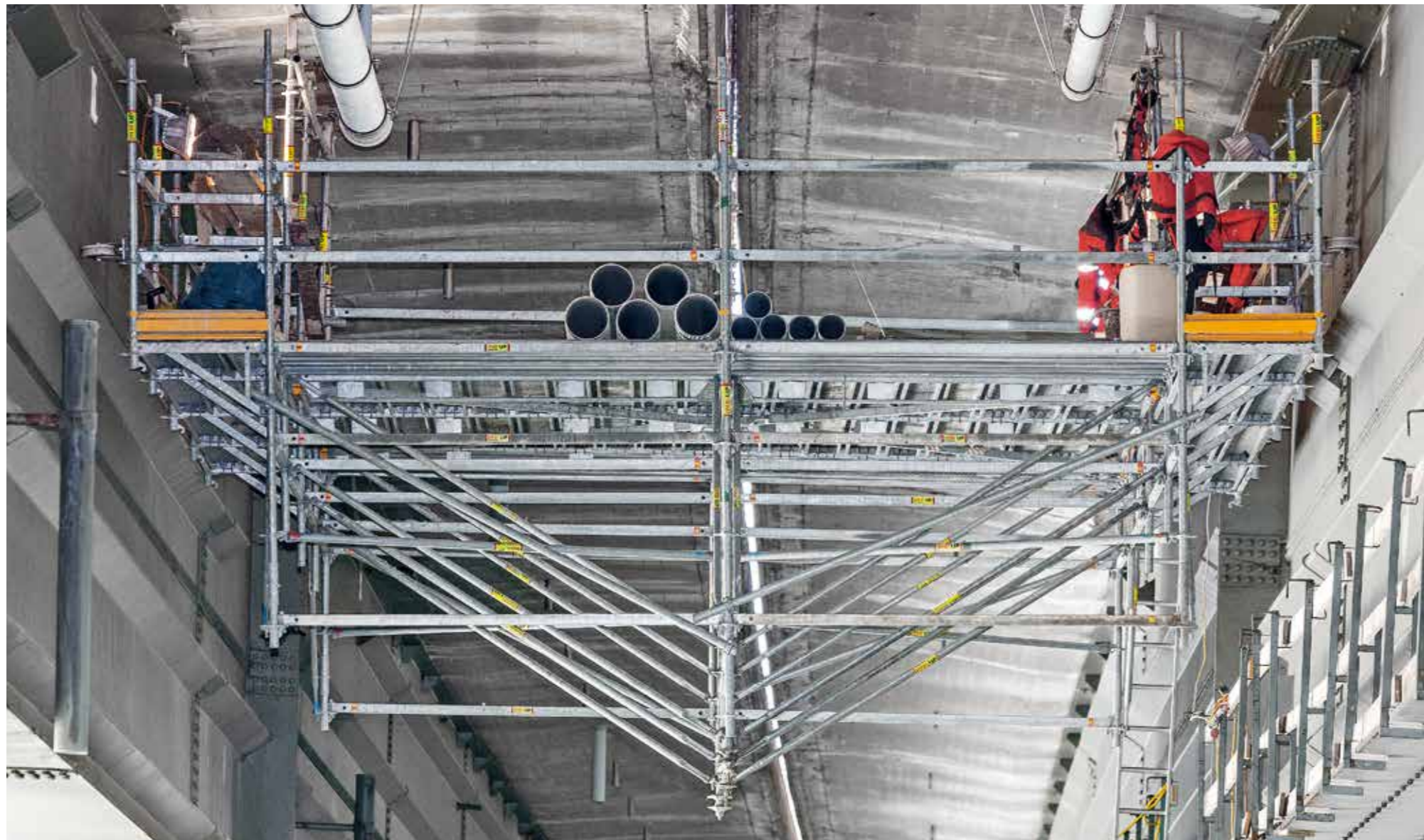
The refurbishment of the 185 m long Inntal Bridge was carried out by two complementary PERI modular construction systems – to a large extent without restricting road traffic.



Manfred Neuhauser
Site Manager

“At bauma 2013, we found the right system solution at PERI for our construction projects. Together with the PERI engineers, a project-specific concept was developed using the VARIOKIT parapet track and the mobile PERI UP suspended scaffold system. Thus, it was possible – and also thanks to the simple handling – to realize all operations in the given time without any problems.”

Contractor
Strabag AG, Direktion AF Verkehrswegebau Tirol/Vorarlberg, Innsbruck
Field Service
PERI Nußdorf/Austria and PERI Weissenhorn/Germany

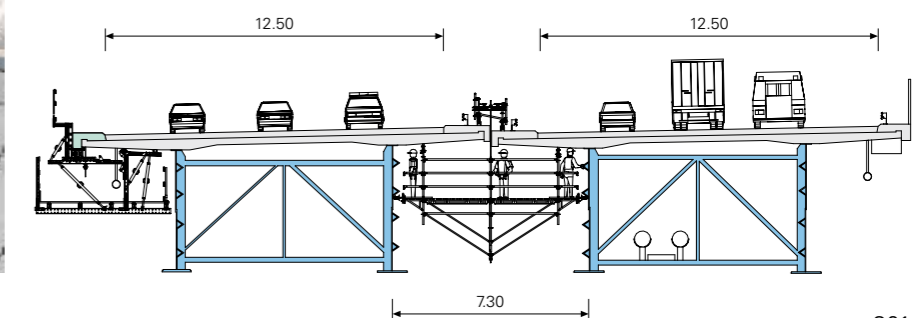


For the bridge renovation, a project-specific PERI system solution ensured smooth working operations. The flow of traffic remained largely unaffected and the construction schedule was easily maintained. The rentability of the components and their easy handling increased the cost-effectiveness.

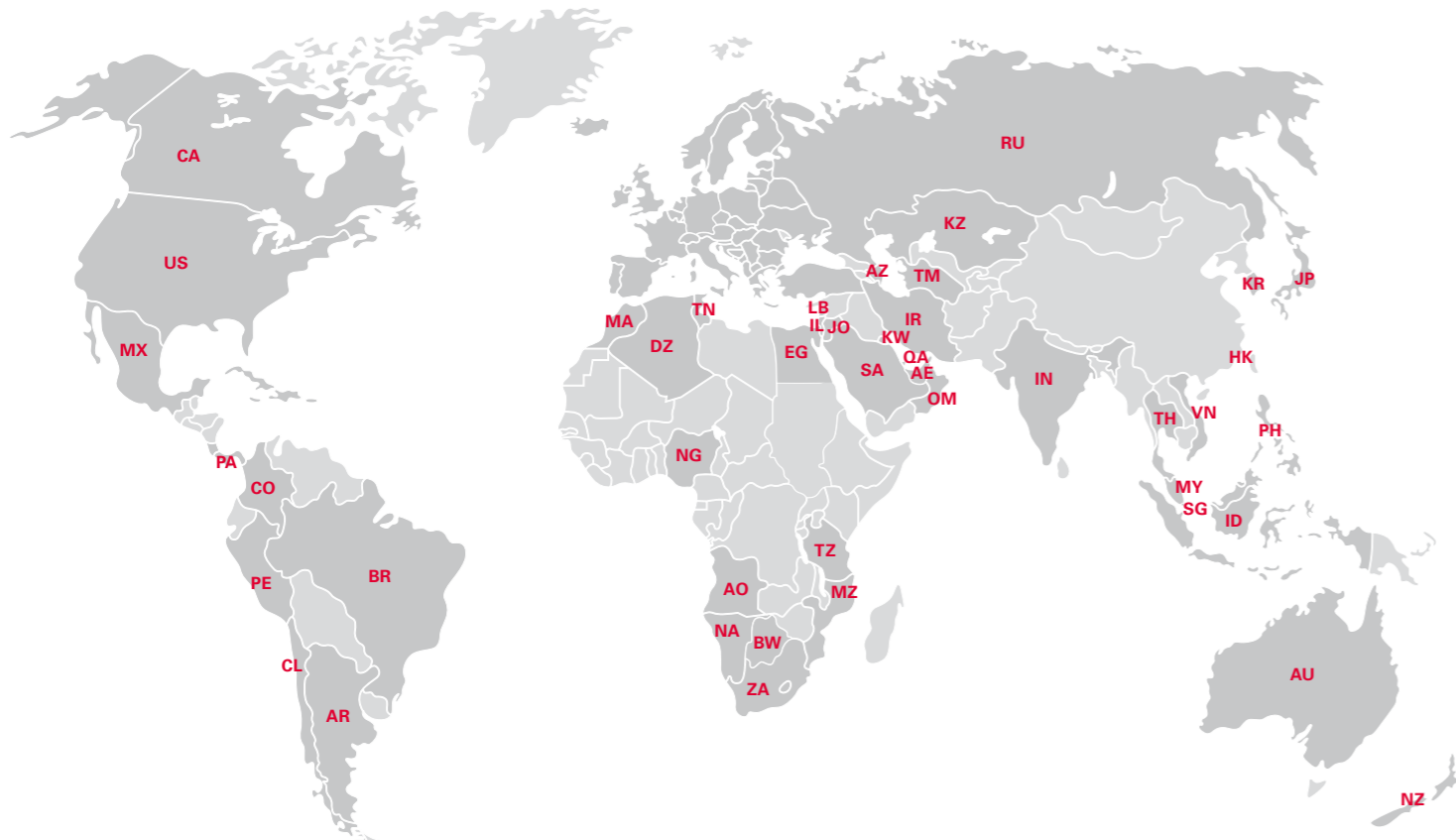
The A12 Inntal autobahn between Kufstein and Innsbruck is part of an important European road axis. During the renovation and widening work on the 185 m long, over 40 years old Inntal Bridge, road traffic on both carriageways should remain largely unaffected throughout. The formwork and scaffolding solution from PERI was based on two complementary modular construction systems: the VARIOKIT engineering construction kit and the PERI UP scaffolding system. Furthermore, two essential elements of the PERI overall solution were the planning service and supervisor's position then the incomplete as-built documentation required high degree of flexibility and maximum adaptability – in the planning phase as

well as during assembly and use on site. For refurbishing the outer parapets on the north side, two VARIOKIT parapet tracks were used. These ran on rollers on the underside of the cantilever. As a result, the superstructure was free of any disruptions whereas the existing drainage system was removed in several stages along with demolishing the old parapet while the new parapet was then shuttered and concreted section by section as well as new drainage pipes were also being installed. In addition, the mobile platform served to store and transport the resulting construction rubble.

For the underside renovation and replacement of the drainage system in the area of the internal cantilevers, movable PERI UP suspended scaffold was used. Suspension was carried out by means of DW 15 tie rods between the two superstructures, and suspended at the top on a carriage comprised of VARIOKIT system components – within the crash barriers and without requiring any time-consuming and expensive cordoning off measures.



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