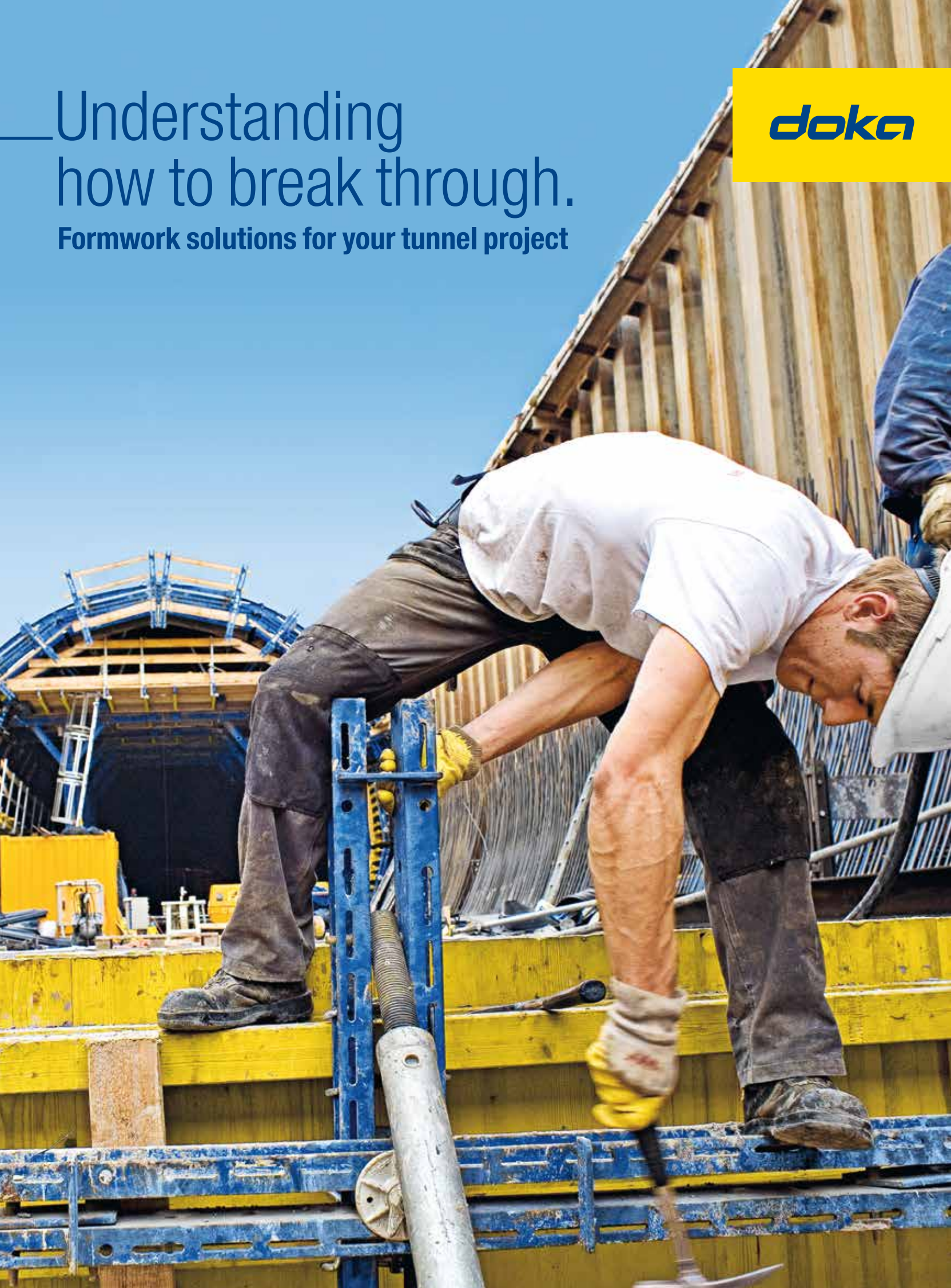


Understanding how to break through.

Formwork solutions for your tunnel project

doka



The Formwork Experts.

_Understanding your tunnel project as a partner

_Understanding the construction process truly and being knowledgeable about it is the prerequisite for being a partner in the construction industry. We have this understanding from the initial planning stage through to completion of construction.

_Understanding such as this is based on our experience from infrastructure projects around the globe. We rely on our flexibility and innovation as the key to success. Successful and economic implementation of tunnel structures requires flexibility. The people at Doka are your expert partners right from the start. We know how to listen and ask the right questions in order to identify challenges and the factors that influence a project.

The custom-tailored solution from Doka includes not only formwork systems but also the services needed to ensure that together we will achieve project success. So we are well-qualified to be your high-performing and reliable partner in tunnel construction.

Engineered by Doka.



Doka is able to look back on a long history of understanding.

Listening intently, understanding the world as seen through the eyes of our customers, learning to understand all aspects and thinking ahead. We are passionate about not being satisfied with the first solution that might get the job done. Rather, we continue fine-tuning it until we come up with a true benefit for our customers. This is the only way a small woodworking shop could grow into a globally operating formwork company, known by the brand name Doka since 1956.



It is all part of progress: innovative infrastructure solutions combined with ever shorter construction times. Not to mention increasingly stringent safety requirements for the structure as a whole. For planners, contractors and suppliers, this means one thing: the criteria are getting tougher. All over the world.

Important information: Always observe all relevant safety regulations (e.g. as issued by construction-industry employee safety organisations) applying to the use of our products in the country in which you are operating. In addition, the User Information booklets (Instructions for Assembly and Use), which contain information on standard system set-up and on compliant utilisation of Doka formwork systems, must also be observed. The illustrations in this brochure show the situation during formwork assembly and are therefore incomplete from the safety aspect. It could be dangerous to combine our formwork equipment with equipment from other manufacturers. If you intend combining different systems, please contact Doka for advice first. Subject to change without notice in the course of technological development. © Copyright by Doka GmbH

Understanding requirements

Find out more
on our website:

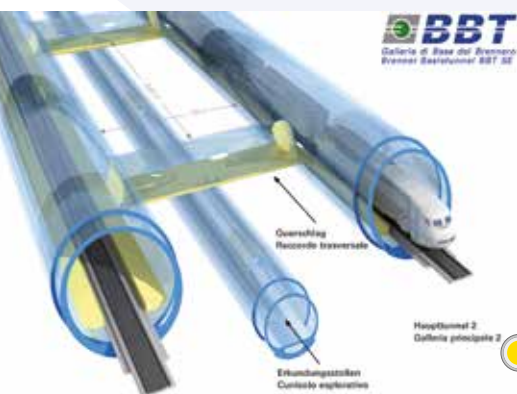
www.doka.com/tunnel



Sound advice begins during the project development stage for the structure. Because from this point on, it's all about cost efficiency and having a leg up on your competitor. Which is why our internationally experienced experts make a point of advising you very early, and very thoroughly.

Doka technicians work to put together the most suitable formwork solutions in combination with high-performing service packages, exactly tailored to each individual construction project and method.

Regardless of how different and unique, one thing holds true for all tunnel projects: our commitment to the entire project solution has one common denominator – to design a construction process that is fast, safe and as good as it can be.



Structural elements

In addition to the main tunnel and depending on utilisation (road, rail, water), the stringent requirements for a tunnel project demand various safety, pedestrian and vehicular access structures including: cross-cuts, emergency shafts and galleries, exploratory galleries, operational and monitoring structures, portal head, breakdown lay-bys, recesses and monitoring structures.

Construction project

WHAT is being built?

Geometry of structure

The ideal geometry is determined on the basis of construction method, use type, terrain, length and loads to be transferred.



Construction method

The construction method is selected based on circumstances related to geology, time and traffic-related conditions such as traffic concept during construction, the terrain, the length and intended location of the structure (water, land, mountain), groundwater, and so on.





Formwork systems

Your site team and our Doka specialists work closely together to select the right formwork system. Site requirements such as overall construction time, workflow (cycle time) and personnel resources are factors in deciding on the right formwork system.



Safety in every situation

For our customers we develop project-specific safety concepts to permit unimpeded operation, safe repositioning of the formwork and safe and fast access at any height. Safe, smooth work routines speed up the workflow.

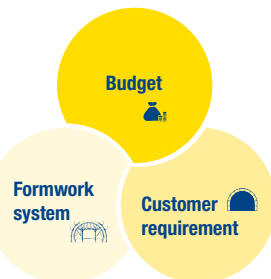
Site infrastructure

Smooth and efficient construction progress depends on functioning site infrastructure. Well thought-out formwork solutions standardise and speed up repetitive jobs, reduce risk, allow for an ideal work environment and simplify the workflow.



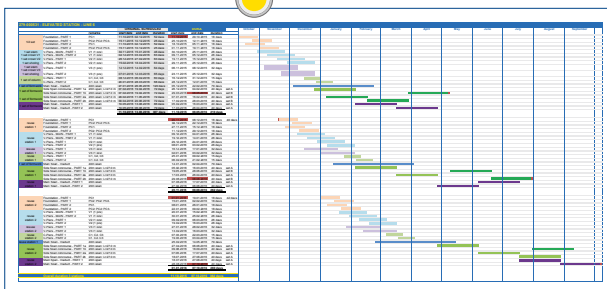
HOW is it being built?

Construction method



Budget

It pays to invest in quality system formwork. A solution customised to meet your project's unique requirements saves resources, as well as time and money. We accomplish this with quality-tested formwork systems and a custom-tailored project solution.



Workflow planning

Optimised workflow planning is the basis of a cost-efficient formwork concept. Planning takes into account the different structural elements, the construction method, the geometry of the structure, site logistics and all project-specific boundary conditions and it also saves time and money.

_Understanding effective consultation right from the start

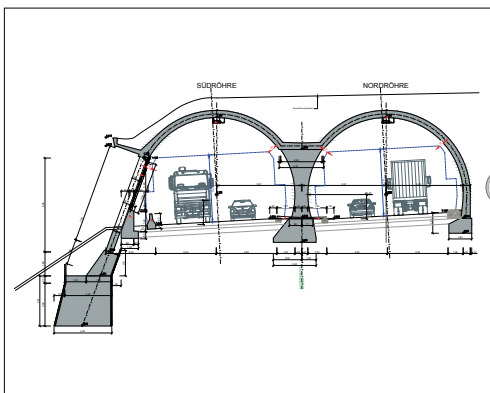
Your project success depends not only on selecting the right formwork solutions. The close support of our experts from the start produces a comprehensive solution concept for your tunnel project. Because we provide single-source supply for products, services and planning, project management and logistics.



Every tunnel is unique – as is the associated formwork solution. The basis for developing a custom-tailored formwork solution is laid by consultation and support for your project from the very start. Doka experts discuss the requirements in detail with you.

Structural analysis

Only a solution based on a fundamental analysis of the entire project supports the best possible construction process. It is important to identify the critical requirements jointly, as early as during the bid stage.



Invitation to bid and initial consultation

- Structural analysis
- Project requirements
- Feasibility study



Engineered by Doka.

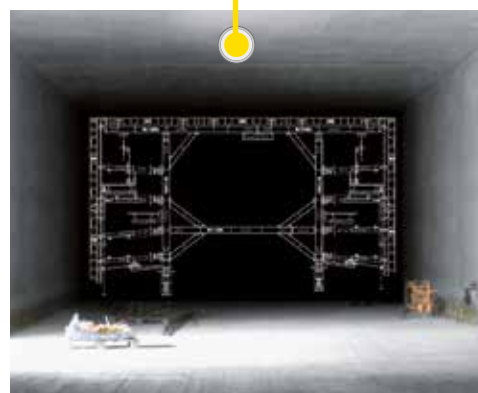
Project requirements

Focused bid planning is based on your site-specific general conditions such as overall construction time, required cycle time, workflow planning and local conditions.



Feasibility study

The formwork concept is elaborated on the basis of the boundary conditions identified beforehand. In this step the custom-tailored formwork solution is determined by our experts and yours working together closely. Minor adjustments in the workflow are identified to help optimise feasibility.



Understanding engineering: Efficient planning for a safe project sequence

Efficient formwork solutions can be developed economically only if there is an understanding of project requirements and construction processes. This understanding is the basis of Doka engineering services.

Engineered by Doka.

Bid submission

Following thorough analysis of the structure, detailing of the project requirements and check of feasibility, the jointly elaborated solution is presented in a detailed bid.



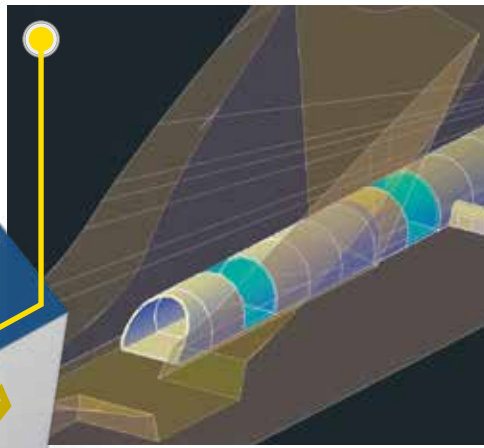
Approval planning

Based on the most recent version of the planning documents, final formwork solutions are discussed in detail with you and released in writing.



Engineering

- Bid submission
- Approval planning
- Implementation planning
- Statics calculations
- Assembly planning
- BIM



BIM – bid planning supported by simulation

Intelligent networking of data, reliable planning and significant savings on time are the biggest advantages of the BIM method. We enable 3D design of formwork in Revit and Tekla and 4D simulation of progress from one defined work cycle to the next throughout the construction sequence. The net results are less labour, a better overview and more transparency throughout construction.



Implementation planning

Implementation planning is the basis for fast, safe forming operations compliant with country-specific standards and regulations. It includes the deployment plans and any assembly and fabrication plans necessary to ensure best possible assembly and utilisation.



Statics calculations

Project-specific statics calculations compliant with local standards ensure that the formwork is stable and suitable when used as intended on site. Depending on need, these calculations range from a simple project statics through to exact dimensioning including documentation (structural analysis) and certification that they were checked by a civil or testing engineer (verified structural analysis).



Assembly planning

The plans created and approved by Doka provide you with the individual steps for assembly down to the last detail. They are the guidelines for fast and safe on-site assembly by your site crew.

_Understanding: Custom-tailored formwork solutions

Individual formwork solutions custom-tailored to your requirements for your tunnel project.





Cut-and-cover method	12
-----------------------------	-----------

Tunnel system DokaCC	14
Reference projects for cut-and-cover method	16-33

Mining method	34
----------------------	-----------

Heavy-duty supporting system SL-1	36
Tunnel system DokaMT	38
Reference projects for mining method	40-49

Top-cover method	50
-------------------------	-----------

Load-bearing tower Staxo 100	50
Supporting construction frame	51
Reference projects for top-cover method	52-55

Metro: lines and stations	56
----------------------------------	-----------

Reference projects for Metro: lines and stations	58-63
--	-------

Box culverts	64
---------------------	-----------

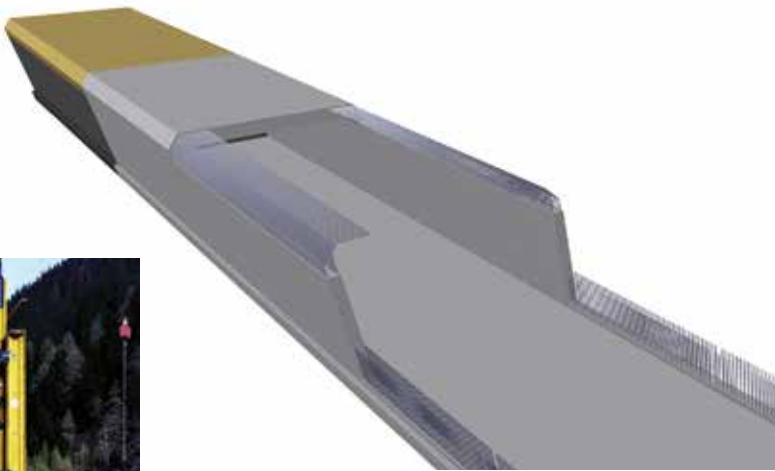
Concrete monitoring with Concremote	66
--	-----------

Cut and cover method

In cut-and-cover tunnelling the pit remains open while the tunnel is being built. This method is used primarily when the soil cover is shallow. If space is not an issue the sides of the pit can be sloped as desired; this often applies when roads are built to bypass towns, for example. In built-up areas, however, space is generally very scarce and the pit is secured using supports in the form of bored pile, sheet pile or diaphragm walls. The tunnel tubes can be constructed by the segmented, partly monolithic or monolithic method.

Segmented construction method:

- Foundation, walls and top slab are cast separately.
- so conventional wall and slab formwork can be used
- detailed cycle planning on the site



In segmented construction, the walls can be poured using large-area and framed formwork or supporting construction frames. Heavy-duty supporting systems combined with tunnel systems are frequently used for the roof slab. On the basis of tunnel length, number of repeat uses and site specifics, Doka experts elaborate the appropriate system in an overall concept that includes services.



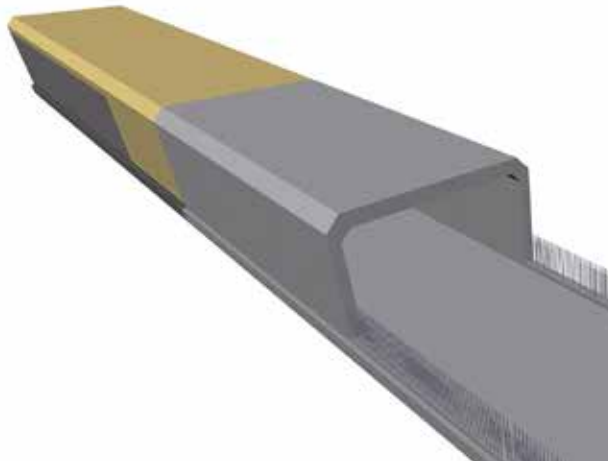
▲ Large-area formwork Top 50



▲ Load-bearing tower Staxo 100 combined with Tunnel formwork system SL-1



▲ Supporting construction frame mounted on travelling unit



Partly monolithic construction method:

- foundation is cast in advance
- walls and roof slab are then cast in one step with a formwork traveller
- round or rectangular cross-sections, manual to fully hydraulic operation: Doka will provide you with a custom-tailored formwork traveller

▼ Tunnel system DokaCC

When a tunnel is built with strip foundations, concrete loads have to be transferred from the formwork traveller into the wall foundations. Tunnel system DokaCC was developed specifically to meet this requirement. No additional temporary strip foundations are needed and the drive-through opening is wide so that there is nothing to obstruct the transport of materials and equipment to your site.



▼ Heavy-duty supporting system SL-1

Bracing the sides against each other means that the walls can be formed without ties. The loads are comparable to those encountered in tunnelling by the mining method. Given these requirements, the solution with the Heavy-duty supporting system SL-1 is ideal.



▲ Securing the construction pit

The method of securing the pit primarily influences the design of the outside formwork. Cramped spaces in particular call for an appropriate solution that offers ample stripping allowance and is easily moved to the next section.



▲ Logistics

Doka assists with a logistics concept if the formwork traveller is needed for different contract sections. This requirement has to be taken into consideration in planning, and the same applies to the availability and usability of technical resources.

Tunnel system DokaCC

The economical tunnel formwork system for cut-and-cover

Find out more
on our website:

www.doka.com/dokacc



With the modular Tunnel system DokaCC, rectangular or circular cross-sections of cut-and-cover tunnels can be formed swiftly and using less material. The applicability on all common types of foundations provides additional benefit in terms of efficiency

Smart system design for cost-efficiency

- small number of shoring frames, made possible by statically optimised load-bearing system
- needs less labour, as there are fewer points needing to be operated.

Safe working conditions in all operational phases

- detailed project-specific planning by Doka Engineering
- The parallel girderframe units can be pre-assembled flat on the ground and safely lifted into the vertical because of their bolted and solidly pinned joints.
- safe up/down access via integrated caged ladderway
- longitudinal gradients up to 10 % can be negotiated safely with the electric Driving unit TL

Smooth construction workflow

- Less assembly work needed on the site, as there are only a small number of shoring frames.
- delivery of pre-assembled units to site means shorter assembly times



▼ Innovative system design

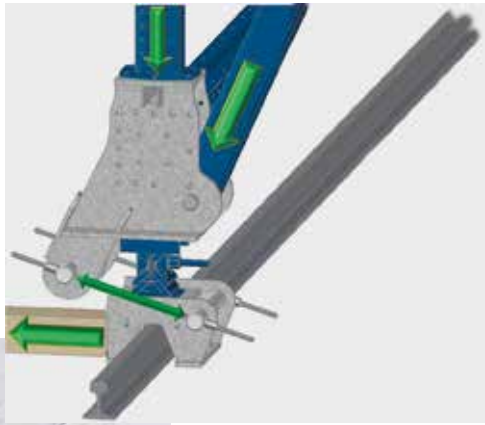
- system can be used on all foundation types
- formwork traveller geometry allows for wide drive-through opening
- loads are smoothly transferred into wall foundations
- no additional foundation work required



▼ Less assembly work

- few individual components and shoring frames
- pre-assembled units
- faster assembly speeds up the overall construction process





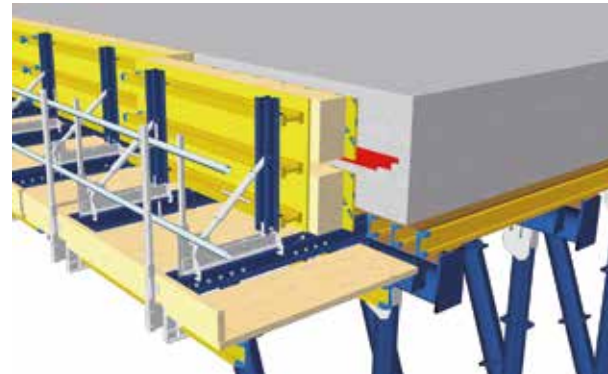
◀ Optimum load transfer

- optimised angle of diagonal strut to transfer the load into the strip foundation
- the horizontal forces transferred into the wall foundation are relatively minor
- increased safety against tilting and sliding of the wall foundation



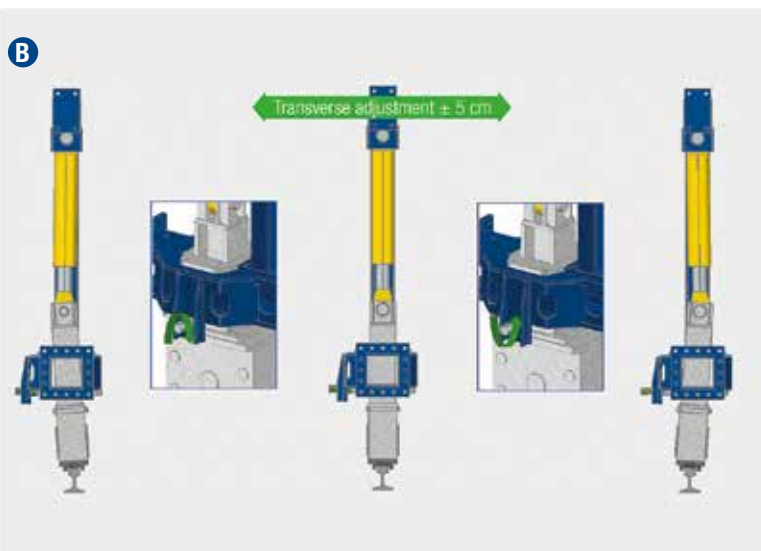
Practical stop-ends ▶

- large-area platforms for adequate stripping distance
- stop-end formwork is easily and quickly opened and closed
- easy to operate sliding mechanism readily exposes the joint tape



High workplace safety ▶

- formwork traveller DokaCC can be combined with proven Doka safety systems
- optimum protection for site crew so that work on the site progresses more quickly



◀ Quick and easy repositioning

- A** The hydraulic lifting appliance makes it easy to raise, lower and precision-adjust the traveller.
- B** The innovative design ensures that the formwork traveller remains securely on the rails without derailing even during lateral shifting. This speeds up the workflow sequence, as the traveller can be lowered directly on to the running rails from every position.



Südgürtel Graz

The Südgürtel is part of a comprehensive infrastructure package designed to bring the southern part of Graz up to speed for the requirements of modern mobility. For the 4-lane connector between Puntigamerbrücke and Liebenauer Gürtel, Doka supplied two DokaCC formwork travellers, two SL-1 tunnel-roof travellers and Wall formwork FF20 for the impermeable tank structures.



Location: Graz, Austria
Construction work by: Granit Ges.mbh, Porr AG, Teerag-Asdag AG
Type of structure: partially monolithic
Tunnel length: 700 m
Clear width: 12.50 m
Clear height: 5.50 m

Project solution:

- DokaCC with V-shaped strut configuration creates a very wide drive-through opening for smooth passage of construction traffic
- shaping timbers can be doubled up for easy adjustment for differences in casting-section lengths up to 4 m
- use of Tie rod system 20.0 and quick-release nuts reduced the number of form-tie points
- pre-assembled in the Pre-assembly Service centre, so quickly assembled on site
- rapid repositioning with fully hydraulic equipment
- the Xface sheet is so hard-wearing that the entire length of the tunnel was formed without the form-ply having to be replaced

Challenge:

- different casting-section lengths over the entire length of the tunnel
- easy passage with changing curve radii

Products used:

Tunnel system DokaCC, Heavy-duty supporting system SL-1, Wall formwork FF20, Large-area formwork Top 50, Xface sheet, Working scaffold Modul

Construction time: 16 months, 2014 – 2015

Solbakk Tunnel

The 14-km long Solbakk Tunnel is one of three tunnels comprising the Ryfast Project, currently one of the world's longest underwater roadway tunnel projects. 290 m underneath the sea at its lowest point, this tunnel has two separate tubes, one for traffic in each direction, and it replaces the current ferry link between Stavanger and Tau.

Challenge:

- regular geological tests as the tunnel is driven, so that the inner shell can be cast if loose rock is encountered
- formwork operations have to continue while the conveyor belt is running



Location: Stavanger, Norway

Construction work by: Marti IAV Solbakk DA

Type of structure: partially monolithic

Portal:

Tunnel length: 185 m each tube

Clear width: 9,18 m | **Clear height:** 7.95 m

Mined tunnel:

Clear width: 10,38 m | **Clear height:** 7.69 m

Project solution:

- pre-assembled units so that the formwork traveller can be quickly positioned where it is needed
- the design of the formwork traveller allows space for removal of spoil by conveyor belt for faster, uninterrupted progress

Products used:

Heavy-duty supporting system SL-1, Large-area formwork Top 50, Working scaffold Modul

Construction time: 2015 – 2016



S10 Highway through Mühlviertel

As part of European route E 55, the S10 highway is an important strategic connection to the South Bohemian and Baltic Sea regions. As a result of local topography, construction of the S10 required enormous earth movements and numerous building operations in order to overcome natural obstacles. To level the path for the S10, the construction firms involved built four tunnels, four underground sections, five interchanges, seven overpasses, 17 bridges, six cuttings, one gallery and several retaining walls.



Challenge:

- the longest infrastructure construction site in Austria with four tunnels, four underground sections, five interchanges, seven overpasses, 17 bridges, six cuttings, one gallery and several retaining walls
- **Neumarkt Tunnel:** advancing centre wall and very cramped site conditions
- **Pernau underground section:** complex, gently curving geometry of the structure
- **Ganglsiedlung underground section:** use the same formwork traveller used for two structures with different cross-sections and foundations

Location: Austria

Project owner: ASFINAG

Construction work by: JV Hochtief & Swietelsky, Porr, Habau, Haider, JV Hochtief & GK Construction

Type of structure: partially monolithic

Overall length: 22 km

Project solution:

- on this infrastructure mega-project, just-in-time deliveries of the necessary formwork materials to exactly the right location on site take the pressure off site logistics
- highly economical and versatile because the 'construction kit' for tunnels allows for variable arrangement of system beams, walings and struts, plus compatibility with Large-area formwork Top 50

Neumarkt Tunnel:

- work continued with traffic ongoing because the formwork traveller was repeatedly repositioned
- two formwork travellers were deployed at the same time to ensure adherence to the tight construction schedule

Pernau underground section:

- in close cooperation between construction firm, planners and Doka, the tunnel system was designed so that it could be adapted to the complex shape of the structure in the course of repositioning

Ganglsiedlung underground section:

- the flexibility of the Tunnel system DokaCC made adaptation to the geometries of both structures possible. The formwork travellers were used without difficulty on the lateral wall foundations of object F25 and on the full-width bottom slab of object F20

Products used:

Tunnel system DokaCC, Heavy-duty supporting system SL-1, Large-area formwork Top 50, Ladder system XS, Composite formwork beams

Construction time: 2009 – 2015



Pernau underground section (object F16)

Construction of the 270-m long tubes with their round cross-sections was completed successfully with the Tunnel system DokaCC. In close cooperation between construction firms, planners and Doka, the tunnel formwork system was conceived so that it can be adapted to the complex, steadily curving geometry of the structure in the course of repositioning.



Ganglsiedlung underground section (objects F20 and F25)

The Ganglsiedlung underground section consists of two tubes, each 275 m long. Their clear widths measure 9.80 m and clear height is 5.68 m. This structure, too, was formed with the Tunnel system DokaCC. Here, the flexibility of the tunnel system for cut-and-cover construction is clearly evident. The same formwork traveller was later used for a second object with a different cross-section.



Neumarkt Tunnel (object F12)

The two tubes with an overall length of 1,970 m and inside radius of 5.05 m were formed using the Heavy-duty supporting system SL-1 in combination with Large-area formwork Top 50. High-performing hydraulics made repositioning the formwork traveller a pushbutton-controlled operation. Given the limited space available, this formwork solution provided the necessary flexibility due to the variable arrangement of system beams, walings and struts.



Challenge:

- very strict tolerances
- water-tight structure with as few form-tie points as possible
- forming and pouring in dry dock, then flooding and floating of the tunnel sections to their destination

Second Midtown Tunnel

The Second Midtown Tunnel is a large-scale project in a class of its own that was completed underwater. The 1.13 km long immersed tube tunnel links the cities of Norfolk and Portsmouth in the US state of Virginia. The tunnel consists of eleven individual segments each 100 m long and cast in 5 pouring sections. After being cast in the dry dock in Baltimore, they were towed 320 km south into the Elizabeth River and immersed there. The Heavy-duty supporting system SL-1 tunnel formwork from Doka was a high-performing and cost-effective solution for this project.



Location: Virginia, United States of America
Construction work by: JV SKW (Skanska, Kiewit & Weeks)

Type of structure: partially monolithically cast, immersed tunnel

Formed tunnel length: 1,130 m

Project solution:

- sturdy formwork construction to meet stringent requirements for structural tolerances
- very few form-tie points to ensure a water-tight structure
- hydrostatic formwork pressure at centre wall for optimised workflow
- conical form ties for high formwork pressure at centre wall (no jacket tubes needed)
- special pouring windows to facilitate concrete placement
- easy adjustability of inside and outside formwork

Products used:

Heavy-duty supporting system SL-1, Large-area formwork Top 50, and a custom steel construction for the outside formwork

Construction time: 2012 – 2015

Imberg railway tunnel

The Imberg tunnel is a section of the new Wendlingen - Ulm rail link in Germany. The two-track tube is 499 metres long overall, with 220 metres of mined tunnel and 279 metres constructed by the cut-and-cover method. A Tunnel formwork traveller DokaCC was used for the cut-and-cover section of the tunnel. It ensured the drive-through access opening specified by the project owner. The fully hydraulic drive allowed repositioning to the next casting segment with a four man operation.



Challenge:

- cycle times were so short that curing treatment of the inner shell was necessary
- large drive-through access opening necessary, to facilitate vehicular traffic on the build

Location: Dornstadt, Germany

Construction work by: Arge NBS Wendlingen-Ulm PFA 2.3

Cycle time: 7-day cycle

Type of structure: partially monolithic construction

Formed tunnel length: 279 m

Clear width: 11.84 m

Clear height: 8.98 m

Casting-section length: 10.0 m

Project solution:

- all-hydraulic solution for safe opening and closing of the formwork and travelling on flanged wheels
- integrated transverse adjustment for easy precision adjustment and positioning of the system
- curing carriage rentable

Products used:

Heavy-duty supporting system SL-1, Tunnel system DokaCC, Large-area formwork Top 100tec, Large-area formwork Top 50

Construction time: 11 months, 2016





E39 Eiganes Tunnel

The Eiganes Tunnel significantly reduces the volume of traffic in Stavanger's city centre and improves the connection between the inner city and the existing Ryfast Tunnel. In addition to a tunnel formwork traveller for portals K51/52 and K30/31, Doka also supplied the formwork solution for dealing with the differing cross-sections in the mined section of the tunnel.

Location: Stavanger, Norway
Construction work by: Implen Construction GmbH
Type of structure: partially monolithic
Portal:
Clear width: 10.40 – 11.65 m
Clear height: 7.35 – 7.82 m
Formed tunnel length: 664 m
Mined tunnel:
Clear width: 10.63 – 14.13 m
Clear height: 7.34 – 8.00 m
Formed tunnel length: 241 m

Project solution:

- wall and floor panels planned and built for use on different radii and cross-sections



Challenge:

- adapt the formwork traveller to all the different cross-sections
- repeatedly re-use the formwork panels available on site
- ventilation pipe runs through the formwork traveller

Products used:

Heavy-duty supporting system SL-1, Large-area formwork Top 50

Construction time: 12 months, 2015 – 2016

St. Pölten rail-freight bypass

Doka delivered several tunnel formwork travellers for contract section GUW 3 of the St. Pölten rail-freight bypass project. The two tubes of the Bründlkapellen Tunnel merge into one tunnel, so the formwork travellers were continuously expanded and modified as the project progressed. Another 16 sections were then built as a single-tube tunnel. The same formwork was then used to build the single-tube, twin-track Radleiten Tunnel.

Challenge:

- merge the two tunnel structures into one tube in the radius of a curve
- changing tunnel cross-section, so the formwork traveller has to be highly adaptable



Location: St. Pölten, Austria
Project owner: ÖBB Infrastruktur AG
Construction work by: Strabag AG
Type of structure: partially monolithic
Formed tunnel length: 822 m / 390 m
Clear width: 5.82 m / 11.20 m | **Clear height:** 7.00 m / 6.90 m

Project solution:

- curved pouring section built with two angled, interconnected SL-1 formwork travellers
- the 'construction kit' system is highly versatile, so the two tunnel formwork travellers could be merged into one as construction progressed
- Tie rod system 20.0 and Quick-release nut 20.0 enable the form-tie points to be released even with 60 kN/m² formwork pressure, saving time and labour
- adjustable bracket for repositioning the outside formwork

Products used:

Heavy-duty supporting system SL-1, Large-area formwork Top 50, Load-bearing tower Staxo 100

Construction time: 18 months, 2013 – 2015



BBI Airport railway link

A tunnel was built as part of the rail link to the terminal building at Berlin's Schönefeld Airport. Doka supplied four wall-formwork travellers consisting of a custom steel construction with Top 50 large-area formwork for this project.

Challenge:

- save crane time
- reposition large formwork units
- tight construction schedule



Location: Berlin, Germany

Project owner: DB ProjektBau GmbH

Construction work by: Berger Bau, Schälerbau GmbH, Ingenieurbau Ges.mbH, Bleck & Söhne GmbH & Co. KG

Type of structure: segmented

Formed tunnel length: 3,100 m

Clear wall height: 6.60 m

Project solution:

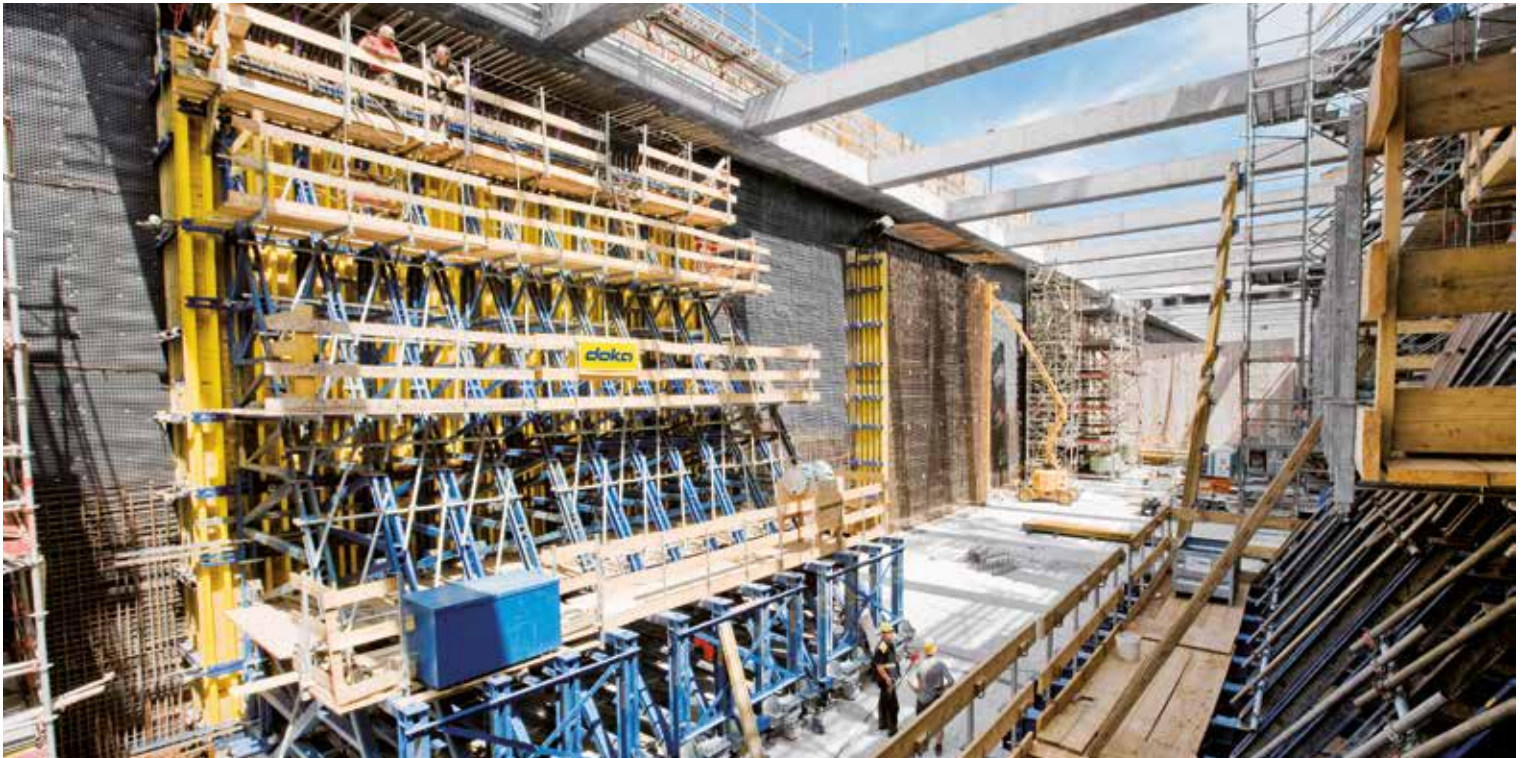
- 20-metre long inside and outside formwork units and formwork traveller repositioned without crane assistance
- integral platforms and access systems for safe working conditions
- 100,000 m² of surface area cast on a tight schedule with only 7,500 m² of formwork

Products used:

4 wall-formwork travellers in special steel construction, Load-bearing tower Staxo 100, Dokamatic tables, Wall formwork FF20, Large-area formwork Top 50

Construction time: 2007 – 2009





U4 HafenCity underground rail link

Hamburg's U4 line from the Jungfernstieg station runs underground in a southerly direction. Two new stations were built in the HafenCity district: 'Überseequartier' and 'HafenCity Universität'.



Location: Hamburg, Germany
Construction work by: Hochtief, Aug. Prein, Züblin, HC Hagemann
Type of structure: segmented
Formed tunnel length: 300 m
Clear width: 17.68 m | 16.48 m
Clear height: 10.20 m | 10.60 m

Project solution:

- a traveller unit carrying large suspended wall-formwork gangforms was used for craneless repositioning
- to make horizontal repositioning possible, the tunnel inside-wall formwork first had to be rolled back by around 1.20 m so that the panel suspenders would clear the projecting reinforcing rods for the cover slab.
- Doka supporting construction frames were used for the single-sided walls on one side and a custom Heavy-duty supporting system SL-1 traveller with suspended wall formwork was used on the other

Challenge:

- the horizontal pit-shoring girders on the Überseequartier station build ruled out crane-lifting for repositioning the wall formwork
- cramped conditions at the HafenCity Universität contract section required single-sided formwork for walls 1.50 m thick and 10.60 m high

Products used:

Heavy-duty supporting system SL-1, Wall formwork FF20, Framed formwork Framax Xlife, Supporting construction frame

Construction time: 17 months, 2008 – 2009



E6 Nordnes Tunnel

The Nordnes Tunnel increases traffic safety, reduces the risk of disruption due to avalanches and landslides, and shortens the E6 by 8 km. A tunnel formwork traveller constructed from standard materials was used to build first the Bergli portal and then the portal at the Monsastubergan end.



Location: Manndalen, Norway
Construction work by: Marti Nordnes DA
Type of structure: partially monolithic
Formed length: 55 m
Clear width: 9.80 m
Clear height: 7.58 m

Project solution:

- both portals were built with only one formwork traveller that needed no more than minor modifications
- fast adaptation to the flared broadening zone by using pre-assembled slab panels and a formwork traveller split down the middle

Challenge:

- all-inclusive formwork solution for both portals with flared broadening zone
- drive-through opening 4 m wide to accommodate site traffic

Products used:

Heavy-duty supporting system SL-1, Large-area formwork Top 50

Construction time: 2015 – 2016

Koralmbahn Railway MA 12 Kühnsdorf Landscape Tunnel

The Koralmbahn Railway is part of a 1,700 km long international north-south railway linking Europe's Baltic and Mediterranean coasts. Construction firm Kostmann deployed the Tunnel system DokaCC with great success when building this 495-m long landscape tunnel in Kühnsdorf.

Challenge:

- finish three pouring sections in just two weeks
- regular and noise-abatement cross-sections to be handled without major modifications
- complete assembly of the formwork traveller for safe and quick deployment
- waterstop on inside
- tight schedule



Location: Kühnsdorf, Austria

Project owner: ÖBB Infrastruktur AG

Construction work by: Kostmann GesmbH

Type of structure: partially monolithic

Tunnel length: 495 m

Clear width: 11.60 m

Clear height: 8.70 m

Project solution:

- regular and noise-abatement cross-sections handled without major modifications to the formwork traveller
- rapid repositioning and easy handling of the formwork traveller for casting three pouring sections within two weeks
- complete assembly by Doka assembly team for safe and speedy deployment
- formwork traveller equipped with all the necessary platforms and access systems

Products used:

Tunnel system DokaCC, Column formwork Top 50, Ladder system XS, Large-area formwork Top 50

Construction time: September 2012 – July 2013



Gateway Gardens rapid-transit light-rail link

Gateway Gardens, formerly a residential complex for the US military, is now Frankfurt am Main's newest municipal district, very close to the city's international airport. The new district will be serviced by the city's light-rail network. It will have its own station and part of the project is the construction of a nearly 2 kilometres long two track rail tunnel. Two tunnel-roof travellers from the Tunnel system DokaCC and a Tunnel formwork traveller SL-1 were part of the equipment supplied by Doka for the cut-and-cover tunnel in the Lot 2 section of the project.

Challenge:

- fair-faced concrete in the vaulted-roof zone
- tight schedule for complex construction project with differing structural dimensions and slab thicknesses up to 1.5 m
- extra-high environmental protection requirements - the construction site is in a groundwater protection zone



Location: Frankfurt a.M., Germany

Project owner: DB Netz AG

Construction work by: Wayss & Freytag Ingenieurbau AG

Type of structure: cut-and-cover, partially monolithic

Formed tunnel length: 210 m

Vault-forming traveller: Clear width: 19.4 m,
Clear height: 8.7 m

Tunnel-roof traveller: Clear width: 11.0 - 12.2 m | Clear
height: 7 m

Casting-section length: Vault-forming traveller:
9.5 - 18 m Tunnel-roof traveller: 10 m

Project solution:

- cost-effective combination of Heavy-duty supporting system SL-1 and SL-1 LW as forming traveller for the vaulted roof of the station, and 2 Forming travellers DokaCC for the typical cross-section of the tunnel
- the drive is electric, ensuring easy repositioning of the forming travellers
- hydraulic system specially configured to operate with biodegradable hydraulic oil
- ingenious overall solution enables speedy progress on all levels and in all situations of the typical cycle
- process, scheduling and cost certainty ensured by professional project management and complete assembly by the experienced team from Doka Germany's Pre-assembly on site service

Construction time: 2017-2020





GK Project

Doka supplied the formwork solution for the world's deepest immersed tunnel the 3 km Busan-Geoje Fixed Link connects South Korea's second-largest city, Busan, to the island of Geoje at a depth of as much as 60 metres. The tunnel segments (180 m each) were prefabricated in dry dock in batches of four and then towed out to the location where they were immersed.

Location: Busan, South Korea
Construction work by: Daewoo E&C
Type of structure: monolithic
Formed tunnel length: 3,000 m
Clear width: 10.07 m
Clear height: 7.29 m

Project solution:

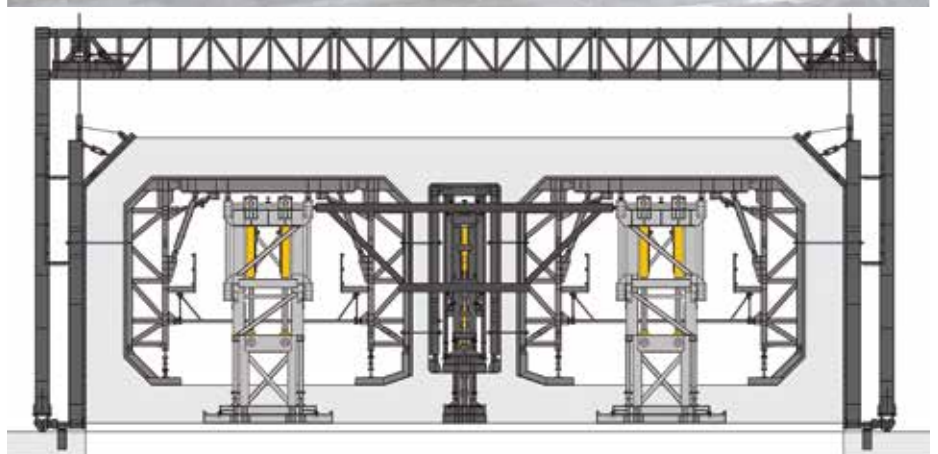
- the form-ply used was made of plastic because of the salt water
- the load-bearing steel construction itself was given special protection against corrosion
- four formwork travellers for forming the tunnel's 3,000 m in 144 pouring sections
- 288 hydraulic cylinders so that the four formwork travellers are repositioned smoothly
- 400 m² outside formwork repositioned in very short order with a gantry structure



Challenge:

- surfaces in contact with salt water from the sea
- long project runtime
- monolithic construction

Construction time: 36 months, 2007 – 2010





A10 motorway enclosure tunnel, Flachau

A 492 m long stretch of the A10 motorway has been enclosed at Flachau. The structure erected here is a solid enclosure that was covered over after completion to create a valley head. The carriageway toward Villach runs in noise-abatement galleries at both ends of the Flachau enclosure. The northern gallery is 204 m long and the southern one 156 m; unlike the enclosure tunnel itself, the galleries were not covered. Both galleries are open on the uphill side; the closed side is toward the town.



Location: Flachau, Austria
Project owner: ASFINAG
Construction work by: Steiner Bau Ges.mbh
Type of structure: partially monolithic | segmented
Formed tunnel length: 984 m | 360 m
Clear width: 9.90 m | 9.85 m
Clear height: 7.00 m | 5.56 m

Project solution:

- the inside formwork traveller has hydraulics for opening and closing the formwork and for lifting and lowering. So progress on this build was rapid.
- the formwork solution selected featured triple-joint frames for the outside formwork without tie rods and a mining-type inside formwork traveller

Challenge:

- environmental protection measure in the form of an open tunnel and adjacent noise-abatement galleries
- outside formwork without tie rods for the round, open cross-section

Products used:

Heavy-duty supporting system SL-1

Construction time: 20 months, 2009 – 2010

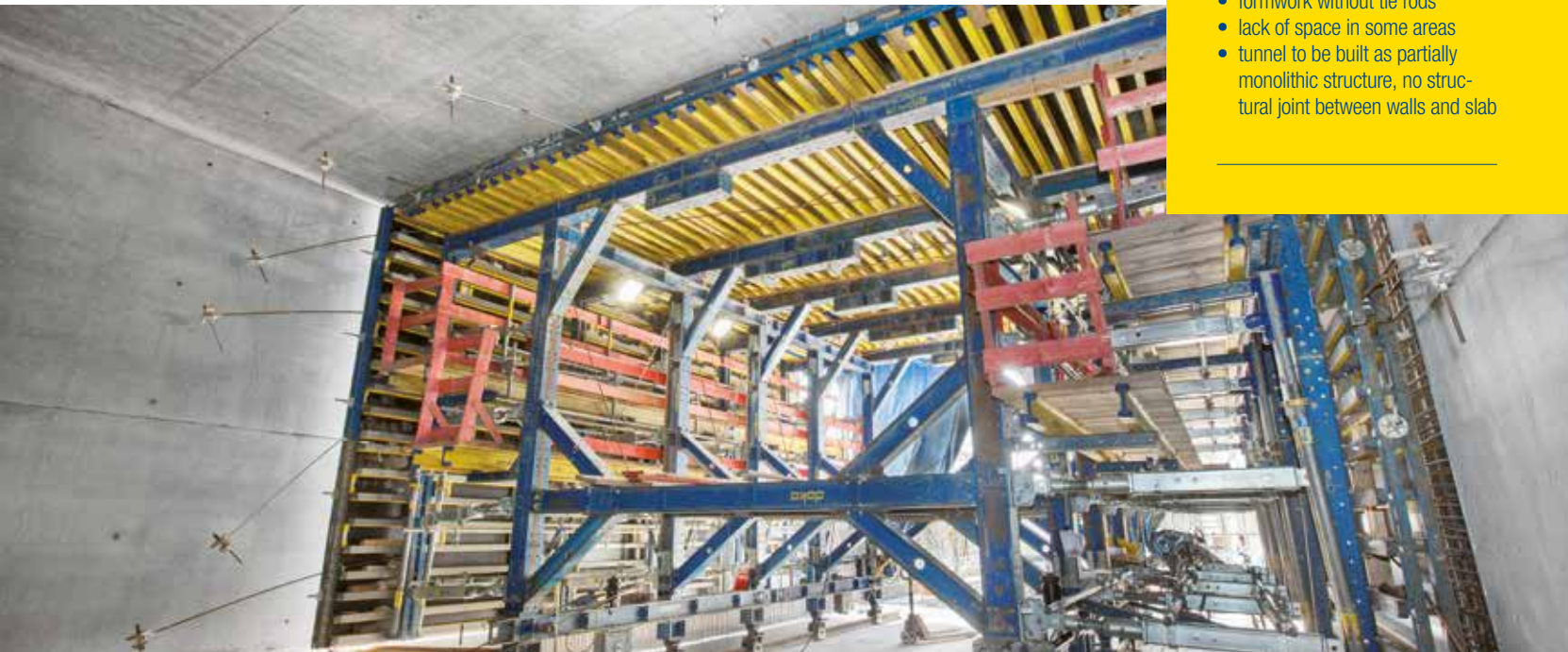


Hahnenkamp Tunnel

A four-lane link road approximately 11.5 km long connects the A2 and A30 motorways. An important component of this construction project was the 450 m long Hahnenkamp Tunnel helps ease traffic congestion in the city centre of Bad Oeynhausen. The project also included trough structures immediately adjacent to the tunnel at either end; the structure at the north end is 178 m long, its counterpart at the south end is 138 m.

Challenge:

- topographic conditions and high groundwater levels placed high demands on sealing tightness
- formwork without tie rods
- lack of space in some areas
- tunnel to be built as partially monolithic structure, no structural joint between walls and slab



Location: Bad Oeynhausen, Germany
Construction work by: Adam Hörnig Bauges. mbH & Co. KG, Aschaffenburg, and Stutz GmbH, Kirchheim-Kemmerode
Type of structure: partially monolithic
Formed tunnel length: 450 m
Clear width: 10.5 m
Clear height: 5.85 m

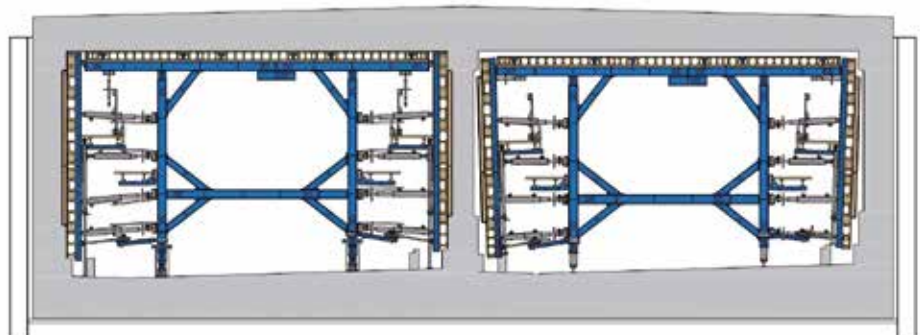
Project solution:

- tunnel outside tunnel walls and trough walls were poured against the pit supports, no form ties were used
- the opposing sets of wall formwork were horizontally braced off each other, and with both walls being poured at the same time there was no need for additional anchoring
- only 430 m² of tunnel formwork and 280 m² of formwork for the trough walls were needed for 18,360 m² of tunnel and 3,800 m² of trough wall

Products used:

Heavy-duty supporting system SL-1, Large-area formwork Top 50 and Top 100 tec, Wall formwork FF20, Composite formwork beams

Construction time: 12 months, 2013 – 2014



Amras motorway enclosure

The 910 m long Amras motorway enclosure was built with a twin-cell cross-section. The tunnel tubes were cast in alternate sequential sections using two all-hydraulically controlled Doka tunnel formwork travellers. As many as three casting sections were completed on each tube in a weekly cycle.

Challenge:

- lack of space right next to the existing motorway with passing traffic
- high-voltage electricity pylons to be passed or integrated, as applicable



Location: Innsbruck, Austria

Construction work by: Ing. Hans Bodner GmbH

Type of structure: partially monolithic

Tunnel length: 910 m

Clear width: 14.37 m

Clear height: 6.07 m

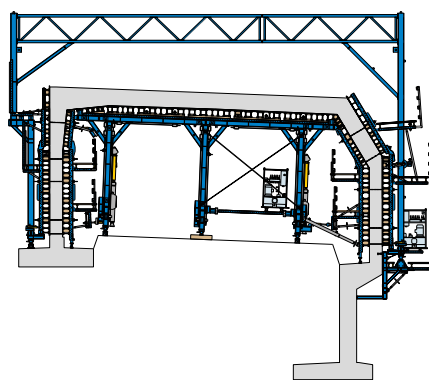
Project solution:

- on the downhill side, project-specific self-travelling outside formwork on leading platform brackets saves valuable construction time
- when work on the southern tube was finished, the formwork was modified slightly for the northern tube
- Doka undertook all assembly and disassembly operations

Products used:

Heavy-duty supporting system SL-1, Large-area formwork Top 50

Construction time: 24 months, 2009 – 2011





Location: Radfeld, Austria
Project owner: Brenner Eisenbahn GmbH
Construction work by: Strabag AG
Type of structure: partially monolithic
Tunnel length: 1,600 m
Clear width: 11,40 m | **Clear height:** 8.60 m

Project solution:

- over the 160 casting sections, the robust formwork reduced the number of form-tie points by 8,000
- Two CE marked formwork travellers casting alternate sequential sections. This means that while tunnel formwork traveller n° 1 is pouring the first section, followed by the third section, traveller n° 2 is being used on the second and fourth sections, and so on.
- To make it possible for the outside formwork, too, to be repositioned as a unit and with no need for a crane, Doka designed the two formwork halves as a telescopic three-hinged arch on roller trestles.
- The tunnel formwork traveller was assembled on site, under the guidance of an experienced Doka Formwork Instructor.
- Doka's robust formwork sheet meant that the two formwork travellers were able to cast 160 sections without a change of form-ply

Brenner Railway H2-2 'Radfeld Mitte' Tunnel

As part of the upgrading of the rail corridor between Munich and Verona, contractors Strabag took on contract section H2-2, 'Radfeld Mitte'. This section includes a 790 m long impermeable tank structure and a 1600 m long tunnel, complete with escape shafts. Doka supplied two hydraulic tunnel formwork travellers for forming and pouring the solid cross-section of this cut-and-cover tunnel.

Challenge:

- the water table is only metres below ground level, so the pit has to be waterproofed with sheet-pile walls and an anchored, underwater-concrete invert (45,000 m³ of concrete)
- sheet-pile walls restrict the space available for the outside formwork
- all 160 concreting sections have to be in water-impermeable 'white-tank' quality with double-run of waterstop and membrane sealing

Products used:

Heavy-duty supporting system SL-1, Framed formwork Framax Xlife

Construction time: 2009 – 2010



Mining method

Tunnelling by the mining method entails boring or otherwise excavating an underground cavity. The sides and roof of this cavity have to be continuously stabilised with shotcrete or tubbings, and the inner shell of the tunnel is then cast in either segmented or partly monolithic construction. The formwork and/or formwork traveller has to bear all the pressure of the fresh concrete, which is not the case with the cut-and-cover method.

Segmented construction method:

- invert, walls and roof are each cast in separate pouring sections
- single-sided formwork for casting the leading walls
- tunnel formwork traveller for forming and casting the roof
- detailed cycle planning



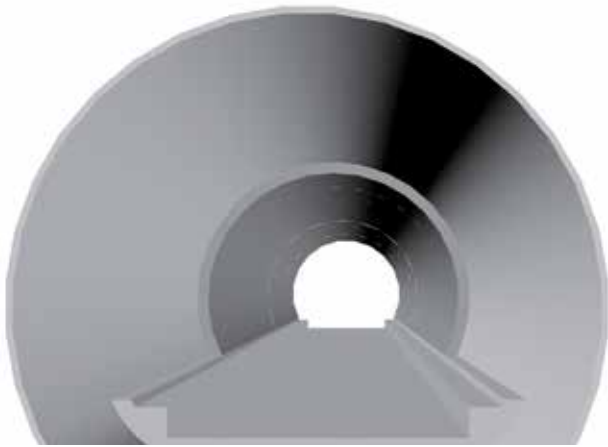
▲ Loading

In the mining method of tunnelling, loading is one of the most important aspects. The line-up consists of the sealing, reinforcing, invert, tunnel, intermediate roof-slab and finishing carriages. Through them all, the drive-through opening has to be big enough to allow supply and removal of material, rebar, embedded parts and concrete as planned.

▼ Heavy-duty supporting system SL-1

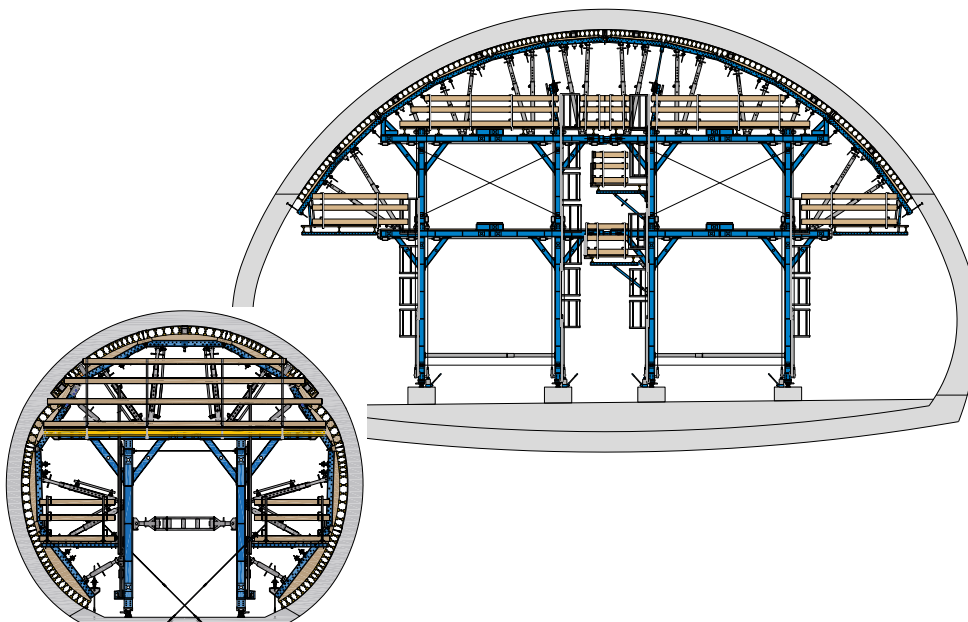
The high-capacity and modular Heavy-duty supporting system SL-1 is ideal for the mining method of tunnelling. As a heavy-duty 'construction kit', it can bear extraordinary loads and it is also versatile for uses ranging from the cross-section of the typical zone through to broadening zones such as breakdown lay-bys and branch-offs. The system is available for rent for short-term use and therefore offers an ideally cost-effective solution.





Partly monolithic construction method:

- invert is formed and poured in advance
- then the monolithic inner shell can be poured
- the formwork traveller has to take all the pressure of the fresh concrete
- concrete is placed via filler necks and pouring windows



◀ Broadening-zone cross-sections and caverns

Separate formwork sets for the broadening zones are often used to speed up construction. This dispenses with the need for modifications to the formwork traveller for the typical cross-sections, and work can proceed in both sections of the tunnel at the same time. Supporting construction frames and the versatile Heavy-duty supporting system SL-1 minimise the labour involved in forming and pouring walls and roof independently by the segmented method of construction.

► Assembly underground

With underground assembly, items to consider as early as during the planning stage include shaft size, crane capacities and available assembly equipment such as telescopic-boom loaders.



Heavy-duty supporting system SL-1

The heavy-duty 'construction kit' for tunnelling

Doka's modular heavy-duty supporting system SL-1 provides complete formwork solutions for widely differing tunnel cross-sections, regardless of shape and load. The smart grid means that it can be adapted for any loads that might occur.

Cost-effective because of the many rentable system components

- outstandingly adaptable
- the system beams, walings and struts can be arranged in variable configurations, enabling optimum use to be made of each item of equipment

Smooth construction workflow

- short set-up times, as the formwork components and heavy-duty supporting-unit components are all pre-assembled
- short repositioning times, achieved by the all-hydraulic formwork solutions

Safe working conditions

- with integrated working platforms and ladderways
- easy travelling even on steep longitudinal and transverse gradients



▼ Typical cross-section in tunnelling by mining method

- robust system for high number of use cycles
- all-hydraulic for fast cycles

▲ Broadening zone in tunnelling by mining method

- ideal for deviation from typical cross-section
- adaptable to all load situations and project-specific conditions



Find out more
on our website:

www.doka.com/sl-1

◀ Rentable and quickly
available with standard
system parts



▼ Hydraulics

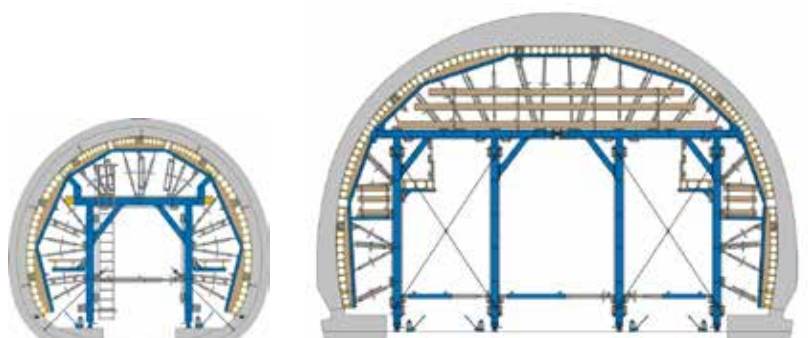
The system can be configured to suit the requirements. From hydraulics for forming and stripping through lifting and lowering with lifting mechanisms to repositioning of the formwork traveller by electrical drive, the ideal, project-specific configuration is selected jointly with you.

▲ Choice of formwork sheeting: from wood to steel

The number of repeat use cycles is the deciding factor as regards the choice of formwork sheeting. Conventional timber formwork is the first choice when aiming for economic success, assuming that the number of use cycles will be low. A formwork traveller for many use cycles can be fitted with rentable steel formwork and is ready for a long period of use without replacement of the formwork sheeting.

▼ Optimised equipment usage

With modular system components, small to large broadening zones can be adapted easily to any project requirements.



◀ Pre-assembly

Formwork traveller pre-assembly by Doka experts gets formwork operations off to a fast, smooth start. The site crew can be busy on other jobs at the same time.

Tunnel system DokaMT

The system formwork traveller for mined tunnelling

Find out more
on our website:

www.doka.com/dokamt



The Tunnel system DokaMT is modular in design, offering an adaptable formwork solution for the typical cross-sections of mined tunnels. The variable-radius steel panels enable easy adaptation to different cross-sections.

Economical

- outstanding adaptability and re-usability
- many system components are rentable

Smooth construction workflow

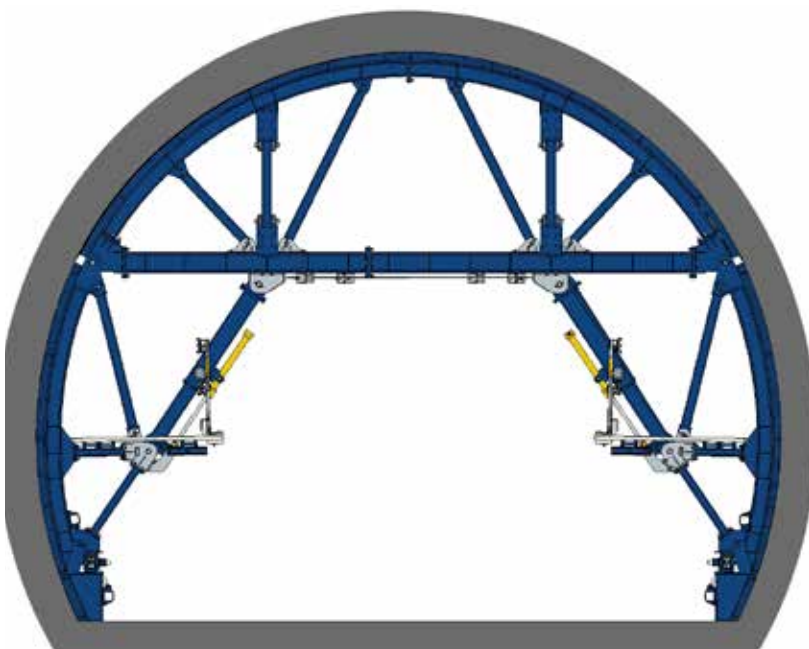
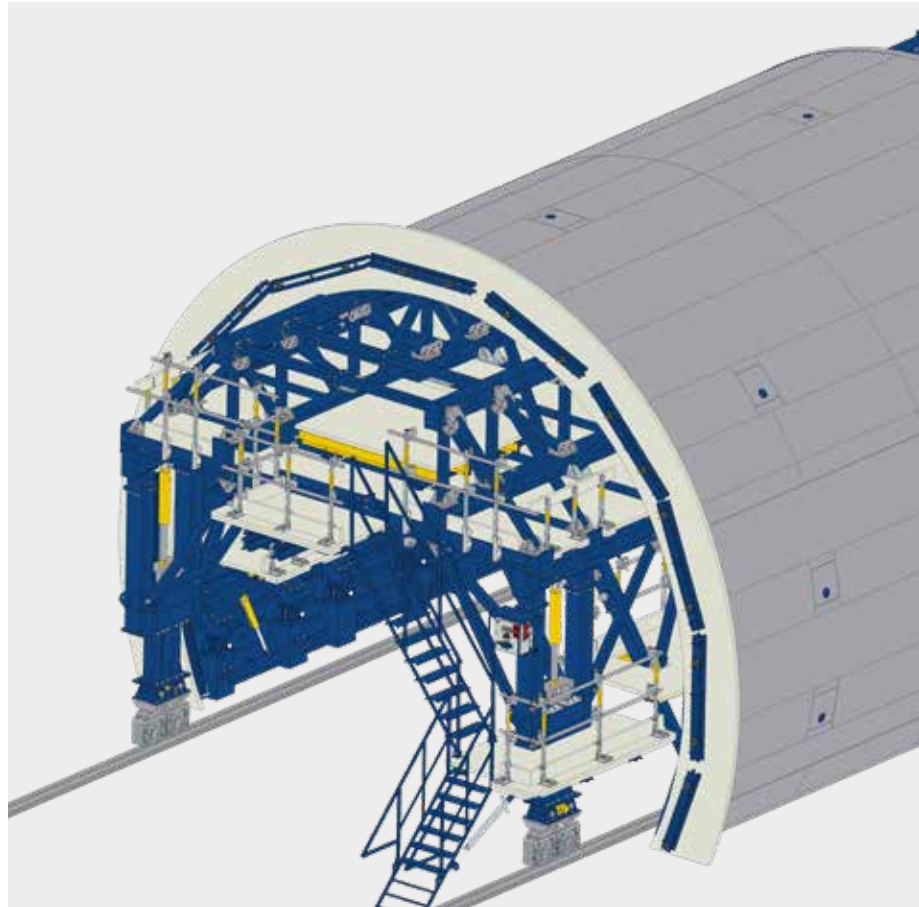
- hydraulic formwork solutions and electric driving units for short repositioning times
- pre-assembled components for faster assembly on site

Safe working conditions

- integrated stairways and working platforms
- optimised stripping distances for cleaning the formwork
- maximum drive-through access opening size for site traffic

Everything from a single source

- network of partners for external vibrators, concrete placing systems and other accessories
- rentable solutions for reinforcing carriages and/or curing carriages



▲ Repositioning gantry

- permits sufficient stripping distances for cleaning the formwork
- large drive-through access openings, so site traffic is not obstructed

◀ Tunnel system DokaMT typical cross-section

- robust Steel panels SL-1, so high numbers of use cycles
- hydraulic/electric operation for fast cycle times



▲ Variable-radius steel panels

The rentable steel panels adapt easily to the structure's radius during assembly and are reusable on widely differing projects. The positions for pouring windows and filler necks can be optimised by agreement with the client.

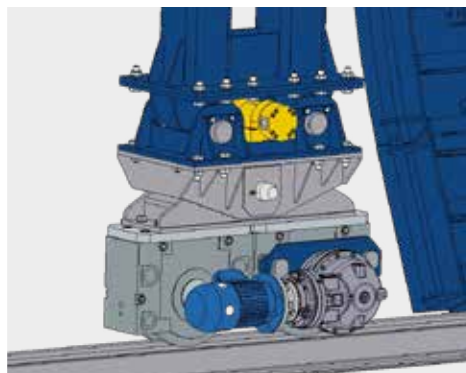
▼ Scaffolds for placing the reinforcement and for curing requirements

Solutions for simple and rentable reinforcing scaffolds and post-pour curing scaffolds round off the Doka portfolio.



▼ Hydraulics / driving units

All formwork opening and closing operations and traveller lifting and lowering operations are fully hydraulic. The formwork traveller has electric driving units for repositioning quickly to the next pouring section.



One-stop shop

We have a network of partners for the supply of external vibrators / concrete placement systems and other accessories, so we can offer everything from a single source.

Gotthard Base Tunnel

The 7,400 m long Erstfeld contract section is the northern-most part of the Gotthard Base Tunnel. It includes construction of two 400 m long underground branch-offs excavated by the drill-and-blast method, followed by CIP concrete lining. A fully hydraulic and highly adaptable Doka tunnel formwork traveller was used for casting the inner shell.

Challenge:

- in both branch-off structures, the cross-section changes from 5.72 m wide and 7.92 m high in the first casting section to 17.65 m wide and 10.40 m high in the last section.
- divided into five sub-sections
- limited space, only access is by on-site rail
- fast construction progress



Location: Erstfeld, Switzerland
Project owner: AlpTransit Gotthard AG
Construction work by: JV AGN, Strabag AG Tunnelbau Schweiz, Strabag AG Spittal/Drau
Type of structure: segmented
Tunnel length: 370 m
Clear width: 17.65 m – 5.72 m
Clear height: 10.40 m – 7.92 m

Project solution:

- The branch-off structure was built in the reverse direction, so the tunnel formwork traveller could be 'downsized' easily from section to section. This was the ideal solution for adaptation to the continuously changing cross-section.
- all-hydraulic, pushbutton control of the forming and stripping, lowering and repositioning operations kept cycle times short
- The Top 50 steel trusses for the tunnel side-walls were slender, so they did not obstruct on-site rail traffic.

Products used:

Heavy-duty supporting system SL-1, Large-area formwork Top 50

Construction time: 10 months, 2010 – 2011





Challenge:

- formwork concept for round and rectangular cross-sections
- safe travelling solution to cope with 3% longitudinal gradient
- harmonised overall logistics to cope with extremely tight schedule and different tunnelling techniques in simultaneous use
- solution for post-pour curing of the concreted sections

Stalvedro Tunnel

320 metres long, the motorway tunnel in Canton Ticino was widened from two to three lanes within only a few short months. A rented reinforcing traveller 12 metres long and a rented curing traveller 30 metres long were used in the mined section of the tunnel. The cut-and-cover section of the tunnel's southern portal was formed with a Tunnel formwork traveller DokaCC.

Location: Canton Ticino, Switzerland
Construction work by: Consorzio 201 Quintai
Type of structure: partially monolithic
Formed tunnel length: 320 m
Clear width: 14.76 m
Clear height: 8.35 m
Casting-section length: 10.0 m

Project solution:

- reinforcing carriage and curing carriage used in the mined section of the tunnel
- tunnel formwork traveller DokaCC for the cut-and-cover section ensured a large drive-through access opening for site traffic
- controlled repositioning of the traveller with electric driving units

Products used:

DokaCC, Staxo 100, Top100 tec, Top50, Pre-assembly service, Pre-assembly on site

Construction time: 6 months, 2017



Tunnel de Fréjus

At the border between France and Italy, the Tunnel de Fréjus was built to link the two countries. The new rentable Steel panels SL-1 were used as formwork for the inner shell of the starting cavern for the tunnel boring machine (TBM). External vibrators were mounted on the steel panels. 15.5 metres wide and 15.3 metres high, the cavern was formed in six pouring sections with the fully hydraulic formwork traveller.

Challenge:

- final assembly inside the excavated cavity, where space was extremely limited
- complete solution for the cavern's formwork concept was specified (one-stop shop)
- extra-high standard of safety throughout the entire construction process



Location: France
Construction work by: Razel Bec
Type of structure: segmented
Formed tunnel length: 38 m
Clear width: 15.5 m
Clear height: 15.3 m
Casting-section length: 6.5 m
Number of pouring sections: 6.00

Project solution:

- optimised final assembly inside the excavated cavity, with large pre-assembled units
- rentable steel panels, complete with external vibrators and optimised concrete placement
- integral platforms and access systems on all levels for safe working conditions

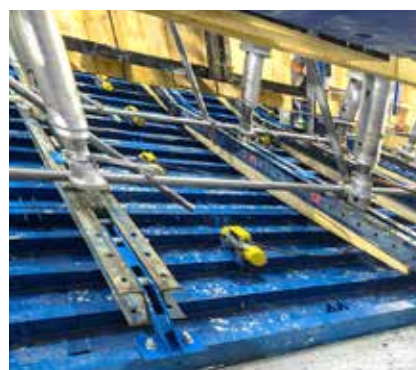
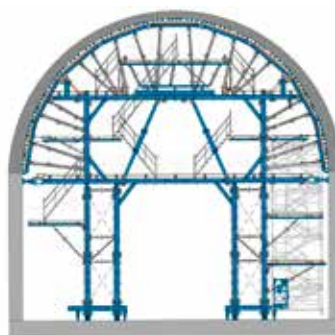
Products used:

Heavy-duty supporting system SL-1, rentable Steel panels SL-1, Supporting construction frames, Edge protection system XP, Stair tower 250

Services in use

Technical consulting, formwork built by Pre-assembly Service, Pre-assembly on site, Formwork instructor

Construction time: 2018





Variante Sur Metropolitana Cavern, Arraiz Tunnel

The rentable Doka tunnel formwork traveller, which can be adapted to any geometry, did sterling service here in one of the largest caverns in Europe. The time available for construction was short, so Doka supplied a formwork traveller that combined cut-and-cover and mined tunnelling. The formwork traveller was 13 m long and consisted of a 4-m long section for mined tunnelling and 9-m long section for cut-and-cover with opposing formwork.



Location: Spain
Construction work by: Ute Arraiz
Type of structure: segmented
Tunnel length: 75 m
Clear width: 27 m
Clear height: 14 m
Concreting sections: 13

Project solution:

- economical solution with rentable Doka tunnel formwork traveller
- A tunnel formwork traveller divided down the middle and travelling on rollers was used for the wide vault. Separating the traveller into a left section and a right section made it easier to assemble and reposition.
- The sidewalls were formed in 8 m high casting sections using Doka supporting construction frames and Large-area formwork Top 50.
- integral platforms and access systems for safe working conditions

Challenge:

- tight schedule for construction of a cavern more than 27 m wide and 14 m high
- project-specific complete solution for cut-and-cover and mining construction
- formwork traveller split into two parts down the middle

Products used:

Heavy-duty supporting system SL-1, Large-area formwork Top 50, Supporting construction frames, Ladder system XS

Construction time: 2010 – 4 months



Angostura Hydro Power Plant

This project is a discharge tunnel for the largest hydroelectric power station built in Chile in the last decade. Due to the size of the cross-section, Doka planned a two-storey formwork traveller constructed from the Heavy-duty supporting system SL-1. With the support of a Doka formwork instructor, the traveller was assembled on the steep 13.75 % longitudinal slope.

Challenge:

- difficult assembly inside the cavern with an extremely steep longitudinal slope of 13.75 %

Location: Los Angeles, Chile
Construction work by: Empresa Constructora Angostura Ltda.
Type of structure: partially monolithic
Tunnel length: 168 m
Clear width: 10.75 m
Clear height: 10.75 m
Concreting sections: 18

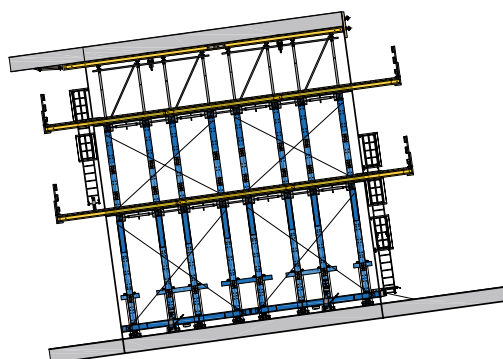
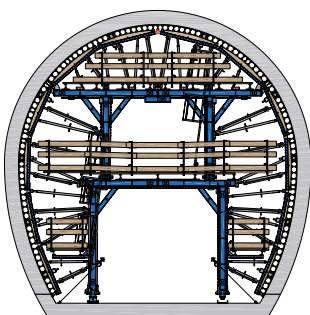
Project solution:

- problem-free repositioning with the Heavy-duty supporting system SL-1
- safe and fast working at any height with the integrated Doka safety systems
- detailed assembly planning including all necessary safety measures to ensure trouble-free assembly on a longitudinal slope

Products used:

Heavy-duty supporting system SL-1, Large-area formwork Top 50, Ladder system XS

Construction time: 2013 – 6 months



Lötschberg Base Tunnel

The Lötschberg Base Tunnel is a 34.5-km long twin-tube tunnel constructed for BLS Alp-Transit. From in Frutigen in the north, it links the Bernese Oberland to the southern Raron in the Canton of Valais in Switzerland. The tunnel is part of the 'Alpen-Transversale' a railway corridor through the Alps that helps to transfer traffic from road to rail.

Challenge:

- adaptation to complex structural geometries at the two jet-vents with conical ends and the funnel-shaped cavern with major cross-section change at the Adelrain fork
- maintenance of site traffic
- speedy alternation and restoration of the formwork



Location: Frutigen – Mitholz, Switzerland

Project owner: BLS Alp Transit AG

Construction work by: ARGE SATCO – Schweizer Alp Transit Consortium

Type of structure: segmented

Adelrain fork:

Clear width: 18.1 – 7.6 m | **Clear height:** 9.95 m – 7.95 m

Formed tunnel length: 275 m

Jet vents:

Clear width: 8.66 – 7.62 m | **Clear height:** 7.95 m

Formed tunnel length: 72 m

Project solution:

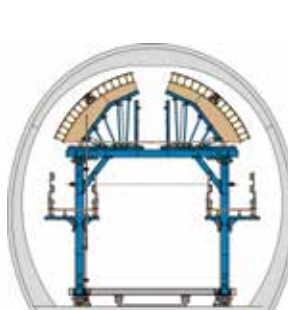
Adelrain fork

- optimised formwork solution, largely with rentable components, easily modifiable for use in the rest of the tunnel
- formwork adapts quickly, so shorter overall construction time
- Both halves of the formwork could be swung down hydraulically. This made it a lot easier for the site crew to adapt the formwork and telescopic beams after every pouring operation. In this way, the tunnel formwork traveller was continually adapted to the conical cross-section.

Products used:

Heavy-duty supporting system SL-1,
Large-area formwork Top 50

Completion: 2005



Jet vents:



Adelrain fork



Brenner Base Tunnel, exploration contract section Wolf II – Saxener Tunnel

The Wolf II – Saxener Tunnel contract section is part of the Brenner Base Tunnel. For this 1-km section Doka supplied a custom-tailored and fully hydraulic formwork solution including assembly by Doka Austria's Pre-assembly Service team. Fully rentable steel formwork, comprising individual panels with adaptable radius.

Location: Brenner, Austria
Construction work by: Swietelsky Tunnelbau GmbH
Type of structure: partially monolithic
Tunnel length: 1 km
Clear width: 9.26 m
Clear height: 6.87 m

Project solution:

- The mined-tunnel formwork traveller masters an extremely steep longitudinal gradient of more than 10 % and pours the concrete for a block length of 10 metres per day.
- rentable steel formwork for tunnelling, comprising individual panels with adaptable radius
- sturdy formwork, re-usable on follow-up projects

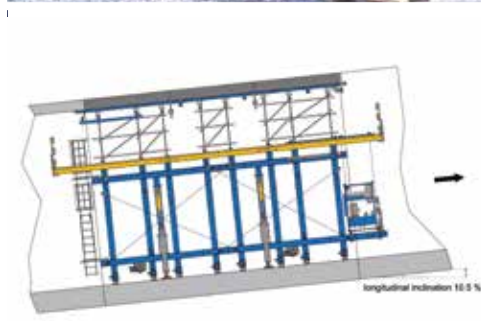
Challenge:

- 1-day cycle
- pre-assembled formwork traveller, easy to operate
- self-propelled formwork traveller for a longitudinal gradient of more than 10 %

Products used:

Heavy-duty supporting system SL-1, Large-area formwork Top 50

Construction time: 2015 – 2016



Pörzberg Tunnel, Schaala bypass

The Pörzberg Tunnel was built to ease congestion on a road which used to feed traffic to the A71 autobahn through the town of Schaala. Doka supplied six tunnel formwork travellers as a cost-saving and efficient way of renovating the intermediate ceiling slabs. It was possible to cast one intermediate ceiling slab every day, while still complying with the stipulated stripping times.

Challenge:

- drive-through opening for easy and fast loading of the entire site



Location: Schaala, Germany
Construction work by: Porr Technobau und Umwelt GmbH, Munich
Type of structure: segmented
Tunnel length: 900 m
Clear width: 10.4 m
Clear height: 7.05 m

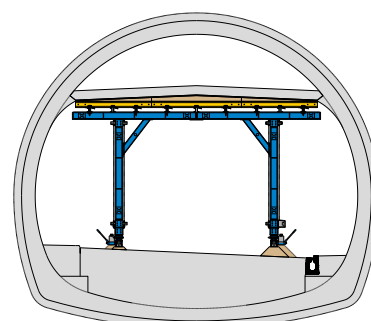
Project solution:

- it was possible to pour one cycle per day with one of the six tunnel formwork travellers
- The six formwork travellers were distributed at intervals along the 900 m tunnel; the large drive-through openings made it easy for the site crew to access them quickly and keep them supplied with materials.
- all six formwork travellers were assembled on-site very rapidly by Doka's Pre-assembly Service team

Products used:

Heavy-duty supporting system SL-1

Construction time: 5 months – 2010





H3-6 Wiesing Tunnel

Contract section H3-6 (Wiesing / Jenbach Ost, known as the 'Tiergarten tunnel') is for an approx. 671 m long section of tunnel forming part of the rail-transit corridor in Tyrol's Lower Inn Valley. This tunnel links the two contract sections H8 and H4-3. To improve site access and for subsequent use as an escape route, an approx. 160 m long drive-through access tunnel was built here.

Location: Jenbach, Austria
Construction work by: JV Tunnel Wiesing H3-6
Type of structure: partially monolithic
Tunnel length: 202 m
Clear width: 8.22 m
Clear height: 5.35 m

Project solution:

- splitting the formwork traveller into two sections made it easy to negotiate the curving section of the tunnel
- when the curved section (seven concreting sections) was finished, a larger formwork traveller was moved into the tunnel and joined to the smaller traveller. Another 17 sections were then concreted

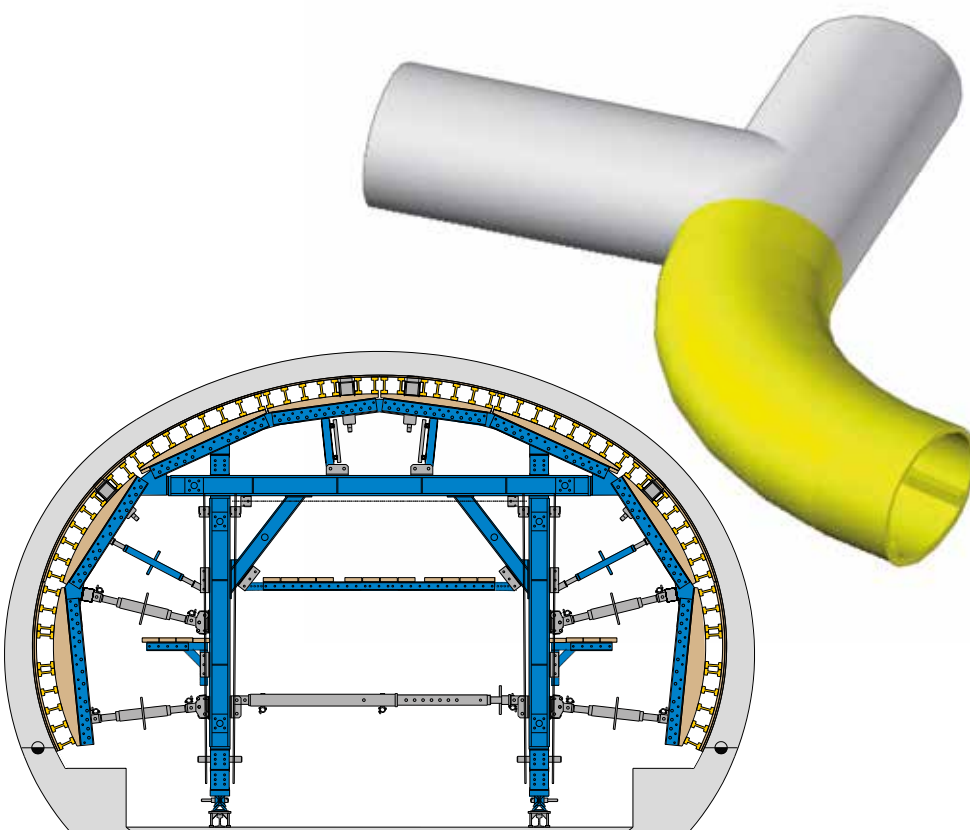
Challenge:

- structure with very tight curve radius (20 m)
- cost-effective concept for dealing with curve sections and intersection zones without major modifications
- steep longitudinal slope of 10 %

Products used:

Heavy-duty supporting system SL-1, Large-area formwork Top 50

Construction time: 2008



Upgrading of A12 Senftenberg Gallery

Doka planned a formwork traveller with steel panels for the new inner shell of the twin-cell Senftenberg Gallery on the A12 motorway. After 36 pouring sections of the first tube and a break in construction work to accommodate winter tourist travel, with only minor modifications the same formwork traveller was ready for the 36 pouring sections of the second tube.

Challenge:

- renovation of a twin-call tunnel with existing centre wall and V-shaped columns
- mined tunnel on one side
- one formwork traveller needing only minor modifications to be usable for both tubes



Location: Tyrol, Austria
Project owner: ASFINAG
Construction work by: Strabag AG
Type of structure: partially monolithic
Tunnel length: 360 m
Clear width: 10.0 m
Clear height: 6.5 m

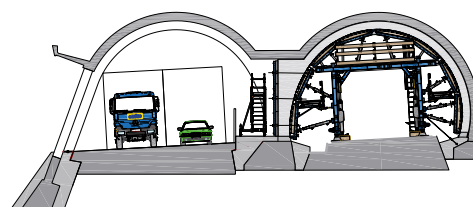
Project solution:

- steel-panel sheeting ensures durability plus a high-quality concrete finish: 72 concreting sections without changing the sheeting
- the formwork traveller meets widely differing requirements: tied wall formwork on the downhill side, single-sided wall formwork on the uphill side
- assembly of the entire formwork traveller by Doka's Pre-assembly on site team reduced risks and costs for the building contractor
- Concremote concrete monitoring was used, so it was possible to adhere to the tight schedule

Products used:

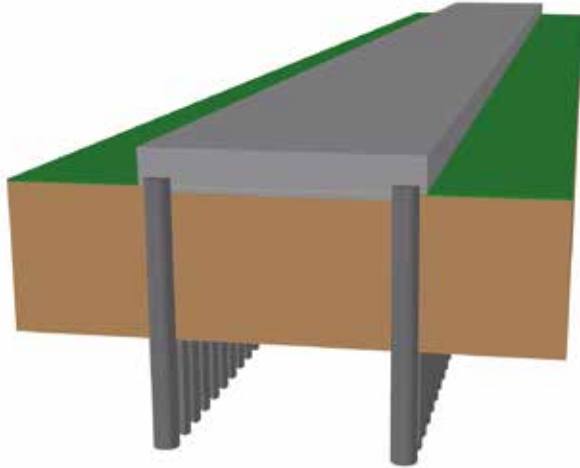
Heavy-duty supporting system SL-1, Concremote

Construction time: 6 months, 2014 – 2015



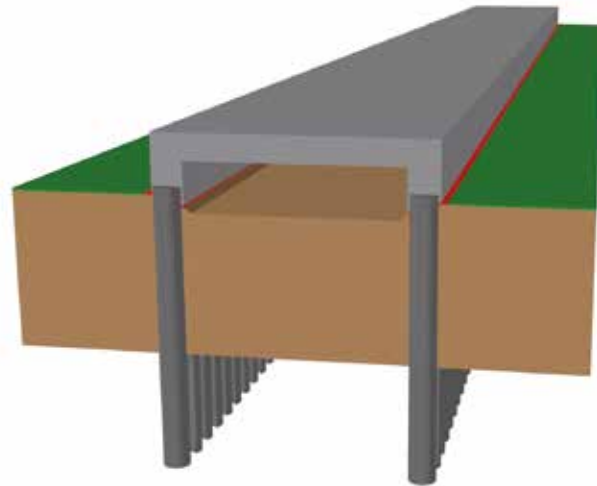
Top-cover method

In this method of tunnel construction bored-pile or diaphragm walls are first constructed and the top-cover slab is then cast directly on top of these walls. The ground between the walls is then excavated to form the tunnel, and the invert and the inliner (wall cladding) are cast in concrete. The top-cover method of tunnel construction is used primarily on inner-city builds. Aside from advantages in terms of statics, the top-cover method reduces site noise and the area above the top cover is available for use more quickly, for example for traffic.



▲ Visible underside, high quality requirements

A cosmetic follow-up is generally necessary when concrete is poured directly on top of the blinding layer.



A heavy-duty supporting system can be used to produce a high-quality visible underside when the tunnel is partially excavated in advance.

Load-bearing tower Staxo 100 for high-performing and fast shoring



- **safe shoring** of heavy loads with load-bearing capacity of up to 100 kN per leg
- **fast assembly** with integrated connectors
- **flexible system** with variable frame spacing from 0.60 m to 3.00 m and a range of spindle types

Find out more
on our website:

www.doka.com/staxo-100





Depending on cycle planning, supporting construction frames or cross-braced formwork travellers are used for casting the inliner. With the cross-braced approach it is important to ensure that the site can be loaded and that the logistics concept will work.

Supporting construction frame for single-sided walls up to 12.80 m high



- **equipment utilisation** is optimised by combinable 'attachable frames'
- **height can be steplessly adjusted** by combining the "Variable" and Universal F supporting construction frames
- **save crane time** by repositioning large units or on some builds avoid using the crane by mounting the formwork on rollers
- **all-round workplace safety** because platforms and access systems integrate easily

Find out more
on our website:

www.doka.com/supporting-construction-frame





Unterföhring light-rail link tunnel

Unterföhring is located directly on the busy light-rail link between Munich's main rail terminus and its airport. Prompted by the growth in corporate relocations to the town over the past 10 to 15 years, the municipal authorities were looking for a functional and visually attractive solution for this railway line. The answer they settled on was an underground tunnel built by the top-cover method.

Location: Unterföhring, Germany
Project owner: Deutsche Bahn Gleisbau GmbH
Construction work by: Walter Bau, DYWIDAG, Bauer GmbH
Type of structure: Top-cover method
Tunnel length: 1,426 m
Clear width: 10.06 m – 18.06 m
Clear height: 2.24 m – 2.32 m

Project solution:

- cost-efficient combination of Wall formwork FF20 and Load-bearing tower Staxo
- prefabricated FF20 panels were used for the top-cover slab
- Dokaflex floor formwork provided cost-effective and flexible infills for the changes in cross-section between the prefabricated FF20 panels

Challenge:

- inner-city project, space is at a premium
- tight schedule for restoration of the original cityscape

Products used:

Wall formwork FF20, Load-bearing tower Staxo 100

Construction time: 18 months, 2004 – 2005



A7 Bindermichl motorway enclosure

Lowering and enclosing one of the busiest stretches of road in the country with around 100,000 vehicles per day was one of Austria's biggest noise abatement projects to date. Doka supplied two wall formwork travellers for the inliners and a top-cover slab traveller as the formwork solution for the western tube.

Challenge:

- construction work ongoing in heavy traffic
- 1-day cycle
- inliner for western tube: cross-bracing width of 15.75 m



Location: Linz, Austria

Construction work by: Strabag, Alpine Mayreder, Porr, Held & Francke

Type of structure: Top-cover method

Formed tunnel length: 912 m

Inliner of top-cover tunnel:

Clear width: 7.25 m – 8.75 m | **Clear height:** 4.30 m

LZ11 inliner:

Clear width: 15,75 m | **Clear height:** 6.25 m

LZ11 top-cover formwork:

Clear width: 15,75 m | **Clear height:** 3.00 m

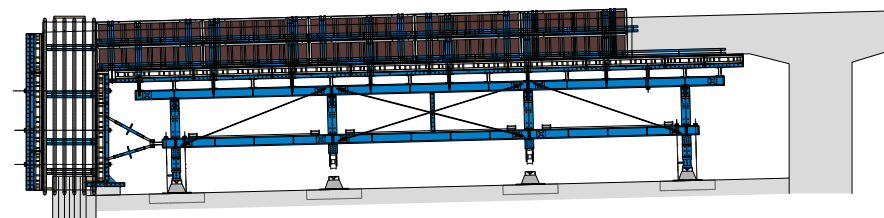
Project solution:

- The formwork for the concrete inliner was braced across the entire width of the tunnel without form-ties in order to save on lost form ties. This saved both time and resources.
- The top-cover slab for the western tunnel was formed at a rate of 500 m² per day. The structure curves, so the formwork traveller was split in two down the middle.
- The formwork traveller designed for this top-cover tunnel weighs 67 metric tons gross and can cover widths from 7.25 m for the typical cross-section to 8.75 m for the extra-wide sections of the tunnel.

Products used:

Heavy-duty supporting system SL-1, Large-area formwork Top 50

Construction time: 11 months, 2004 – 2005



H5 extension, Stans-Terfens tunnel

Main contract section H5 between Vomp and Terfens is part of the new Inn Valley railway link between Kufstein and Innsbruck. The larger portion is a mined tunnel excavated by drilling and blasting. Doka supplied a formwork traveller for the dome-shaped tunnel roof in a section approximately 400 m long.

Challenge:

- cost-effective alternative to conventional top-cover construction with huge earth movements
- economical formwork solution for very low dome



Location: Tyrol, Austria
Project owner: Brenner Eisenbahn GmbH
Construction work by: Strabag AG
Type of structure: top-cover method
Tunnel length: 410 m
Clear width: 12,34 m | **Clear height:** 3.82 m

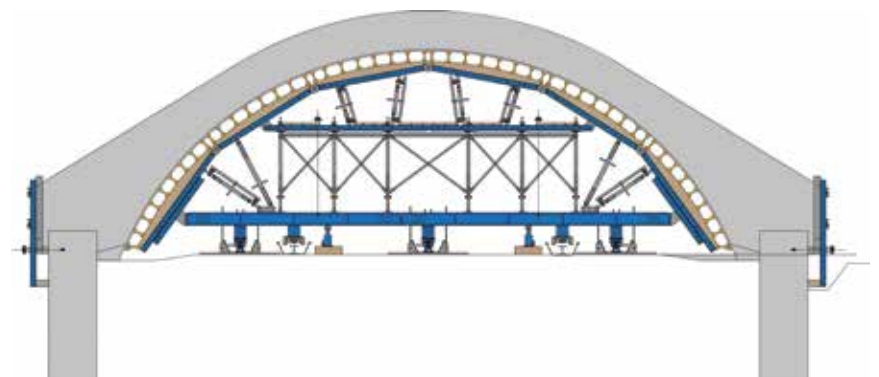
Project solution:

- to allow rapid repositioning, the Staxo shoring tower was set up on a girder grille made of rentable SL-1 system beams
- with fewer form-tie points to be operated and the girder grille integrated into the repositioning unit, repositioning was very fast

Products used:

Heavy-duty supporting system SL-1, Large-area formwork Top 50

Construction time: 2005





ÖBB inliner, Blindenmarkt

This project was a 1700 m long subsection of the 4.3 km Hubertendorf – Blindenmarkt section of a major upgrade to Austria's main east-west railway line. This 1700 m subsection was built using the 'top-cover' underground construction method. Because the walls were braced against one another by the tunnel formwork traveller, there was no need to use any expendable anchoring components for casting the inliner. As there had to be a drive-through opening for site traffic, the tunnel formwork traveller was fitted with a 'fly-over' construction.



Location: Blindenmarkt, Austria
Construction work by: JV 'Arbeitsgemeinschaft Betonbau ÖBB'
Type of structure: top-cover method
Tunnel length: 1.7 km
Clear width: 11.32 m
Clear height: 7.90 m

Project solution:

- equip the formwork traveller with a fly-over construction to allow unobstructed passage of vehicles
- cross-braced solution for casting the inliner eliminates expendable anchoring components

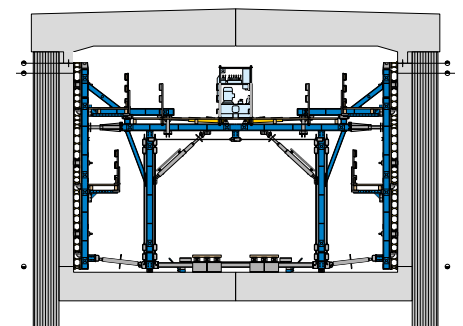
Products used:

Heavy-duty supporting system SL-1, Large-area formwork Top 50, Framed formwork Framax Xlife

Construction time: 2009 – 2010

Challenge:

- unobstructed passage of vehicles as requirement
- form and cast inliner without expendable anchoring components



Metro: lines and stations

Construct different contract sections cost-effectively in an overall concept

The ideal construction method and its application have to be identified on the basis of requirements and boundary conditions. Metro projects are complex because of the number of individual contract sections, often involving different methods of construction. The contractor's project team and Doka experts work together closely to develop a solutions-oriented overall concept taking requirements such as a tight schedule and lack of space into account along with the specifics of the predefined workflow.

Compliance with overall construction timeline

- by implementation of optimised workflow plans and site logistics
- by rapid availability from within a global logistics network
- just-in-time deliveries to help free up space in cramped conditions

Project-specific formwork solution

- formwork configuration to suit project requirements (from manual to all-hydraulic operation)
- easy, safe materials handling
- modular formwork systems for fast adaptation

Project support from the beginning through to successful completion

- from our Competence Center for Tunnel and Metro Projects
- competent on-site support

Stations

Challenges for building stations:

- underground, ground-level and elevated
- tight schedule
- space is often at a premium, so just-in-time deliveries and site logistics
- heavy slabs need heavy-duty shoring
- flexible solution: formwork systems usable on more than one contract section



Lines

Challenges for building metro lines:

- underground, ground-level and elevated (different construction conditions apply – urban to rural areas)
- tight schedule
- intersection zones call for flexible solutions
- methods of construction can vary from station to station
- flexible solution: formwork systems usable on more than one contract section

Intersection zones

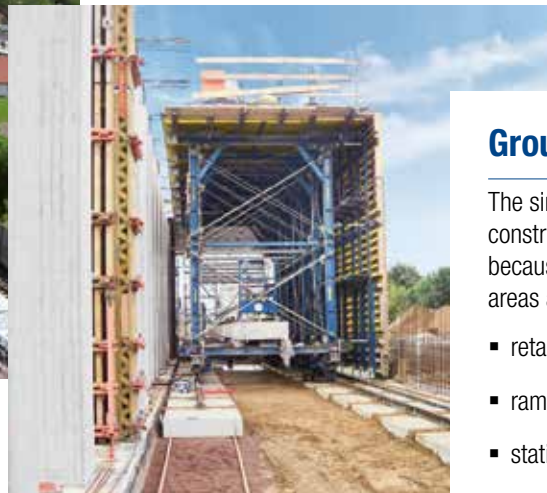
The ideal overall solution for these large-scale metro projects permits multiple use of the same formwork systems. Doka handles even difficult intersection zones with readily available standard systems.



Elevated construction

Depending on space and geological conditions, the tracks and the station are built on permanent piers. Any common method of bridge-building can be used.

- supported by load-bearing towers
- free cantilever construction
- launching-girder
- incremental launching



Ground-level construction

The simplest and fastest in metro construction, this method is rarely used because of the lack of space in built-up areas and the cost of site acquisition.

- retaining walls
- ramps
- station structures

Underground construction

Inner-city constraints generally dictate that lines and stations have to be built underground, so this is the most common method of metro construction.

- cut and cover
- mining method
- top-cover method





Cityringen Copenhagen

The Cityringen project is a Copenhagen-centre circle metro line expanding the city's existing network. The Cityringen route will service 17 new metro stations. They are to be built to integrate with Copenhagen's existing metro network. The opening is scheduled for 2019.

Location: Copenhagen, Denmark
Construction work by: JV CMT (Salini Impregilo, Tecnimont and Seli)

Project solution:

- detailed logistics concept in line with project requirements
- just-in-time deliveries to help free up space in cramped conditions
- Doka project managers in the field for optimum support in all phases of construction

Challenge:

- planning and implementation of logistics for the entire project in the heart of Copenhagen

Products used:

Heavy-duty supporting system SL-1, Large-area formwork Top 50, Framed formwork Framax Xlife and Frami Xlife, Load-bearing tower d2, Dam formwork, Dokaflex, Steel formwork

Construction time: 2015 – 2019



Metro Riyadh

The first metro project in Saudi Arabia started in the capital, Riyadh, in 2014. The six lines will extend 178 km and there will be 85 stations.

Challenge:

- stringent safety requirements across the entire project in all contract sections
- structural changes are frequent, so the formwork solution has to be flexible
- complex fair-faced concrete structures designed by famous architects
- support has to be available right away and deliveries must be on time



Location: Riyadh, Saudi Arabia
Project owner: Arriyadh Development Authority

Project solution:

- optimised equipment inventory management and speedy deliveries based on detailed planning
- increased site-crew productivity with the on-site support of a formwork instructor throughout the entire construction phase
- fast progress with formwork solutions for the individual construction sections

Products used:

Heavy-duty supporting system SL-1, Large-area formwork Top 50, Load-bearing tower Staxo 100, Framed formwork Framax Xlife and Frami Xlife

Start of construction: 2014





Challenge:

Gellert-Kersztalagút station:

- build two broadening zones and connecting tunnels within a tight construction window
- build a high endwall without tying the formwork into the wall

Rákóczi tér station:

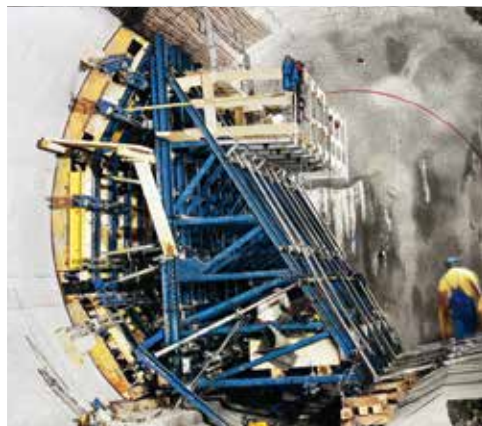
- two different tunnel cross-sections

Gellert pillar station:

- construct pillars and drop beams of special geometry in very cramped conditions

Metro Budapest

Doka was involved in finding solutions for, and implementing, one of the most demanding sections of the construction work on Budapest's new M4 metro line. The contractors' main requirement was for a concept that allowed them to re-use the same formwork equipment for as many different parts of the structure as possible, including metro stations, broadening zones and connecting tunnels, along with a number of other structures.



Location: Budapest, Hungary
Construction work by: Bamco KKT

Project solution:

Gellert-Kersztalagút station:

- adaptable formwork traveller, constructed largely from standard materials, for the continuously changing structure
- use of the versatile Doka supporting construction frame anchored to the invert without penetrating the sealing membrane

Rákóczi tér station:

- economical solution and easy handling with short-term use of formwork traveller with Staxo towers

Gellert pillar station:

- simple solution for repositioning using standard components from various systems for a project-specific solution (e.g. roller unit from climbing formwork)

Products used:

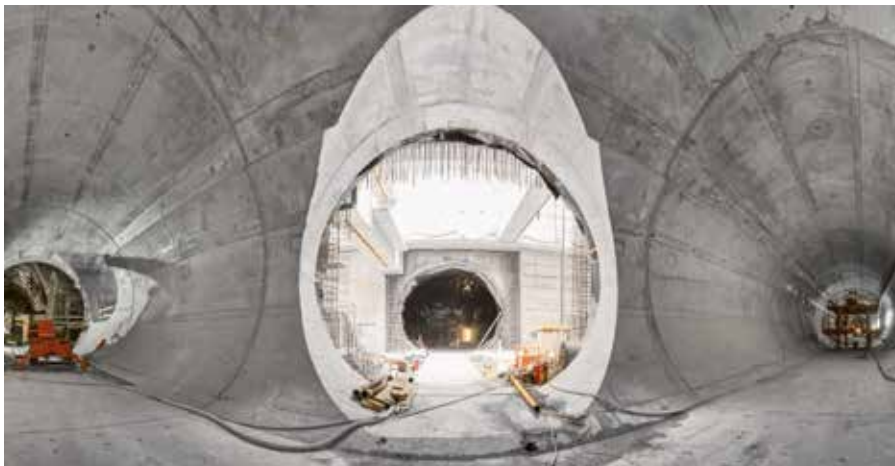
Heavy-duty supporting system SL-1, Supporting construction frame, Load-bearing tower Staxo 100, Large-area formwork Top 50

Construction time: 2009 – 2010



Metro section U1/9 'Altes Landgut'

The U1 line of Vienna's light railway network was extended past Reumannplatz, formerly the southern terminus on that line, to Oberlaa. To comply with the brief for this build, Doka designed an arched-roof tunnel formwork traveller that could easily be modified to cope with the challenges of the two light-railway build sections U1/10 Troststrasse and U1/9 Altes Landgut.



Location: Vienna, Austria
Project owner: Wiener Linien
Construction work by: Strabag AG
Connecting tunnel | station tunnel | vault
Formed tunnel length: 12 m | 112 m | 2 x 120 m
Clear width: 7.86 m | 8.63 m | 8.69 m
Clear height: 6.72 m | 7.85 m | 7.75 m

Project solution:

- traveller easily modified from U1/10 Troststrasse to U1/9 Altes Landgut specs by installation of additional elements for slab supports
- the formwork solution consisted of one formwork traveller for the intersection zone, one reinforcement traveller, and Staxo propping for the intermediate roof slabs of both stations



Challenge:

- economical formwork concept for several sections of the project
- positions of pouring windows predefined

Products used:

Heavy-duty supporting system SL-1, Load-bearing tower Staxo 100

Construction time: 13 months, 2014 – 2015



Metro Qatar

The first phase of the infrastructure project consisted of more than 82 km of underground lines and 25 underground stations. The Red Line, or 'Coast Line' as it is also known, traverses the Emirate from north to south and is the main line in Qatar's public transport system, phase 1 of which is now has now been implemented.

Location: Doha, Qatar
Project owner: Qatar Rails

Project solution:

- certainty of costs, schedule and quality with co-ordinated overall formwork concept and on-site support
- just-in-time deliveries for fast response even to workflow changes at short notice
- on-time planning and delivery by provision of a logistics team
- compliance with tight construction schedule and supporting advice in all stages of construction

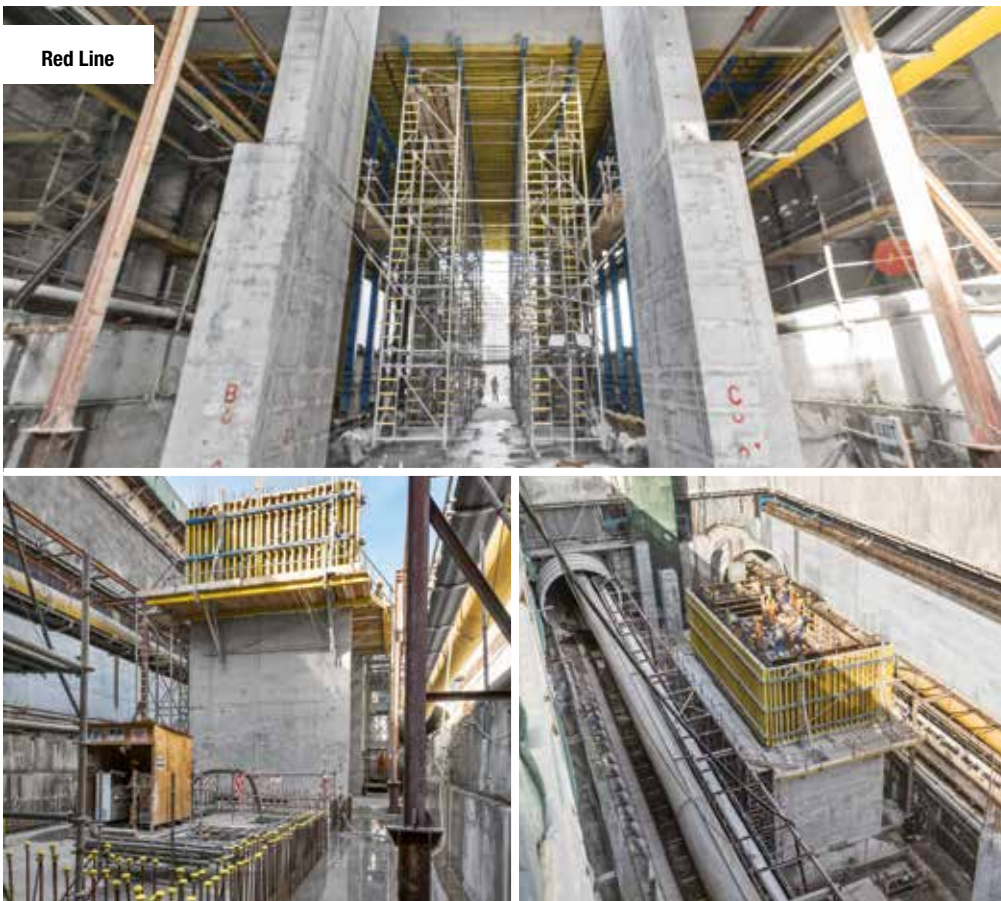
Challenge:

- extensive large-scale project requiring a great deal of technical planning
- formwork solution must comply with and support tight construction schedule

Products used:

Large-area formwork Top 50, Framed formwork Framax Xlife and Frami Xlife, Load-bearing towers Staxo 100 and Staxo 40, Heavy-duty supporting system SL-1

Project start: 2013



Box culverts

Quick and easy production of collector ducts, culverts and supply shafts

These 'small tunnels' are ducts, shafts, openings, galleries and culverts are encountered in widely differing structures and not just in tunnel projects. A simple, speedy solution making outstandingly efficient use of synergies on your site can be constructed with Framed formwork Framax Xlife and Large-area formwork Top 50, products to be found in use on most builds.

Can quickly be readied for use

- minimum planning with prefabricated standard solutions in a 10-cm grid
- Framed formwork Framax Xlife and Large-area formwork Top 50 can be used
- slab thicknesses up to 60 cm dealt with in the system

Speeds up the construction workflow

- lightweight so easy to handle by crane, or repositioning with the integral steel rollers

Easy access to operating points

- strong frame made of standard multi-purpose walings for walk-through openings even in structures with very small cross-sections

▼ **Pre-defined 10-cm grid** to meet any set of requirements



▲ **Early stripping** by uncoupling the joint plate



▲ Forming is fast because there are not many points to be operated.



▲ Walk-through openings even in structures with very small cross-sections



Concrete monitoring with Concremote

Measuring concrete temperature and strength in real time

With Concremote you can plan your construction project better and no matter where you are, you have round-the-clock access to your real-time data. So you can gauge concrete performance and initiate the necessary measures at exactly the right time.



**Save
time**



**Increase
safety**



**Enhance
concrete quality**



**Reduce
costs**



▲ How to use Concremote slab sensors



Find out more
on our website:

www.doka.com/concremote



Generation 2.0

The tried-and-tested Concremote sensor technology is enhanced with new features, including additional networking options (2G, 3G, 4G, Bluetooth Low Energy (BLE), an LED status indicator, rechargeable batteries, and a smaller housing designed to withstand the harsh conditions of construction. The new version is available now as your reliable concrete wizard.



▲ How to use the Concremote cable sensor and the sensing element wall

Proof of concrete strength for safe stripping and climbing operations:

- Real-time monitoring of strength development with Concremote sensors
- Active notification (by text message or email) when target strength is reached
- Supports earliest possible stripping of the floor slab, so commissioning quantities are optimised
- Supports earliest possible stripping and repositioning of the climbing formwork for shorter cycle times
- Strength development is documented and can be called up at any time in the Web portal

Proof of thermal stresses in structure to prevent cracking:

- Real-time monitoring of the difference between core temperature and surface temperature with Concremote sensors
- The early-warning system enables measures to be implemented quickly to avoid cracking, e.g. heating, cooling, covering
- Suitable for solid components with high quality requirements, e.g. foundations, mega-columns, shear walls and core walls
- Temperature development is documented and can be called up at any time in the Web portal



_Understanding: Creating a project sequence that is safe

From planning stage through to project completion, Doka experts provide help with professional consultation in case of any questions. Safe use of formwork systems is achieved not only by the system, but even more so by using their components correctly. Documents, practical tips, training right on site and verified systems support a safe project sequence.

Documentation

The following technical documentations ensure that your project solution can be calculated, configured, commissioned and dismantled safely and as intended:

- Planning documents
- Statics calculations
- User Information booklets
- Operating Instructions for CE-compliant systems
- Safety posters / checklists
- Video clips of system in use



Formwork instructor

The Doka Formwork instructor is a specially trained and experienced practitioner on the site. He provides the site crew with support in efficient and safe formwork use on the construction site. So you make the best possible use of resources in terms of personnel and systems.



Safety with Doka

- Documentation
- Formwork instructor
- Training on-site
- Standards-compliant and verified systems



Training on-site

Doka offers you detailed product and system training. This on-site training helps with keeping on schedule and gives the trained site crew more confidence for handling the systems. So speed and efficiency are implemented right away in everyday work on the site.



Deutsches
Institut
für
Bautechnik

DIBt



European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung



Standard-compliant and verified systems

Certificates and awards issued for standard-compliant Doka formwork systems are your guarantee for high quality and safety. Additionally, all products are tested regularly at Doka's Test Center in Amstetten.

_Understanding the importance of time

Logistics network for fast global availability

To ensure a smooth construction workflow, the entire logistics network has to mesh like clockwork. Doka logistics experts plan and provide on-site support of deliveries and return shipments, site logistics on the site and much more.



Delivery and return delivery just in time

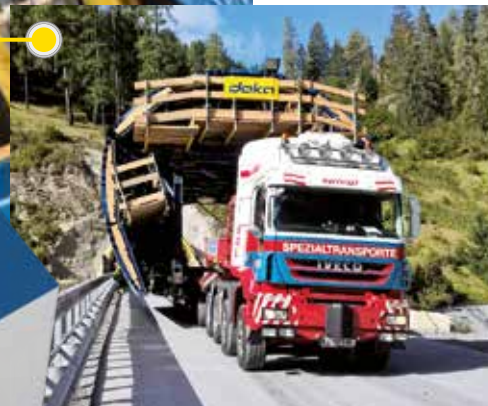
Precisely scheduled deliveries to the right locations simplify your construction workflow on sites with different construction sections and masses of formwork equipment. Doka has the worldwide logistics distribution centres and the necessary routine and practice to optimise standard shipments and also special shipments and wide/oversize loads.





Logistics

- Delivery and return delivery just in time
- Site logistics
- Formwork return
- Cleaning and reconditioning
- myDoka



Site logistics

Tunnel projects are sites that require high volumes of materials. So logistical control of formwork in construction operations is a requirement. Doka supports you with logistics concepts for intermediate storage and repositioning of formwork.

Formwork returns

The rental formwork is inspected jointly right on the site or at the Doka branch. So reconditioning and maintenance measures are defined together and transparently listed in a report.

Cleaning and reconditioning

At Doka Reconditioning, your formwork is cleaned and perfectly reconditioned in keeping with Doka quality standards. Any needed repairs are carried out and replacement parts properly installed. This extends the lifespan and ensures safety and reliability for the next formwork assignment.

myDoka

myDoka is the electronic customer portal for your project-specific data. myDoka provides you with 24/7 access to your latest inventory and transaction data, giving you an overview of all key information. From planning to evaluation, from contracts all the way through to controlling: you will find all your data displayed at a glance and always up-to-date.

Understanding what happens on site: We are right by your side.

We back up our promise on site. When it is time to put the made-to-measure formwork concept for your tunnel project into practice, our formwork experts are by your side. This is how we ensure that construction workflows and schedules can be kept and the project successfully realised.





Pre-assembly on site

Formwork utilisations that are out of the ordinary require specially trained personnel for pre-assembly, operation and dismantling. Doka experts handle these tasks for you directly on site. All this ensures a smooth start of formwork operations.



Formwork inspection as assembled

The Doka Formwork instructor or technician checks the site in your company so you know that the formwork is correctly assembled. Faulty utilisation is identified immediately and can be corrected before pouring commences.



Formwork instructor / technician

The Doka Formwork instructor is a specially trained and experienced practitioner on the site. He provides the site crew with support in efficient and safe formwork use on the construction site. As a result you are ensured the best possible use of resources in terms of personnel and systems.



Customer service

Proper servicing and preventive maintenance of electrical and hydraulic formwork equipment by Doka specialists ensure troublefree operation on site.



Dis-assembly

Formwork units are disassembled and sorted in the Doka-Pre-assembly Service centres. Any non-reusable formwork equipment can be disposed of properly on request. So on site your crew can concentrate on the essentials of forming and concreting.





Understanding what the future holds

We invest every day in further developing our products and services so we can always continue to find the best solutions for our customers. Valuable information is gathered in each and every project and incorporated as soon as we work on the next one. Thus we are equipped for the future and always ready to take our customers to the next level.



