The VARIOKIT formwork carriage for steel composite bridges fulfils all the project requirements.

The advantages of the PERI VARIOKIT formwork carriage:
- high rigidity in both the longitudinal and transverse directions of the carriage.
- variable and flexible arrangement of the support points (carriage supporting point) on the bridge longitudinal beam.
- with the unique steerable carriage supporting shoe, forming of bridge radii is possible without any great effort.
- through the rigid longitudinal truss, cross frames are not restricted by any increments and can always be completely utilized.

The extremely rigid main beam truss ensures optimal load distribution and protects the bridge girders against excess point loads.

Striking can take place either from the concreting level or the finishing platform.

The steerable carriage supporting shoe is mounted to the carriage supporting point.
Modifying the formwork carriage is a simple process by extending the components marked in red.

The internal formwork is selected according to the geometry of the structure. In so doing, a difference is made between:
- movable slab formwork element on roller brackets
- MULTIFLEX formwork
- panel formwork

Through the enormously high number of combination possibilities for the system components, modifications can also be carried out at any time for other bridge cross-sections.

The external formwork carriage is mounted on the main beams of the bridge. The three main component groups can be clearly seen:
- longitudinal truss
- cross beam
- formwork unit with adjustment device

Project 1
Internal formwork with MULTIFLEX

Project 2
Internal formwork as movable slab formwork element on roller brackets
The PERI VARIOKIT cantilever bracket is the construction kit solution for the realisation of bridge cantilevers using the steel composite and semi-prefabricated concrete component construction methods. Both for short crossings of railway lines, motorways or side streets as well as and with large formwork quantities, the cantilever bracket provides cost-effective and rational solutions. The necessity for a mobile solution does not apply with these projects as the superstructure is usually constructed in one casting segment.

Decisive advantages:
- fast assembly
- low dead weight
- suspension with DW 15 system

Areas of application for the VARIOKIT cantilever bracket are:

- **Steel composite construction method**
  Combination of steel girders in the tensile areas and in-situ concrete slabs in the compression areas of the bridge cross-section.

- **Semi-prefabricated concrete component construction method**
  Tensile area of the prefabricated concrete girders and compression areas from the in-situ concrete slabs.

**Steel composite construction method**
Chinchage Brücke, Canada
Steel girders with in-situ concrete slabs.

**Semi-prefabricated concrete component construction method**
Golden Ears Bridge, Canada
Prefabricated concrete girders with in-situ concrete slabs.
For anchoring, the DW 15 tie system comes in two versions.
Fixing to the steel girders is carried out by means of the weldable and screwable VARIOKIT anchor plate.

Operable from the top side of the bridge
The assembly and dismantling of the brackets takes place from the top side of the bridge via re-usable conical pipe nuts.
Advantages:
– No elevating work platform or ground-supported erection scaffolding is necessary.

Operable from the underside of the bridge
The bracket is fixed from below via the Tie Yoke Head SRU.
Advantages:
– no penetration of the superstructure.
– no interruptions points in the concrete work.

Support spindles for optimal adjustment to the bridge cross-section with an adjustment range of +/- 10 cm.
Anchor plate with pipe nut and DW 15 tie rod, can be operated from the top side of the bridge.
Tie Yoke Head SRU with DW 15 tie rod, can be operated from the underside of the bridge.
The PERI VARIOKIT solution for the building method with underslung and overhead launched travellers. In the process, the solution overhead launched traveller has a main beam on which the crosswise arranged trusses are positioned which carry the concreting loads of the cantilever. With suspension tie rods on the outer frame, all adjusting possibilities regarding inclination and position are possible.

### Hydraulic operations
For some VARIOKIT projects, there is the option of being able to operate the formwork components with a mobile hydraulic system which is also available for use with the above-positioned launched traveller. Thus, only 4 hydraulic lifting cylinders are required regardless of the number of raised formwork units.

### Assembly versions
The construction for both launched traveller versions - positioned overhead and underslung - is a modular design. Load-optimised width of influence on the two cross-frames form the basis of each launched traveller. The total number of cross-frames is, in each case, a multiple of the pairs of frames.

The transfer of the bearing loads into the pier is a very important area. Adaptable to the structural geometry and with system safety accessories, PERI UP provides an optimal solution here.
The underslung launched traveller can also be supplemented with system formwork thus ensuring cost-effective use. For moving, the traveller and formwork are firstly pushed sideways, then moved forward in a longitudinal direction and subsequently realigned.

Assembly of the sub-assemblies in a position behind the abutment is the rule regarding initial assembly. At the same time, passing the abutment wall is a factor that must be taken into consideration.

Moving past the piers is possible without any problems after the working platform and slab formwork have been hydraulically folded in.

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PERI VARIOKIT raised formwork units provide flexible and economical solutions for a very wide range of requirements in modern civil engineering projects. Due to their high flexibility, the units can be mounted on different load-bearing systems. Thus, the same raised formwork units are used on launched travellers, incremental launching equipment as well as light to heavy load-bearing scaffold. Adapting to the wide range of bridge geometries take place continuously thanks to the VARIOKIT engineering construction kit.

Raised formwork units on the launching beam with large spans.

Raised formwork units on PERI UP Rosett supporting scaffold.

Frame construction formwork for incremental launching equipment. The raised formwork units remain firmly positioned on one side of the abutment and serve as formwork for the cyclic construction of the superstructure.
Time-saving and cost-efficient construction site assembly can be realized due to standardized connecting components such as the UK 70 coupling and bolt connections. The formwork can be adapted at any time to structural changes by means of SLS spindles. Through this, VARIOKIT frame construction formwork provides a very flexible and economical solution for all conventional load-bearing systems and a broad range of building geometries.

Main components of the raised formwork units:
- Steel Waler SRU 120
- SLS Spindles
- Coupling Components
- Bolts Ø 21 or 26 mm.

- **Articulated connection**
  For transferring normal and shear forces between two walers. This results in an fully adequate joint between the SRU steel walers.

- **Rigid connection**
  All waler lengths can be combined without any loss of load-bearing capacity. The static values of the UK 70 coupling correspond to the profile of the SRU waler. The connection with the bolt ø 21 x 120 is without any clearance.

- **Connecting accessories**
  In the widened areas, accessories can be bolted on. This means that spindles and diagonals etc. can be optimally positioned at the required points without having to take the couplings into consideration.
The PERI VARIOKIT solution for arch cantilever traveller is a combination of hollow box girders for carrying the loads and VARIOKIT standard components for the formation of formwork, working scaffold and platforms.

A self-launching procedure by means of integrated moving hydraulics, complete hydraulic adjustment and alignment lead to accurate concrete results. Millimetre deviations can be realized with arched spans of up to 140 m.

**Time-consuming technical planning**
Balanced cantilever equipment and formwork normally experience large changes in geometry and load which result from the varying heights of the superstructure towards the middle span. Here, detailed technical planning is indispensable. In addition, the constantly changing load conditions along with the resulting loads and deformations must be accurately calculated.

Using the very latest 3D formwork planning, PERI provides perfect implementation plans and detailed processing which make on-site forming cost-effective and efficient.

The transfer of very large loads through accurate static calculations for each climbing cycle are precisely implemented.

Changes to the external geometry of the web require variable constructions. VARIOKIT steel walers and spindles provide here a continuous and safe load-carrying system.
The transfer of the loads into the pier is a very important area. With the PERI UP scaffold system, flexible and safe access to this area is realised.

Furthermore, the inner sides of the bridge web also require filler areas in both the width and height. The VARIOKIT adjustment unit offers continuous adjusting possibilities.

Geometrically complicated details in the cantilever area can be flexibly formed with the VARIOKIT construction kit. Moving the formwork takes place by means of a lightweight chain hoist.

The PERI VARIOKIT balanced cantilever traveller consists of new main frames which allow compensation of the bridge longitudinal and lateral inclinations to be carried out without packing timber.

Furthermore, the inner sides of the bridge web also require filler areas in both the width and height. The VARIOKIT adjustment unit offers continuous adjusting possibilities.
Heavy-duty shoring has been in use for many years in civil engineering. As the first manufacturer, PERI has redefined the application in the course of developing the VARIOKIT engineering construction kit. With this, the disadvantages of the two conventional versions, load-bearing scaffold with steel profiles and special scaffold tower systems are avoided without additional application. Technical processing of heavy-duty shoring applications is very challenging. PERI makes this possible using the latest technology and flexibly used system parts. Here, the advantages of a large range of components come to the fore. Always having the correct length facilitates a cost-effective planning process. Heights to 40 m can be realised with VARIOKIT heavy shoring towers with a constant high load-bearing capacity up to max. 240 t.

4 assembly types are possible:
- **Standard tower**
  4 legs are assembled using the standard connection parts. This results in an axial dimension of 2 x 2 m.
- **Tower with additional legs**
  In very highly-loaded areas, additional legs can be placed with leg spacings of 37.5 cm. With this, the permissible load-bearing capacity is then doubled.
- **Shoring tower frames**
  Is a combination of legs to “frames” with load-dependent and geometrically necessary number of load-carrying components.
- **Assembly as main beam frame**
  Main beam frames, e.g. in front of abutment walls, can be assembled up to 10 m high as independent units only with head restraint.
With PERI UP scaffold construction kit, all required stairs, access points and working platforms are quickly and safely erected.

The Leg Connector VST 48 is equipped with a centering aid. This allows easy and simple extensions.

With PERI bolts, the main connections of the individual components are carried out quickly, accurately and safely.

One component for extensions and base units - the Leg Base VST 48.
With the help of VARIOKIT engineering construction kit, flexible, load-optimised and versatile trusses can be designed for load transfer.

Depending on the load, SRU Waler 120, RCS Rails U 200 or HDT Main Beam HEB 300 serve as the chord of the truss; in combination with SLS Spindles or rectangular struts as diagonal bracing, load-optimized solutions can be designed.

The extremely variable adjustment to the structural geometry takes place by means of a defined set of holes with 12.5 cm increments in the SRU and RCS rails.
Creation of horizontal assembly areas on inclined roof areas for falsework with VARIOKIT components.

Simple and fast construction site assembly by means of bolted connections.
Main connecting means are bolts and fitting pins with Ø 21, 26 and 40 mm. Jobsite assembly is accelerated through standardized connecting components such as the UK 70 coupling or RCS 97 climbing rail connector.

The VARIOKIT system construction kit provides numerous combination possibilities with other PERI system components.

Rentable solution in bridge construction. Truss comprised of SRU steel walers with SLS spindles as diagonal bracing.
The RCS climbing system combines the advantages of different climbing systems in one modular system. Depending on the requirements and use, the system can be climbed with the crane, or raised crane-independent by means of mobile, hydraulic climbing devices. The RCS modular construction system allows standard solutions to be easily adapted to project-specific requirements.

- **RCS Climbing Protection Panel**
  For completely enclosing floors under construction particularly those in high skeleton structures.

- **RCS Formwork Scaffolding**
  For rail-guided climbing of wall formwork.

The flexible anchoring of the RCS climbing system is the basis for numerous project successes all around the world, also for many extraordinary structures.

The RCS climbing shoe guides the climbing rail during the moving procedure. The integrated climbing pawl automatically engages the connection bolts of the climbing rail and secures the unit at a distance of 50 cm. Already during the first concreting cycle, the upper part of the formwork scaffolding is attached to the foldable runners of the climbing shoe.

Formwork for cores or facades of a high-rise building is climbed with PERI RCS just as safely and cost-effectively as for bridge piers.
Both systems can also be climbed hydraulically and are thus crane-independent.

With the mobile self-climbing devices and hydraulic pumps, the cost of the self-climbing technology is reduced as well as ensuring cost-effective implementation for structures with lower heights.

Hydraulic pumps and cylinders are quickly operational and easy to transport.

With the climbing rail, the scaffold unit is always connected to the building by means of the climbing shoe for the entire climbing procedure. Moreover, it is impossible for the RCS climbing unit to “drift” during strong winds. This means that climbing can take place safely and quickly at any time.

The hydraulic cylinder, with 5 t lifting capacity, can be easily positioned on the climbing shoe and rail.

Advantages:
- The climbing rail is not climbed in advance but, instead, is part of the load-bearing system.
- Wall openings are easily bridged by the climbing rail.
- The mobile self-climbing equipment can be retrofitted at any time.

Climbing units are raised with a lifting speed of 1 m/min.
PERI Product Range

Wall Formwork
- Panel Formwork
- Girder Formwork
- Circular Formwork
- Facade Formwork
- Brace Frame

Climbing Systems
- Climbing Scaffold
- Self-Climbing System
- Climbing Protection Panel
- Platform Systems

Column Formwork
- Square
- Rectangular
- Circular

Scaffold, Stairways, Working Platforms
- Facade Scaffold
- Working Platform
- Weather Protection Roof
- Stairway Access

Slab Formwork
- Panel Formwork
- Beam Grid Formwork
- Girder Formwork
- Slab Table
- Beam Formwork

Bridge and Tunnel Formwork
- Cantilevered Parapet Carriage
- Cantilevered Parapet Platform
- Engineer’s Construction Kit

Shoring Systems
- Steel Slab Props
- Aluminium Slab Props
- Tower Systems
- Heavy-Duty Props

Services
- Formwork Assembly
- Cleaning / Repairs
- Formwork Planning Software
- Statics
- Special Constructions

Additional Systems
- Plywood
- Formwork Girders
- Stopend Systems
- Pallets
- Transportation Containers

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