Build on formwork expertise

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Doka bridge formwork

Creating new paths.

www.doka.com

doka
The Formwork Experts

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We reserve the right to make alterations in the interests of technical progress.

Important instructions Always observe all industrial safety regulations and other safety rules applying to the application and utilisation of our products in the country and/or region in which you are operating. The illustrations and site photos in this brochure sometimes show the situation during formwork assembly and/or in situations outside Doka's direct control. For this reason, they may not always be complete from the safety point of view. It could be dangerous to combine our formwork equipment with other manufacturers'. If you intend to combine different systems, please contact Doka for advice first.

Cover page photo:
Transportation project "German Unity N° 8", new railway line between Ebensfeld and Erfurt (VDE 8.1)
Froschgrundsee Viaduct, Client: DB Netz AG. Project management: DB ProjektBau GmbH
www.vde8.de

Contents

Solving individual requirements

with global consulting capability and “hands-on” engineering expertise

More and more complex bridge structures are typical of the architecture of our times. All over the world. Doka technicians work closely with the client’s planners to put together the most suitable solutions, exactly tailored to each individual situation and to the requirements of the structure.

Doka helps you decide which is the right system for you – and for your success on the site.

Custom-tailored, versatile, and thus efficient.

Doka’s modular system, based on its decades of experience of hugely diverse construction tasks in many different countries, means that it can deliver the right solution for the entire spectrum of architecture. Doka has the biggest and most flexible range of offerings on the market – anywhere in the world.

What all Doka systems have in common is this: The very highest standard of safety, combined with extremely high cost effectiveness and easy, safe handling.

Doka knows what demands are made, and with its modular system it can always offer the ideal equipment.

Formwork expertise you can trust

More know-how for your project

The task of finding the optimum formwork solution for a structure begins as early as in the bidding phase. For the eventual profitability of a construction project, this is often a make-or-break decision. Doka staff can start inputting their wide-ranging knowledge, and the experience amassed in the course of innumerable projects, from a very early stage.

In this way, we successfully accompany you all the way through your construction project.

The formwork system used will have a significant bearing on the success of a construction project. To help users with the selection, planning and deployment of its formwork systems, Doka offers a very wide range of services. These provide greater certainty regarding the costs of on-site forming operations – which definitely makes site managers' and foremen's jobs a lot easier.

Building bridges

Creating new paths with Doka.

Piers and pylons

Piers decrease the width of the superstructure support centres between the abutments, permiting a lower overall height. They mostly take the form of single or paired piers. On cable-stayed or suspension bridges, the central support takes the bridge loads, which are suspended from it. The term used for this is a pylon. These basically take the form of self-supporting pylon towers, A or H-pylons or portal pylons.

Using falsework

If the superstructure of a concrete bridge is not far above the ground, it can be constructed cost-effectively and efficiently using falsework. Falsework is an auxiliary construction that is used for holding the building materials and systems in shape, particularly in the field of concrete bridge construction. On multispan bridges, the superstructure is mostly cast a section at a time, using a single falsework construction.

Launching-girder equipment

Bridge superstructures that are built using launching-girder equipment are usually constructed one span at a time on service girders that can be relocated along the longitudinal direction of the bridge, with no mid-span support between the bridge piers. The launching-girder method is best used for multispan bridges with more than 7 spans, for bridging deep valleys, and where access is made difficult by e.g. nature reserves, lakes and rivers, or by the need to bridge existing traffic routes.

Cantilevering

The sections of the bridge are cast one after the other by a pair of cantilever forming travellers that work outward from a pier (pier-head) and carry the formwork, the rebar and the weight of the fresh concrete. In most cases, this takes place more or less symmetrically to either side of the pier. The casting steps are generally between 3 m and 5 m long.

Doka delivers solutions

Because of the limited or non-existent scope for shoring the formwork on tall piers and pylons, Doka uses modular systems to provide a wide range of climbing-technology solutions. For both crane-lifted and crane-independent solutions, the principle is always the same: The very highest standard of safety, combined with extremely high cost effectiveness and easy, safe handling. Single or paired piers of lower height can be formed using the well-proven Doka wall systems, which allow virtually any shape to be cast.

Doka delivers solutions

Doka Staxo 100 is a high-capacity load-bearing tower made of steel, with integrated safety components. It is a rentable system with which just about any shape can be cast, especially when used with Doka large-area formwork Top 50. With their high strength, stability and versatility, Doka load-bearing towers make for fast work on the site. Craneage requirements can be reduced to a minimum.

Doka delivers solutions

With its Large-area formwork Top 50, Doka offers an efficient all-purpose system for use on launching-girder equipment that can also be used on complicated bridge cross-sections.

Doka delivers solutions

Doka is a reliable supplier of a rentable, modular all-in-one system (formwork plus traveller) that meets the most stringent requirements in terms of planning, structural-design approval, ease of assembly, operator safety and rapid availability for modern-day bridge-building.

Incremental launching

The continuous superstructure is cast a section at a time behind an abutment in an on-site casting yard. Each section that is cast here (i.e. each “cycle”) is “pushed” across the piers, together with the previously cast sections, to make space for the casting of the next section. This method is most often used on longer bridges with straight or near-circular groundplans and which have uniform summit or sag-curve radii in front elevation view.

Composite construction

Put in simplified terms, the steel longitudinal girders of the bridge are connected to the CIP concrete deck slab by means of shear-connector studs in such a way as to obtain a shared (i.e. “composite”) load-bearing effect. Because the longitudinal girders are factory-prefabricated, this can greatly shorten the construction period. The composite technique results in low-cost, long-life, low-maintenance bridge-deck solutions, which is why it may be found in use for anything from small overpasses to large viaducts.

Arched construction

The arched bridge is surely the most visually impressive constructional design of bridge. Particularly when it comes to crossing deep ravines, arched bridges are the preferred design. The most common construction methods are cantilevering and “classic” falsework. An alternative technique here is the lowering-arch or “swivel-in” construction method.

Cantilevered parapets

Bridge edge-beams are subsequently cast onto the finished deck slab. As well as concealing any dimensional inaccuracies of the cantilever arms of the bridge deck, they also serve to safeguard the traffic space, as e.g. railings, crash barriers and noise abatement walls are later mounted on them.

Doka delivers solutions

The individuality and flexibility of the Doka Formwork Catalogue is very much apparent in incremental launching. The interplay between the various Doka systems involved even makes it possible to cast the cycles without using tie-rods, for example. This cuts costs and prevents any complications when it comes to routing the tendons.

Doka delivers solutions

The Doka composite forming carriage is the fast, safe way to build composite bridges. The system stands out for its easy adaptability to widely differing cross-sections, the speed with which it can be assembled from rentable standard components, and its high standard of safety. For any type of composite bridge, Doka has the right system for you – ranging from standard solutions to combinations of composite forming carriages and the Doka heavy-duty supporting system SL-1, all the way up to sophisticated custom solutions.

Doka delivers solutions

With arched bridges, too, Doka's decades of experience have given it the necessary engineering know-how to give you a formwork solution that is perfectly tailored to your arch. Like the specially developed arch forming carriage – already fielded on many sites – that is anchored to only the underside of the arch. This leaves the workspace on the upside of the arch unobstructed, allowing the arch to be back-stayed easily and early.

Doka delivers solutions

Doka's equipment offers universal adjustability combined with the very highest standard of safety, and this makes it highly versatile. In this way, Doka can ensure fast and efficient forming of outer and median parapets using its wide range of different systems, such as the manually mountable Bridge edge beam formwork T, the Forming wagon T and the Forming wagon TU, with minimal disruption to traffic-flows and to the overall construction sequence.

Doka Services
– get you further!

Doka Engineering

Collaboration on every phase of your project

The advantages for you

- practical, relevant planning and engineering expertise, “from practitioners, for practitioners”
- customised proposed solutions for even the very toughest assignments
- the safety, certainty and peace of mind that come from our many years’ experience
- improved results with 3D planning and verifiable statical calculations
- CE-certification for maximum on-site safety

This is Doka’s great capability: always being able to find the optimum solution for every bridge structure. The aim is to help the contractors get by with as little formwork as necessary.

These engineering solutions take shape in the course of dialogue between our experienced Doka advisers and your technicians – ideally, even before the tendering phase.

It’s always worth discussing the project with the Doka Formwork Experts even as early as in the development phase.

Doka Site Demonstrators

Complete “on-the-job” expertise

Nobody knows all the formwork systems better than they do. And nobody can explain them to your people better than they can.

Doka Site Demonstrators are accomplished practitioners. They bring with them huge know-how from many projects all over the world – and put it directly into practice on your construction project.

You can always count on the Doka Site Demonstrator to give your people formwork tips and tricks that will facilitate the construction workflow.

The advantages for you

- a wealth of experience placed at your service to aid work on your site
- on-site instruction of your employees
- speedy solutions, even for out-of-the-ordinary formwork assignments
- the Doka Site Demonstrator will always have the right tools with him for the job

Doka "Ready-to-Use" Service

Delivered to the site ready for use

The advantages for you

- no delays or unforeseen additional costs when starting up at a new site
- improved results from using dimensionally accurate custom formwork
- optimised formwork solutions

Reduce the amount of assembly work needed on the site, and cut your costs.

The specialists of the Doka "Ready-to-Use" pre-assembly service can build any formwork for you, in any design, dimensionally accurately and in high quality, for just-in-time delivery to your site. On a completely individualised basis.

If individually custom-fabricated formwork is what you need, you'll be better off getting it delivered to you "site-ready" by the Doka "Ready-to-Use" Service.

Doka Reconditioning Service

Ongoing cleaning and overhauling

Only well looked-after formwork will deliver flawless concrete finishes and can be operated quickly and safely.

The Doka Reconditioning Service's expert staff inspect the formwork equipment for any signs of damage and to verify its dimensional accuracy. Where necessary, they will immediately carry out all necessary cleaning and repair work.

Out on the site, your equipment is subjected to tough conditions. The Doka Reconditioning Service makes your formwork "fit" once again.

The advantages for you

- the cost-certainty that comes from professional cleaning and repair of the formwork
- reconditioning of your own formwork is also possible


doka H20 top
doka

High-performance systems
– for your success!

Climbing formwork MF 240

The crane-lifted climbing formwork for structures of any shape and inclination

High flexibility

meaning optimum adaptation to any construction project, with only a few individual components

By turning pressure spindles, the Climbing formwork MF 240 can be accommodated perfectly to structures whose inclination varies from one cycle to the next.

Optimum safety

for your site crew

reliably safeguarded workspaces and workplace access routes ensured by

- the 2.40 m wide work-platforms, with plenty of space for fast, safe working
- the integrable Ladder system XS

Easy to operate

saving you time and money

Makes the forming operations swift and efficient, as

- the formwork is easy to set up and remove using a travelling unit, with no need for a crane
- the formwork and scaffold are shifted together, in one piece
- the formwork can be adjusted both precisely and quickly in all directions

Climbing formwork Xclimb 60

An innovative, modular system for a wide range of applications

Huge flexibility

thanks to the innovative, modular system

Benefit from the system's multi-use capability

- for walls, for facades or as a protection screen
- and from the option of lifting the system either by crane or as a self-climbed system using manually relocatable hydraulic lifting appliances

High standard of safety

for your site crew

Safety is "built in" to all phases of the work, as

- the system is anchored to the structure at all times
- the guided repositioning operation is independent of the weather
- enclosures can easily be constructed with materials that are adapted to the requirements
- the platforms are the ideal width for practical working
- the Ladder system XS can easily be integrated

Simple modular design concept

based on a practical "construction-kit" system

Save time and money because of

- the high degree of pre-assembly
- the way the system simplifies planning, utilisation and handling
- the facility for leaving service loads in place on the platforms even while these are being repositioned

Automatic climbing formwork SKE

The crane-independent climbing formwork for structures of any shape and height

Superlative cost-efficiency
for your project
A cost-effective solution is ensured by
- the easy way in which the system accommodates varying structure geometries and inclinations
- the practice-oriented project planning provided by Doka

Rapid working
in a controlled sequence
Flexible cycling
- as even large formwork gangs can be raised in tandem, independently of the crane
- even in stronger winds
- because service loads can stay on the platforms while these are being raised
- because it is possible to integrate concrete placing booms

Maximum safety
in every phase of every cycle
The very best on-site protection, because
- the climbing scaffolds are anchored to the concrete at all times
- of the wide working platforms, enclosed on all sides
- the climbing operations can be managed with complete precision using radio remote control
- the Ladder system XS or a stair tower can be integrated to provide safe workplace access

Load-bearing tower Staxo 100

Extremely efficient and fast, with built-in safety

Maximum safety
in every situation

Staxo 100 gives a boost to safety on your site, with its
- slip-proof ladders integrated in the frames
- suspension points for chest harnesses
- clip-on, liftout-safe assembly battens, with or without manholes
- "mounted-ahead" railings
- ability to be used as a stair tower

Very high capacity
combined with flexible range of use

Benefit from the advantages of the best load-bearing tower on the market
- extremely high load-bearing capacity of up to 100 kN per leg
- optimum adaptability to different layouts, floor shapes and loads
- precision height adjustment, right down to the last millimetre, even when under load
- also ideal for large shoring heights

– Simply give us a call! We'll be pleased to advise you.

Swifter working
thanks to optimised logistics

Staxo 100 gets work on your site up to speed with its
- small number of easy-to-handle component parts
- captively integrated connectors
- integrated safety solutions

Cantilever forming traveller (CFT)

Formwork and shoring both from the same supplier

Active and passive safety

for your site

Twice as safe, thanks to

- passive safety, as the CFT self-locks while being advanced on sliding plates
- active safety, which helps work progress swiftly by providing ideal workplace access routes

Rapid working

thanks to the smooth way in which each project moves ahead

Easy, efficient working is facilitated by

- the unobstructed access to all work-zones
- the ingeniously thought-out solutions for making work easier, right down to the last detail
- the optimised planning interface with the designer of the superstructure (as both the CFT and the formwork are provided by one and the same high-calibre supplier)

Guaranteed to be more cost-efficient

by all-round Doka Service

Save time and money

- because the equipment is rentable, so no pre-financing is needed
- because the system components are available very quickly, meaning short delivery times
- because you do not need to maintain and store formwork equipment of your own, as the system is rentable
- because the use of standard system components means highly efficient planning

Composite forming carriage

The highly efficient solution for steel composite bridges

Reduced costs

for maximum efficiency

The Doka composite forming carriage helps you build composite bridges swiftly and safely, thanks to its

- small number of versatile, combinable component parts
- ease of assembly
- high safety standards for rapid working

Customised, complete solution

ideal for your requirements

Doka offers you a “one-stop shop” to plan and supply:

- high-calibre solutions for all steel composite bridges
- forming carriages, shoring towers and working platforms all designed to work together seamlessly
- adaptability to different shapes of bridge

Forming wagon TU

The underslung bridge edge beam formwork for fast forming of cantilevered parapets

A safe, sure way to work better

thanks to the field-proven Doka system

Site crew better protected, by

- top safety standards on your site
- pre-mounted working platforms ready for immediate use
- all-round scaffolding tubes for rugged side protection
- a built-in gravity brake that secures the forming wagon against accidental travelling

Rapid project progress

and controlled construction workflow

Makes the forming operations swift and efficient, as

- the system is very quick and easy to set up, thanks to its pre-assembled system units
- the horizontal and vertical formwork are removed simultaneously, with a swivel/tilt motion
- spindle struts are used for precision formwork set-up

Efficient all-in-one solution

thanks to its innovative system

Cost-saving results are guaranteed:

- rentable all-in-one system with pre-assembled working platforms and parallel girderframe units / forming elements
- easy rebar and concrete placement operations from above
- the underslung constructional design minimises disruption to traffic (e.g. during bridge rehabilitation) or to the construction workflow

Forming wagon T

The site-ready, travelling bridge edge beam formwork

The cost-saving way to cast

cantilevered parapets

A safe and cost-efficient solution

- on longer bridge superstructures
- for higher numbers of re-use cycles
- for “section-at-a-time” repositioning cycles
- on bridge superstructures where it is not possible to suspend formwork from under the cantilever slab
- for rehabilitating existing bridge superstructures
- on bridges with wide radii

Multi-use capability

for diverse requirements

The versatile Forming wagon T can be used as as a forming carriage, a demolition wagon and for horizontal repositioning of formwork. This flexibility, coupled with its great ease of handling, makes for high-speed working in a daily rhythm.

A well thought-out system

for your benefit

The galvanised, long-life construction of the Forming wagon T is pre-assembled for rapid site-erection and dismantling, and to minimise the amount of storage space needed.

Bridge edge beam formwork T

The fast manual bridge edge beam formwork

Great flexibility
for your project
Excellent adaptability, thanks to
- generously dimensioned adjusting range
- continuous height adjustment, with millimetre accuracy

High efficiency
thanks to its innovative system
Used most efficiently on
- shorter superstructures
- medium-length bridges with a small number of repositioning cycles
- tight radii and complicated cross-sections

Large-area formwork Top 50

The large-area formwork for all shapes and loads

Versatility

for all shapes and loads

The "construction kit" timber-beam formwork for

- any architectural requirement
- any formwork pressure
- any type of form-facing
- any tie-hole pattern

Cost-certainty

thanks to Doka know-how

Pre-assembly in Doka's unique "Ready-to-Use" Service gives you

- a perfect joint pattern due to precision element joints
- time and space savings at the site
- exactly matching elements, no need for finishing-work
- special solutions for bridge, tunnel and industrial construction

Fast, efficient working

thanks to optimised formwork solutions

Cost-efficient project implementation thanks to

- individualised solutions
- high numbers of re-use cycles
- short forming-times
- large gang-forms with optimised form-tie numbers and spacing

Extremely high safety

thanks to safe workplace access routes

Large-area formwork Top 50 can, of course, easily be combined with practical Doka safety products such as the Pouring platform U and Ladder system XS.

Piers and pylons – reference projects

Sutong Chang Jiang Highway Bridge

For the first time, a cable-stayed bridge has broken the magic 1000 m span barrier. The six-lane Sutong Bridge in China's Jiangsu Province also sets a new benchmark with its two A-shaped pylons, whose height of 306 metres is also unprecedented. All in all, a great challenge for contractors CHEC Construction and for formwork manufacturer Doka, which supplied the necessary climbing-technology solution.

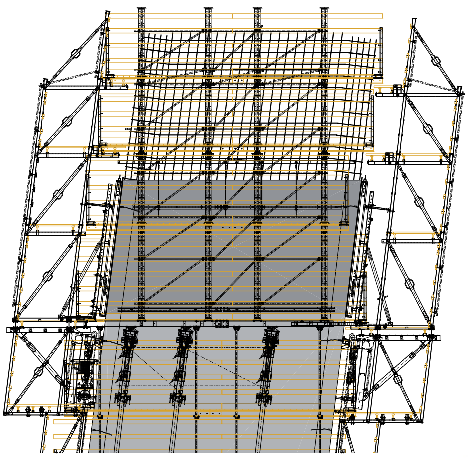
Project data
Two A-shaped pylons
Nantong, China
Pylon construction time:
17 months

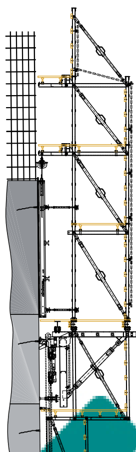
Structure data
Structure height: 306 m
Casting-step height: 4.5 m
68 casting steps

Extra information
3-day cycle

Contractors
CHEC Construction

Doka systems in use
Automatic climbing formwork
SKE 100
Large-area formwork Top 50





P19 Lavant Viaduct

Project data
8 piers
Lavant, Austria
Pier construction time:
19 months

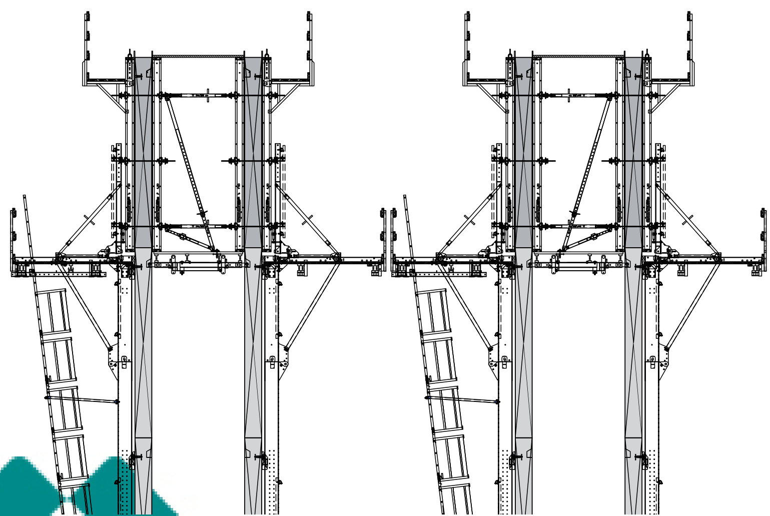
Structure data
Structure height: 7 to 136 m
Casting-step height: 4.50 m
31 casting steps

Extra information
2 day cycle, forming-time less than 0.2 manhours per m² formed

Contractors
Steiner Baugesellschaft m.b.H (Austria)

Doka systems in use
Climbing formwork GCS
Large-area formwork Top 50
Shaft platform
Ladder system XS

Some 160 m high, Carinthia's Lavant Viaduct is the second-tallest bridge in Austria. This valley crossing is an important element in the progressive upgrading of the A2, Austria's motorway artery to the south. The CIP piers of the new viaduct rose in 2-day cycles alongside an existing bridge erected in 1984.



Metsovo to Panagia

One of the most modern – and most difficult-to-build – motorways in Europe was recently completed in Greece: The Egnatia Motorway. This 680 km long motorway includes very many bridges and tunnels. The tallest piers of all the bridges were formed using Doka automatic climbing formwork SKE 50.

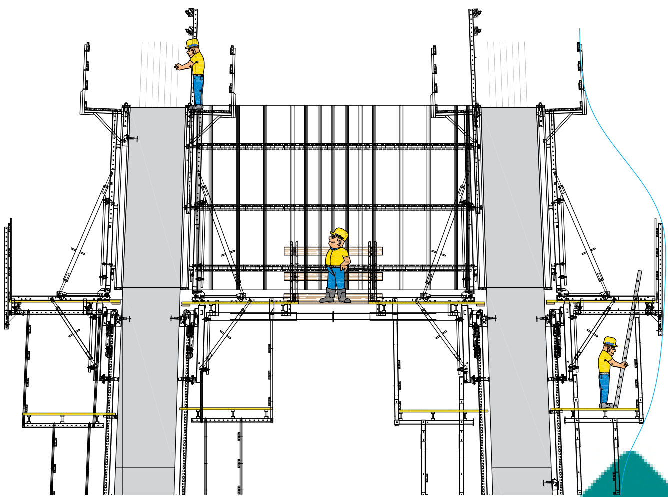
Project data
2 piers
Metsovo, Greece
Pier construction time: 5 months

Structure data
Structure height: 100 m
Casting-step height: 4.4 m
22 casting steps

Extra information
4-day cycle (Pier 1),
6-day cycle (Pier 2), no two casting sections the same

Contractors
Aktor ATE

Doka systems in use
Automatic climbing formwork SKE 50
Large-area formwork Top 50



Rhine Bridge at Wesel

Project data
Pylon
Wesel, Germany
Pylon construction time:
12 months

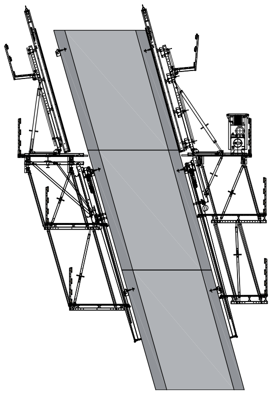
Structure data
Structure height: 133 m
Conventional construction method, 26 casting steps

Extra information
Entire pylon cast in fair-faced concrete

Contractors
Hermann Kirchner - Hoch- und Ingenieurbau GmbH - Bad Hersfeld
Donges Stahlbau GmbH, Darmstadt

Doka systems in use
Automatic climbing formwork SKE 50
Large-area formwork Top 50

To improve the traffic situation on the Lower Rhine in NW Germany, the B 58n Wesel bypass is currently under construction, including a new bridge over the Rhine. This 9.9 km, EUR 150 m project is made up of three sections: The 4.55 km long Büderich bypass, the 1.6 km long Rhine crossing and the 3.75 km long Wesel southern bypass. The JV “Rheinbrücke Wesel”, consisting of Hermann Kirchner Hoch- und Ingenieurbau GmbH of Bad Hersfeld and Donges Stahlbau GmbH of Darmstadt, used Doka formwork to build the centrepiece of the B 58n: The new Rhine Bridge at Wesel.



River Suir Bridge

With its 108 m tall pylon and 400 m span, the 465 m long cable-stayed bridge across the River Suir was not only by far the most challenging contract section of a major road-building project in SE Ireland, but is also the biggest cable-stayed bridge in the whole country. Doka supplied the entire formwork solution for this technically complex bridge-building project, including detailed formwork planning that gave impressive testimony to Doka's outstanding problem-solving capability.

Project data
Pylon
Waterford, Ireland
Pylon construction time:
18 months

Structure data
Structure height: 110 m
Conventional construction method
Casting-step height: 4.0 m
28 casting steps

Extra information
1-week cycle

Contractors
Dragados

Doka systems in use
Automatic climbing formwork SKE 50
Climbing formwork GCS
Large-area formwork Top 50

Köröshegy Bridge

Project data
16 piers
Köröshegy, Hungary
Pier construction time: 21 months
Total construction time: 33 months

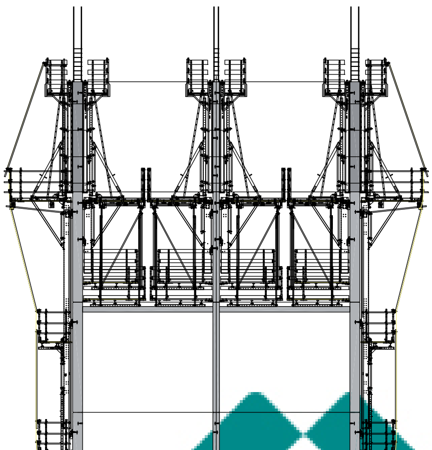
Structure data
Structure height: 17 to 80 m
Casting-step height: 5 m
4 to 17 casting steps

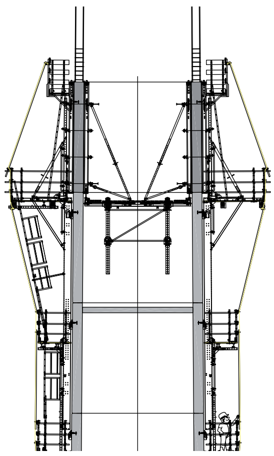
Extra information
1-week cycle, extra finishing-work platform, telescoping GCS platforms on the inside

Contractors
Hídépítő ZRT

Doka systems in use
Climbing formwork MF 240
Climbing formwork GCS
Large-area formwork Top 50

Near the southern shore of Hungary's Lake Balaton, at Köröshegy, stands the longest valley crossing in Central Europe. It was built as part of the project to extend the M7 motorway all the way to the Croatian border. The 1872 m long superstructure of the viaduct is distributed across 16 piers of up to 80 m in height. These were formed by contractors Hídépítő ZRT using the fast, wind-stable Doka climbing system GCS.

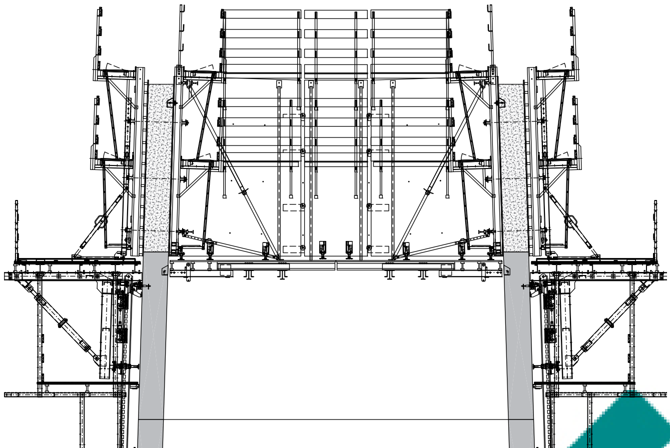




Verrières Viaduct

The 5 piers of the Verrières motorway viaduct soar skyward in some very "offbeat" shapes: The three shorter piers taper conically and uniformly, as do the top sections of the two larger ones.

The taller two differ in that for their first 40 m or so, they have a parabolic profile which is visually underlined by a projecting haunch.



Project data
5 piers
Verrières, France
Total construction time:
36 months

Structure data
Structure height:
3x ~ 97 m; 2x ~ 141 m
Casting-step height: 4 m

Extra information
3 day cycle, moveable suspension shoes, changes in shape from one casting step to the next

Contractors
Razel-Spie-Sogea-Dodin

Doka systems in use
Climbing formwork MF 240
Automatic climbing formwork SKE 100
Large-area formwork Top 50
Shaft platform

Millennium Pylon bridge

Project data
Pylon
Podgorica, Montenegro
Pier construction time:
7 months, Total construction time: 12 months

Structure data
Structure height: 57 m
Casting-step height: 3.3 m
18 casting steps

Extra information
2-weekly cycle, pylon inclined by 15°, tensioning cable anchorages flush with edge of concrete wall, telescoping platforms

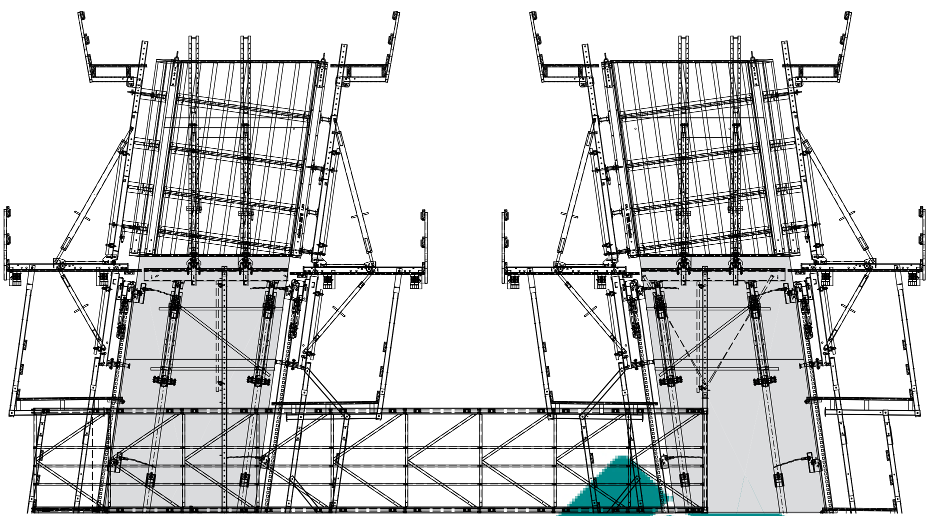
Contractors
Primorje, Alpine-Mayreder & Freyssinet

Doka systems in use
Climbing formwork MF 240
Large-area formwork Top 50

Even complicated shapes such as those of the Millennium Pylon bridge in Montenegro can be formed easily, quickly and safely with Climbing formwork MF 240.

Binh Bridge

Two A-shaped towers, each over 100 m tall, are the centrepiece of the Binh Bridge. Automatic climbers SKE 50 were used here in conjunction with Large-area formwork Top 50.



Project data
Twin A-shaped towers
Haiphong, Vietnam
Total construction time:
8 months

Structure data
Structure height: 102 m
Casting-step height: 3.62 m
23 casting steps

Extra information
2-day cycle, curved inside formwork d = 1.50 m, catwalk, fair-faced concrete surface

Contractors
ISS JV – IHI / Shimizu / Sumitomo JV

Doka systems in use
Automatic climbing formwork SKE 50
Large-area formwork Top 50

Falsework – reference projects

Bridge over D1 motorway

Project data
Motorway bridge
Mengusovce-Jánovce,
Slovakia
Total construction time:
15 months

Structure data
Overall length: 546 m
Width of bridge: 11.5 m
Support centres: 18 – 23 m

Extra information
26 piers

Contractors
Inžinierske stavby, a.s. and
Marti Contractors

Doka systems in use
Large-area formwork Top 50
Load-bearing tower Staxo 100
Forming wagon T

This bridge over the D1 Mengusovce – Jánovce motorway in eastern Slovakia was built with assistance from Doka. The piers were constructed using Large-area formwork Top 50 elements which had been preassembled by the Doka "Ready-to-Use" service in Amstetten to ensure the superb quality of the concrete surfaces.

Gschaid valley crossing

For the “Gschaid valley crossing” project at Altlengbach, outside Vienna, contractors Held & Francke turned to Doka for quality formwork equipment – in particular, Staxo load-bearing towers, which played a key role in the falsework construction.

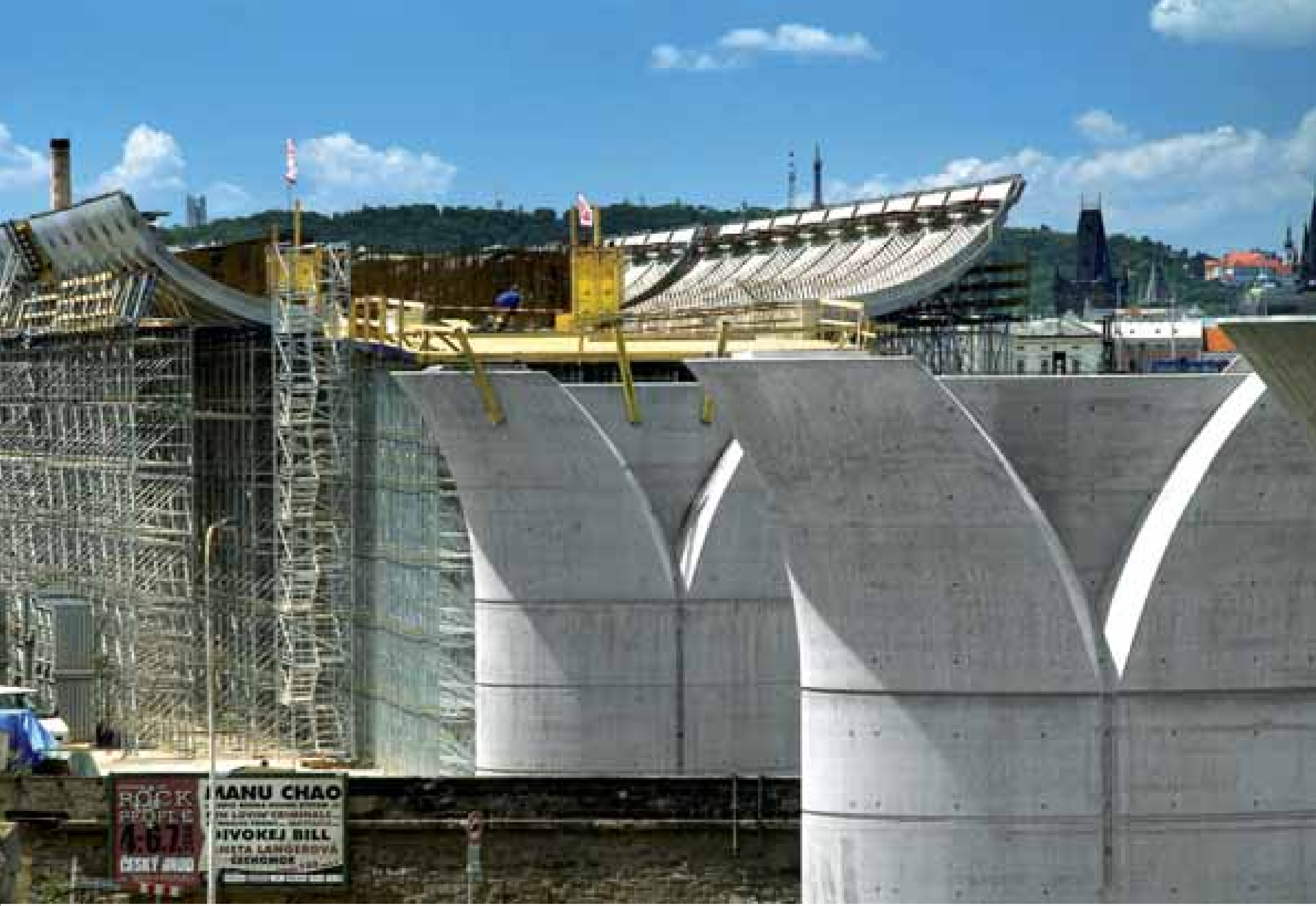
Project data
Beam-and-slab bridge
Gschaid, Austria

Structure data
Length of bridge: 109 m
Width of bridge: 14.5 m
Shoring height: 3.5 m – 14.5 m
Slab thickness: 0.25 m
Beam thickness: 1.65 m
Beam width: 0.8 m

Extra information
Integrated drive-through access opening: 3.5 / 4.6 m

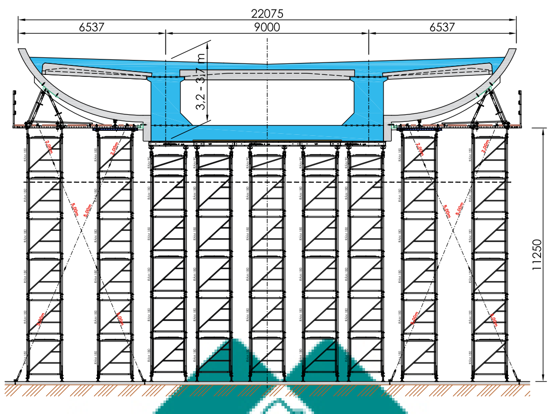
Contractors
Held & Francke, Salzburg

Doka systems in use
Load-bearing tower Staxo
Framed formwork Framax Xlife
Folding platform K



By-pass of Masaryk rail terminus, Prague

One of the biggest railway overpasses in Europe was completed in 2008, in Prague. The Nové Spojeni project allows trains running between Decin, Prague and Brno to bypass the city's Masaryk rail terminus, providing a faster and easier link for inner-city and international railway traffic. One of the key structures is the bridge over the Masaryk station itself. This four-track overpass was divided into 12 spans along its nearly 450 m length. The cross-section was constructed in CIP concrete on a conventional Staxo load-bearing tower falsework. Pre-cast cantilever-arm elements were attached to the CIP cross-section, onto which a pre-cast deck slab was placed. Contractors SSŽ profited from the fast repositioning times for the Staxo shoring towers, and from the uncomplicated handling and adaptability of the Top 50 formwork elements, which had been pre-assembled by the Doka Prague Branch's "Ready-to-Use" Service. As well as the formwork and shoring, Doka also supplied its Top 50 forming system for casting the piers.



Project data
Triple-cell box girder
Prague, Czech Republic

Structure data
Overall length: 441 m
Carriageway width: 22 m
Spans: 37 – 39.9 m
Shoring height: 10 – 11.5 m
12 casting sections

Extra information
Fair-faced concrete necessary due to use of semi-precast methods; for geological reasons, only a large-area falsework solution was possible

Contractors
SSŽ 09 ŘEVNICE

Doka systems in use
Large-area formwork Top 50
Load-bearing towers
Staxo 100

Launching-girders – reference projects

Bridge across the Kalterbachtal valley

Project data
Box-girder bridge
Neuhäusel, Germany
Construction period:
16 months

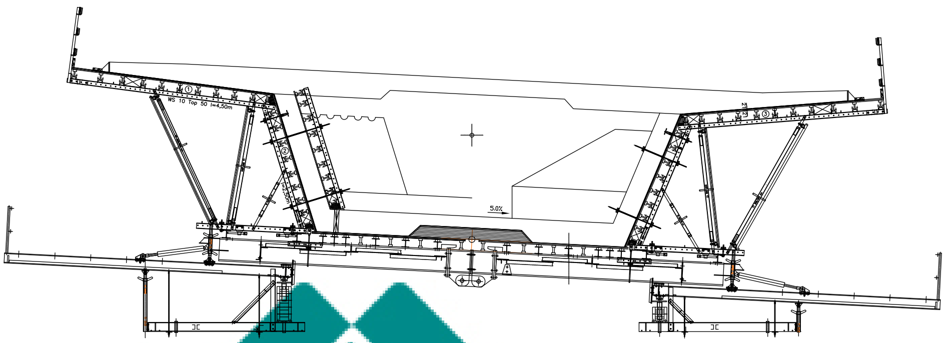
Structure data
7 spans
Overall length: 332 m
Carriageway width: 16 m
Max. support centres: 55 m
Max. cross-sectional height:
3.5 m

Extra information
Turning radius: 650 m

Contractors
Fritz Meyer GmbH

Doka systems in use
Large-area formwork Top 50

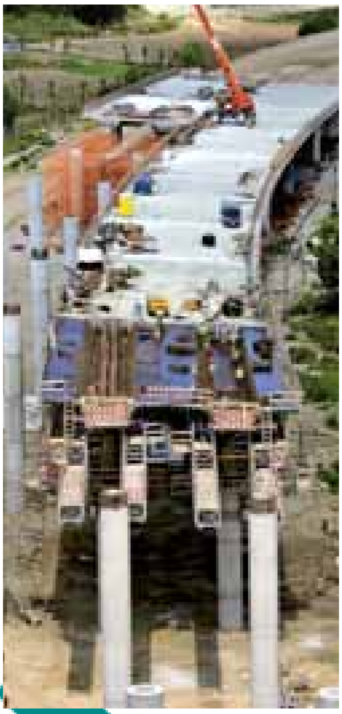
This structure was erected to bridge a deep ravine as part of a bypass being built around Neuhäusel, near Koblenz in Germany. The biggest challenges in building this bridge were the limited and difficult access to the piers, and its tight turning radius. As is usual when constructing box-girder bridges with launching-girder equipment, the superstructure was cast one span at a time in two separate casting sections – the trough in the first casting section, and the deck slab in the second. The formwork elements were pre-assembled from the Top 50 timber-beam formwork system, and were quick and easy to erect and reposition on the launching-girder equipment. The elements were arranged in such a way that they could be moved in relation to the launching-girder equipment, for good adaptation to the turning radius.



Bridge over the Rio Sousa

The two parallel carriageway decks of the Rio Sousa bridge were constructed with Doka Formwork Technology in co-operation with BERD launching-girder equipment. The construction firm benefited from this direct collaboration between Doka and the launching-girder supplier.

An ideal complete solution was ensured before work even began, preventing any possible interface problems between the formwork and launching-girder equipment. With Large-area formwork Top 50, a universal forming system was successfully used on the launching-girder equipment.



Project data
Pre-stressed double-webbed T-beam
Lisbon, Portugal
Total construction time: 8 months

Structure data
2 x 15 spans
Overall length: 450 m
Carriageway width: 15 m
Max. support centres: 30 m
Max. cross-sectional height: 1.25 m

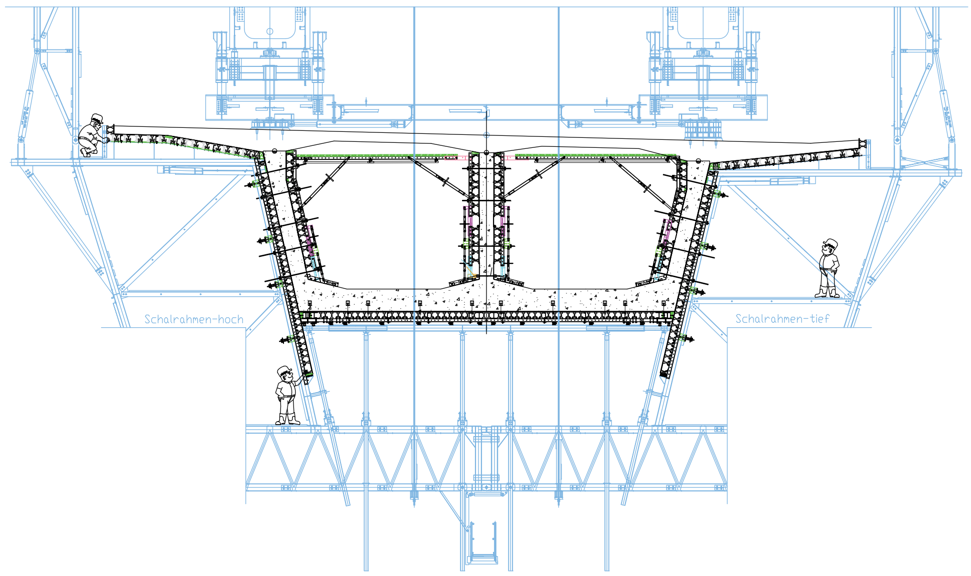
Extra information
Turning radius: 1000 m

Contractors
Mota Engil

Doka systems in use
Large-area formwork Top 50

Köröshegy Bridge

The 1872 m long superstructure of this, the longest valley crossing in Central Europe, was constructed a section at a time by means of launching-girders. The top-running launching-girder equipment was supplied by Messrs. RöRo Traggerüstsysteme. To go with this system, Doka supplied a formwork solution based on Top 50 components which met the tough specifications for this assignment: fast and simple adaptation to varying cross-sectional geometries, combined with the high stability of the Doka form-facing. The facility for adjusting the height by way of the telescopic inside formwork was particularly ergonomical and safe. A custom solution was developed for the varying width of the bottom slab. Before the launching-girder equipment came into action, the pier-heads were first cast with the aid of Doka supporting construction frames.



Project data
Box-girder bridge
Köroshegy, Hungary
Total construction time:
30 months

Structure data
17 spans
Overall length: 1872 m
Carriageway width: 23.2 m
Max. support centres: 120 m
Max. cross-sectional height: 7 m

Extra information
Turning radius: 4000 m

Contractors
Hídépítő ZRT

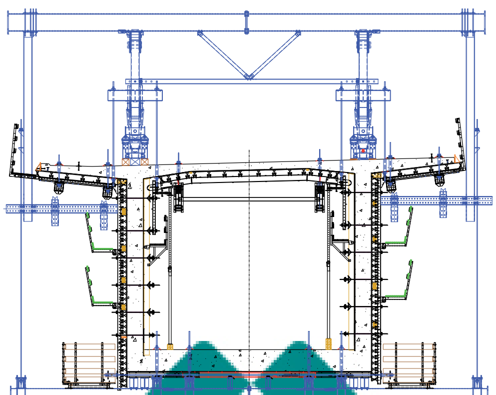
Doka systems in use
Large-area formwork Top 50

Cantilevering – reference projects


Wasserbau GmbH

Danube bridge at Traismauer

This 356 m long bridge across the River Danube is being erected with two pairs of Doka cantilever forming travellers in 28 casting steps per traveller, each with a max. length of 5.2 m. The modular, flexible design concept of the Doka CFT (based on rentable standard components) and its high safety standard together ensure fast and efficient construction progress here. The two pre-stressed box girder superstructures are statically independent of one another; they have a maximum width of 15.7 m and are divided into a 156 m long main span and two 100 m long side spans. The superstructures have been designed with a longitudinal gradient of max. 3.5 percent and a transverse gradient of 2.5 percent. The perfect design match between the formwork and the cantilever forming traveller cuts down the formwork/traveller interface to one single contact person for superstructure planners and contractors to deal with, and ensures certainty regarding the planning and the costs, as well as optimising the construction workflow.



Project data
Single-cell box girder
Traismauer, Austria
Construction period: 10 months

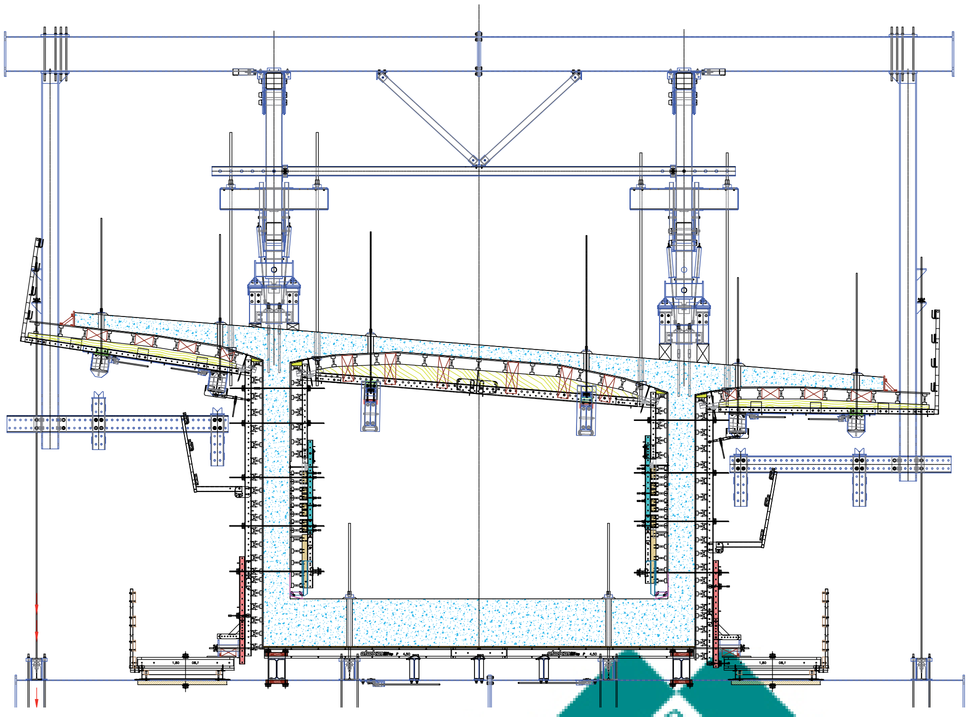
Structure data
Overall length: 356 m
Carriageway width: 15.7 m
Max. span: 156 m
Height of deck: 3.9 m - 7.69 m
Max. casting-sect. length: 5.2 m

Extra information
118 casting sections, element assembly by Doka “Ready-to-Use” Service, only 30 cm gap between the 2 superstructures, weekly cycle achieved right from outset

Contractors
Alpine Bau GmbH

Doka systems in use
Large-area formwork Top 50
Cantilever forming traveller (CFT)

Viaducto 5



As part of a project to extend the highway encircling the island of Gran Canaria, 7 viaducts are being erected by construction firm UTE Guia Pagador. Doka was awarded this contract because only the Doka cantilever forming traveller was capable of fulfilling the high safety requirements in force on Gran Canaria. The transverse gradient of the bridge varies between 2 % and 8 %, while the longitudinal gradient rises from 5 % to 6 % over the length of bridge. Despite the substantial longitudinal gradient, safe shifting of the Doka cantilever forming traveller is ensured by the fact that the slide bearings used here prevent any uncontrolled motion of the traveller.

In close collaboration with the bridge planners, Torroja Engineria, and the client, UTE Guia-Pagador, a safe concept was elaborated for casting the pier-heads, which are located 110 m above the ground. The Doka main support girder ensures safe working at all times. The main support girders are raised by crane and then pushed into place through the pier hydraulically. The various different inclinations and structure heights of the 4 pier-heads are accommodated by using d2 load-bearing towers.

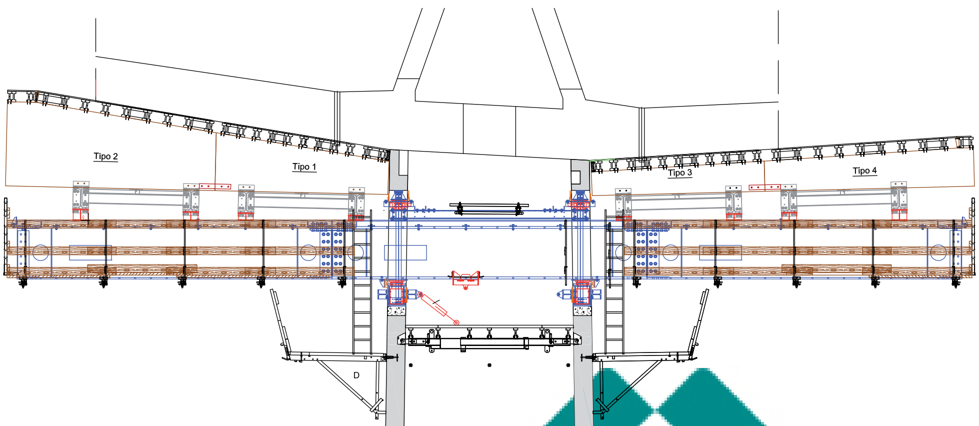
Project data
Single-cell box girder
Gran Canaria, Spain

Structure data
Overall length: 432 m
Superstructure width: 15.0 m
Height of superstructure deck: 2.70 - 6.00 m, Max. casting-sect. length: 5.40 m, 94 casting steps
Max. span: 114.5 m

Extra information
Transverse gradient: 8%
Longitudinal gradient: 6%
Telescopic inside formwork

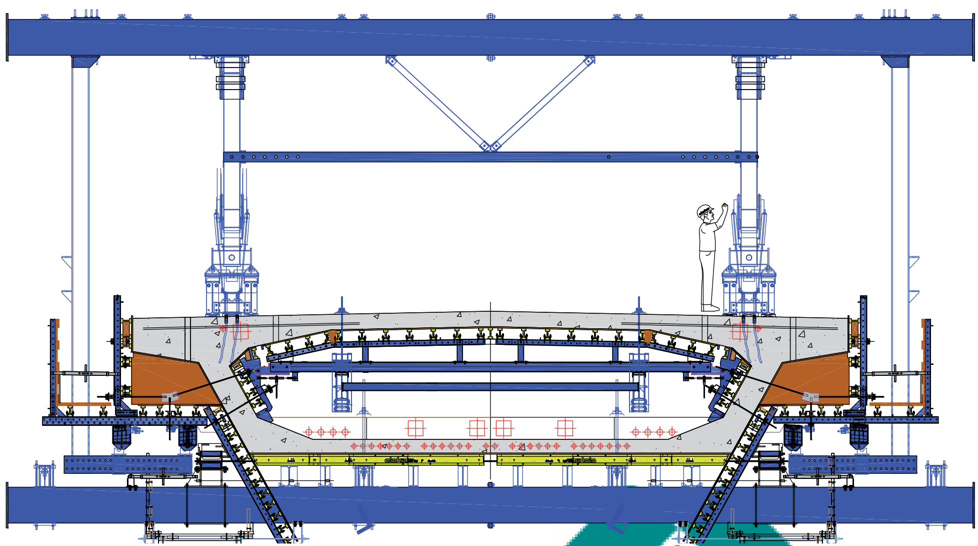
Contractors
UTE Guia-Pagador

Doka systems in use
Cantilever forming traveller (CFT)
Large-area formwork Top 50
Load-bearing tower d2
Automatic climbing formwork SKE 50
Climbing formwork MF 240



Viaducto de Teror

To divert traffic away from the old single-lane bridge near the town of Teror on Gran Canaria, UTE Puente Teror is building Spain's first-ever extradosed bridge, the "Viaducto de Teror". Its max. longitudinal gradient is 5.10%.



A particular challenge was presented by the external anchor-block boxouts, which had to be redesigned and supplied to the site ready-assembled for each separate section. Stabilisation of the short cantilever arms was achieved by way of a follow-up platform and a spindle-adjustable supporting construction.

The geometry of the V-shaped piers necessitated a pier-head solution using the Doka cantilever forming traveller system.

The pier-head was constructed in three casting sections (bottom slab with transverse stiffeners, webs, deck slab with deviator saddles for

the tendons). Note that the V-shaped piers already had to be finished up to the level of the top of the deck slab, in order to be able to carry the cantilevering superstructure. This exact casting sequence is only possible thanks to proper planning and continuous liaison with the contractors.

Project data
Single-cell box girder, extradosed
Gran Canaria, Spain

Structure data
Overall length: 261 m
Superstructure width: 13.0 m
Height of superstructure deck: 2.58 - 5.08 m
Max. casting-section length: 6.0 m, 38 casting steps
Max. span: 145 m

Extra information
Slanted webs, external anchor-block boxouts, site erection and Doka “Ready-to-Use” Service, inaccessible terrain

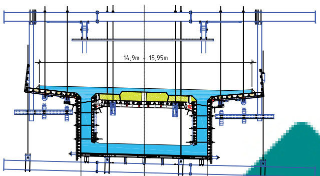
Contractors
Puente Teror (Comsa & OAC)

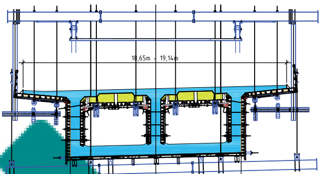
Doka systems in use
Cantilever forming traveller (CFT)
Large-area formwork Top 50
Load-bearing tower d2


doka
SKANSKA

SO 206 bridge over River Vltava

Situated just to the south of Prague, contract section R 513 includes a 236 m long bridge across the River Vltava. In terms of the formwork engineering involved, it is one of the most challenging sections of the new orbital motorway. With the modularly designed Doka cantilever forming traveller, both the single- and twin-cell decks can be formed and cast with no need for time-consuming, costly modifications. The sidewall heights taper from 4.6 m to 2.7 m. The formwork plus shoring are safely travelled to the next casting by the new Doka-developed drive system, on plastic slide bearings which prevent any uncontrolled motion of the over 80-tonne construction. Between the 4th and 13th casting sections, an access ramp is integrated onto the side of each previously completed bridge deck with the aid of post-tensioning tendons. These necessitated additional anchor blocks on the inside faces of the sidewalls. This construction task presented another formwork-engineering challenge, which the Doka "Ready-to-Use" Service tackled by crafting exactly fitting anchor-block boxouts and integrating these in the inside formwork.





Project data
Single and twin-cell box girder
Prague, Czech Republic

Structure data
Overall length: 236 m
Height of superstructure deck: 2.6 – 5.2 m
Max. casting-sect. L: 5 m
50 casting steps
2 piers
Max. span: 104 m

Extra information
Changeover from single-cell to twin-cell (cross-section) using the same equipment, anchor blocks in deck slab, sidewalls and bottom slab

Contractors
Skanska DS

Doka systems in use
Cantilever forming traveller
Large-area formwork Top 50

Prosmyky Bridge over River Elbe

Project data
Single-cell box girder
Litomerice, Czech Republic

Structure data
Overall length: 584.5 m
Superstructure width: 14.5 m
Height of superstructure deck: 3.5 – 7.5 m
Max. casting-section length: 5 m
61 casting steps
6 piers
Max. span: 151 m

Extra information
Telescopic inside formwork
Min. radius of spiral transition curve: 325 m

Contractors
JV of SMP & Metrostav

Doka systems in use
Cantilever forming traveller
Large-area formwork Top 50

As part of this large-scale project, the contracting consortium of SMP and Metrostav is erecting the 585 m long Prosmyky Bridge across the River Elbe. This ambitious construction project marks the world debut for the newly developed Doka cantilever forming traveller. The cover-slab anchor blocks, positioned in the middle of the carriageway slab, present a particular challenge here. The site crew are dealing with this challenge by using anchor-block boxouts made specially by Doka. This custom solution keeps work moving swiftly ahead, without costly downtimes. To facilitate casting of the tapering sidewalls, Doka further optimised its new cantilever forming traveller with a telescopic timber-beam formwork. There is thus no need for any improvised on-site modifications to the formwork, such as cutting back or shortening system components. The surplus formwork is dismounted in a few simple steps and the universal girders of the sidewall formwork are raised by turning spindles, as required by the upward taper.

Devil's Slide Bridge

The two Devil's Slide Bridges will form part of a realigned stretch of Highway 1 on the West Coast of the United States. The cross-sections of the two bridges are completely identical, decreasing in height from 5.9 m at the pier-heads to 2.71 m in mid-span. The central span of each bridge superstructure was constructed using the balanced cantilever technique, working outward from the right and left piers so as to cast nine individual 5 m long segments in each case.

Seen from above, the bridge decks describe a straight line transitioning into a 290 m radius. The foreland zones were constructed using conventional shoring towers and carpenter-built formwork.

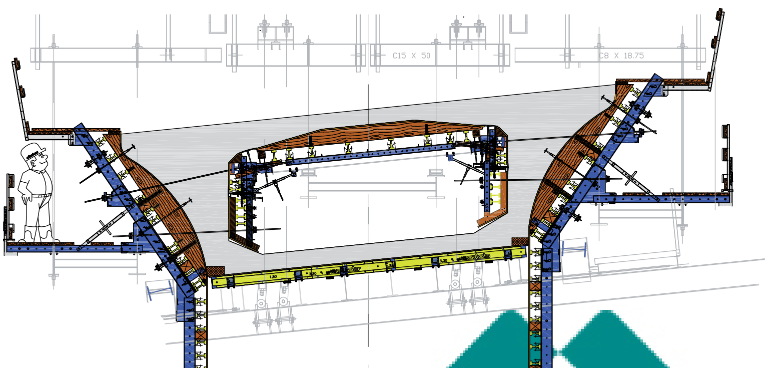
Project data
Twin single-cell box-girder bridges
San Francisco, USA

Structure data
Overall length: 275 – 296 m
Superstructure width: 8.85 m
Height of superstructure deck: 2.7 – 5.9 m
Max. casting-section length: 5 m
36 casting steps
2 piers
Max. span: 136.44 m

Extra information
3 % transverse gradient, transitioning to 10 %

Contractors
Disney Construction

Doka systems in use
Large-area formwork Top 50



Gulburnu Viaduct

Project data
Box-girder bridge
Gulburnu, Turkey

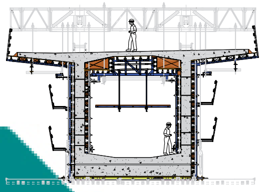
Structure data
Overall length: 2 x 330 m
Superstructure width: 13.9 m
Height of superstructure deck: 3.51 – 7.61 m
Max. casting-section length: 5 m
130 casting steps
Max. span: 145 m

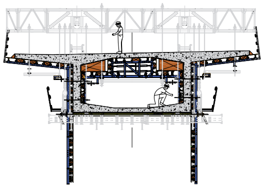
Extra information
Anchor blocks in cover slab and base slab, conical web offset, on-site element assembly with guidance from a Doka Site Demonstrator

Contractors
JV of Güris and Metis

Doka systems in use
Large-area formwork Top 50

The viaduct comprises two parallel bridge superstructures built using the balanced cantilever method. The two 3-span superstructures each have an overall length of 330 m and rest on two piers built out in a bay of the Black Sea. This bridge's 165 m main span makes it the biggest pre-stressed RC box-girder bridge in all of Turkey. The maximum height of the straight-walled single-cell box girder superstructures is 7.56 m, decreasing to 3.51 m at mid-span. The two pairs of cantilever forming travellers were fitted with Doka large-area formwork Top 50 for the maximum casting-section lengths of 5 m. In order to deal satisfactorily with the site conditions, the Doka tunnel slab traveller slides on plastic bearings instead of on damage-prone armour-plated rollers. The formwork planning had to allow for anchor blocks in the cover slab and base slab, and for a conical offset in the web from 60 cm to 45 cm in one casting section. A Doka Site Demonstrator assisted the crew with first-time assembly of the Top 50 elements.





Bridge over the River Drava in Ptuj

The challenging 430 m long, 18.7 m wide and 2.7 m high superstructure of this extradosed bridge across the River Drava in Ptuj has max. spans of 100 m. It was constructed in 5 m long casting sections using two pairs of Wito cantilever forming travellers and Large-area formwork Top 50, working outward from the pier-heads in both directions. The bridge has a radius of 460 m. A particular formwork-engineering challenge was presented by the external anchor-block boxouts of the bridge superstructure. Doka was called upon to supply all the formwork resources for this project – for the foundations, piers, pylons, foreland zone, bridge superstructure and even the bridge edge-beams.

Project data
Extradosed bridge
Ptuj, Slovenia

Structure data
Overall length: 430 m
Superstructure width: 18.16 m
Height of deck: 2.4 – 2.7 m
Max. casting-section length: 5 m
77 casting steps
4 piers, Max. span: 100 m

Extra information
External anchor-block boxouts, formwork for the foundations, piers, pylons, superstructure and bridge edge-beams

Contractors
Porr Slovenija

Doka systems in use
Large-area formwork Top 50
Supporting construction frames Universal F
Load-bearing tower Staxo

Incremental launching – reference projects

Gebergrund Bridge

Between the Dresden-Prohlis and Heidenau motorway junctions on the A17 autobahn, the 288 m long Gebergrund Bridge passes over the River Geberbach and the Kauscha Dam at a height of 35 m. The bridge superstructure was built as an incrementally launched single-cell box girder. Each of the casting sections was pre-fabricated in a sort of "field factory", in a stationary formwork assembled from Top 50 large-area formwork. This mode of construction did away with the need to use costly falsework, reduced transportation distances and needed less manpower. Each 22.5 m long section is cast directly onto the end of the section before it, and is then

given primary pre-stressing before being launched. After the entire bridge had been finally launched, the external pre-stressing was carried out. The bottom slab and sidewalls of the box girder were cast in one single pour. The cover-slab formwork was lowered and moved forward on roller brackets. 14 cycles were planned for each carriageway.

Project data
Single-cell box girder
A17 Dresden to Prague motorway, between Dresden-Prohlis and Heidenau junctions

Structure data
Overall length: 288 m
Carriageway width: 14.3 m
Height of bridge: 35 m
Cycle length: 22.5 m
14 casting sections

Extra information
Weekly cycle, no falsework needed, shorter transport distances and lower manpower requirements

Contractors
Alpine Bau Deutschland GmbH, Dresden branch

Doka systems in use
Large-area formwork Top 50


Schmidbauer KG
Schmidbauer KG

Iller River bridge at Thanners

This 254 m long bridge was built in fair-faced concrete to cross the River Iller near Thanners in SW Germany. The two superstructures took the form of single-cell box girders and were constructed using the incremental launching method. The formwork concept chosen was based on a "non-tied" solution in which the outside and inside formwork were able to be manoeuvred separately without interfering with one another. This, together with the variable compensating elements, meant that far fewer fitting-elements were needed than would usually be the case. The uplift forces which occurred were dependably transferred into the outside girderframes by Doka system components. The Heavy-duty supporting system SL-1 – originally developed for use in tunnel-building – provided the necessary stability here. The Doka concept meant that there was no need for the heavy overhead girders that would conventionally be required. The opposite inside elements were braced against one another by weight-optimised custom steel bracing struts, enabling them to be repositioned in pairs. The formwork was rounded off by the proven Doka roller-bracket system for forming the deck slab.

Project data
Incremental launching
B19, Kempten-Immenstadt
near Thanners

Structure data
Overall length: 254 m
Carriageway width: 10.95 m
Height of bridge: 27 m
Cycle length: 25 m – 33.7 m

Extra information
2 x 9 casting sections

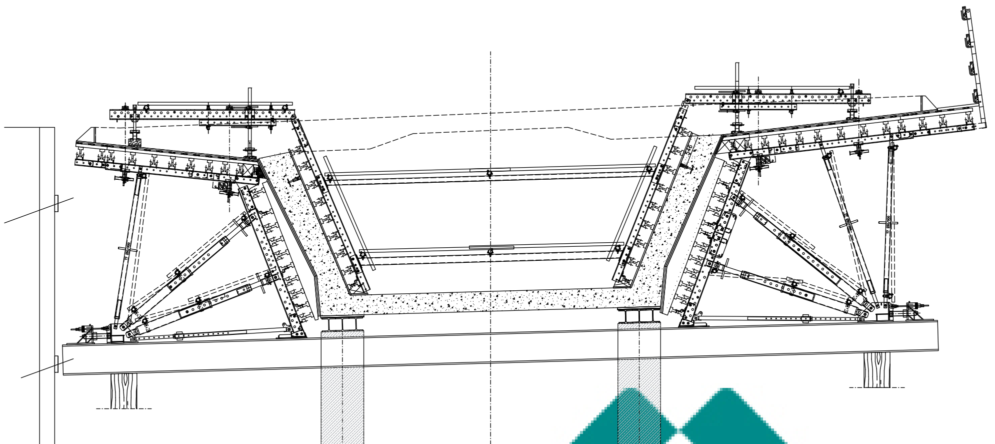
Contractors
JV of Xaver Riebel GmbH & Co, Mindelheim and Alpine Deutschland AG

Doka systems in use
Large-area formwork Top 50
Heavy-duty supporting system SL-1

Holzmattal Bridge

An approx. 404 m long pre-stressed concrete bridge was built in fair-faced concrete as part of the 4-lane widening of Germany's A98 autobahn. The new bridge superstructure was constructed as a single-cell box girder using the incremental launching method. The formwork concept chosen was based on a "non-tied" solution. The system previously used with such success for decoupling the inside and outside formwork on the Iller River bridge at Thanners was re-used here, this time with a roll-back mechanism for the outside girderframes. This facilitates forward jacking of the bridge superstructure despite the tight radius. The

deck slab was cast using specially made Top 50 cover-slab elements supported on roller brackets. After the formwork had been struck, these elements were towed over the roller bearings of the roller brackets into the next casting section, as a single unit.



Project data
Box-girder bridge
Autobahn A98 / Waidhof – Karsau / Gemarkung Inzlingen

Structure data
Overall length: 403.08 m
Carriageway width: 13.35 m
Height of bridge: 32.00 m
Cycle length: max. 26.86 m, min. 11.3 m

Extra information
17 casting sections

Contractors
JV of Max Streicher GmbH & Co. KGaA and Xaver Riebel Bauunternehmen GmbH

Doka systems in use
Large-area formwork Top 50
Heavy-duty supporting system SL-1

Composite construction – reference projects

Overpass near Lichtenfels

Project data
Composite truss frame
Kösten, Germany

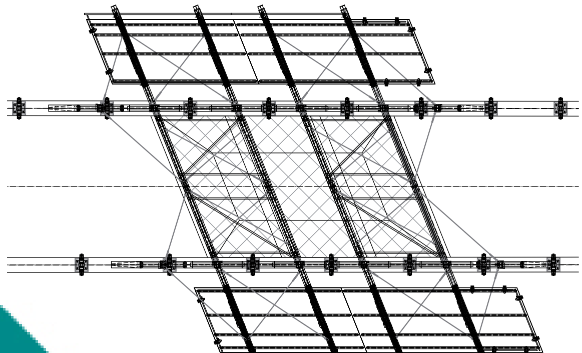
Structure data
Overall length: 110 m
Carriageway width: 10.35 m
Height of bridge: 20 m
14 casting sections

Extra information
Overslung composite forming carriage with custom height adjusters

Contractors
Raab Baugesellschaft mbH&Co.KG, Ebensfeld

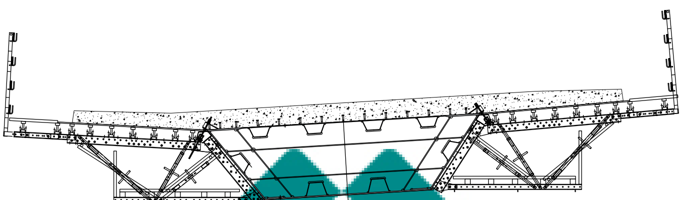
Doka systems in use
Composite forming carriage
Large-area formwork Top 50

This composite bridge with its tubular-steel truss construction is the only one of its kind in the whole of Germany. Work began on the bridge in the autumn of 2006, with construction of the foundations and abutments. In the spring of 2008, the steel truss construction was delivered to the site. The first step was for a truck-mounted crane to hoist a 40.5 m long central section of the steel construction, weighing over 108 t, onto two pairs of temporary supports. After the end segments had been mounted to this central section, the construction as a whole was welded together above the temporary supports. The top and bottom chords (tubes) of the trusses were then embedded in the abutment. The cross-members of the steel composite bridge run parallel to the motorway at an angle of 68° to the longitudinal members of the steel construction. Both the abutments and the geometry of the casting sections of the RC deck slab are aligned to the cross-members of the steel construction. The RC deck slab, with pre-cast members in the middle zones, was constructed using a 13 m long forming carriage designed with a parallelogram-shaped groundplan.



Chemnitz southern bypass

The Chemnitz “Südring” (southern bypass) is a limited-access 4-lane inner-city trunk road that currently begins at the B173 Neefe-Strasse. It was designed for an expected traffic load of 30,000 to 35,000 vehicles per day. Since the completion of rebuilding work on the B173/Südring junction in 2007, following a 3-year construction period, there is now an intersection-free stretch of the B173 that runs through a tunnel, and an intersection-free link for northbound traffic over a flyover leading to the A4 autobahn. Owing to the very tight radius and the closed trough cross-section of the structural steelwork for this flyover, a crane-dependent composite-bridge formwork assembled from Multipurpose walings SL-1 WU16 (part of the Doka heavy-duty supporting system SL-1) was used for the entire 192 m length. In order to reduce the number of suspension points on the structural steelwork, the girder units for a formwork width of 2.60 m were designed for an influence width of 3.00 m and connected to the structural steelwork by a project-specific diagonal anchor system. Also, by using rentable Dokadur panels as the form-facing it was possible to greatly lower the costs, as the formwork was commissioned in sufficient quantities for the entire length of the bridge.



Project data
Steel composite bridge
Flyover, Chemnitz southern bypass, Germany

Structure data
Overall length: 193 m
Carriageway width: 11 m
Height of bridge: 0 – 10 m
Cycle length: 193 m;
100 % formwork commissioning

Extra information
Stationary cantilever arm formwork – brackets

Contractors
Ed.Züblin AG, Chemnitz Branch

Doka systems in use
Large-area formwork Top 50
Heavy-duty supporting system SL-1 WU16
Dokadur panels

Bridge across Örekilsälven River

The approx. 1.6 m high steel superstructure, consisting of two airtight-welded, single-cell steel troughs, is 2.1 m wide at the bottom and 3 m wide at the top. The composite deck slab has a width of 24.2 m. The casting-section lengths of the 31-span bridge superstructure were 19 x 15 m in the pier zone and 12 x 16 m in the arch zone. The reinforced concrete deck slab, whose thickness varies from 0.8 m at the edge-beams to 0.27 m at the ends of the cantilevers and 0.5 m over the troughs, was constructed in the above-mentioned section lengths with the aid of two forming carriages. Each 20 m long and 27 m wide carriage was travelled across the steel superstructure via "frame-type roller-trestle bearing supports – with longitudinal connectors", so that the loads occurring during pouring (680 t in total) could be evenly distributed in the webs of the troughs.

Project data
Steel composite bridge
Saltkällan near Munkedal, Sweden

Structure data
Overall length: 477 m
Carriageway width: 15.3 m
Height of bridge: 85 m
Cycle length: 20 m
32 casting sections

Extra information
Overslung composite forming carriage

Contractors
NCC Construction Sverige AB, Gothenburg

Doka systems in use
Composite forming carriage
Large-area formwork Top 50

Vesterstraumen and Austerstraumen Bridges

Project data
Steel composite bridges
Lofoten, Norway

Structure data – Vesterstraumen
Overall length: 305 m
Cycle length: 20 m
17 casting sections

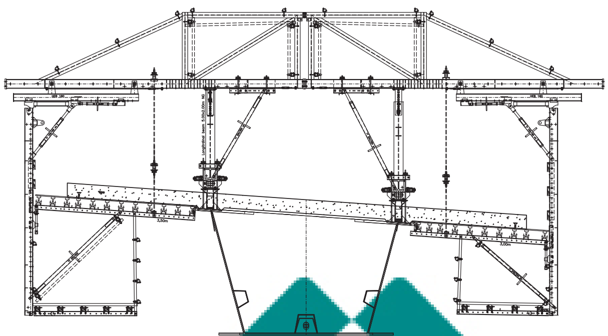
Structure data – Austerstraumen
Overall length: 196 m
Cycle length: 19 m
11 casting sections

Extra information
Overslung composite forming carriage

Contractors
MESTA AS

Doka systems in use
Composite forming carriage
Large-area formwork Top 50

The Vesterstraumen and Austerstraumen Bridges cross the Øksfjord on the Lofoten Islands in Norway. They form part of the 51 km long E10 Lofoten Mainland Connection (“Lofast”), which includes 10 tunnels and 3 bridge structures. The E10 links Å on the Lofoten Islands with Töre, near Kalix on the Baltic coast of northern Sweden. Both bridges are steel composite bridges whose steel troughs were hoisted into place in approx. 100 m long sections from pontoons moored in the fjord. The structural steelwork follows a polygonal track, and the bridges have a radius of 369 m. On 1st December 2007 the “Lofast” project, giving the Lofoten archipelago a permanent link to the mainland with no need for ferry crossings, was officially inaugurated by Norway’s Queen Sonja.



Banchina Est wharf, Portovesme

To construct the pier-heads on a new wharf being built in the harbour of Portovesme on Sardinia, the composite forming carriage was placed on the previously constructed piers, which had been anchored to the seabed. The pier-heads themselves were formed here using Doka framed formwork Framax Xlife attached to WS10 multipurpose walings on the cantilever-arms of the composite forming carriage. Working approx. 50 cm above the surface of the sea, this made it possible to cast concrete slabs onto the piers. These pier-head slabs were then joined up with pre-cast concrete components on which the cover slab of the wharf was finally poured.

Project data
Mooring wharf built as steel-composite construction
Sardinia, Italy

Structure data
Overall length: 2000 m
Carriageway width: 15.3 m
Height above water: 0.5 m
Cycle length: 5 m per pair of piers
400 casting sections

Extra information
Overslung composite forming carriage

Contractors
ASTALDI S.p.A. – Rome
MA.TRA.S.p.A. – Cagliari

Doka systems in use
Composite forming carriage
Large-area formwork Top 50
Framed formwork Framax Xlife

Bridge between Erla and Bermsgrün-Schwarzenberg

Project data
Steel composite bridge
Erla, Germany

Structure data
Overall length: 160 m
Carriageway width: 10 m

Extra information
Overslung composite forming carriage, semi-integral bridge concept, pier-heads and deck slab in one single pour

Contractors
VSTR GmbH Rodewisch

Doka systems in use
Composite forming carriage
Large-area formwork Top 50

One of the first composite bridges in Germany to be based on the semi-integral concept was built by the construction firm of VSTR GmbH Rodewisch in Erla in Saxony. This method is familiar in the building of pre-stressed concrete bridges and can also be applied to composite bridges, where it further reduces the maintenance intensity of the bridge construction. 160 m long and on average around 10 m wide, this bridge is a classic composite bridge construction with a CIP deck slab cast on longitudinal steel girders. Passing across two roads, a river and a railway line, with broadening zones on both abutments, varying centre-to-centre spacing of the structural steelwork on one abutment, and pier-heads which had to be cast in one single pour together with the respective section of the carriageway deck, this bridge was definitely not an everyday assignment. The last of these points called for a custom formwork-engineering solution. The **intelligent formwork solution** found here was to use an overslung composite forming carriage and to divide up the bridge as a whole into a typical zone between the piers, a pier zone (superstructure + pier-head in one pour) and a stationary formwork solution in the zone with varying centre-to-centre spacing.

Auenbach valley crossing

Austria's A2 "Süd-autobahn" has been widened by two extra lanes between the Bad St. Leonhard and Wolfsberg Nord junctions. This entailed the building of a new composite bridge directly alongside the existing Auenbach Viaduct. The 686 m long structure traverses the valley in an S-shaped curve. For the nine bridge piers, ranging up to 65 m in height, contractors Steiner Bau GesmbH used Doka climbing formwork MF 240. **A special formwork concept was called for by the 15 m wide bridge superstructure.** Its S-shape means that the carriageway deck had to be banked differently at the curves, necessitating changes in the transverse gradients of the superstructure. For this reason, the 27 m long Doka composite forming carriage was designed so that the haunched sections of the superstructure formwork could be telescopically adjusted in both height and gradient. Adaptation to the varying inside and outside radii of the S-curved superstructure was accomplished using pre-assembled wedge segments that were simply mounted between the longitudinal girders of the forming carriage. Following a brief induction phase, the workers were soon completely familiar with operating the composite forming carriage and were able to cast the 24.5 m long concreting sections in a weekly cycle. They even soon managed without the foreman and supervisor always being on hand, as they found that the Doka "forming machine" practically ran all on its own!

Project data
Steel composite bridge
A2 Twimberg - Wolfsberg, P30

Structure data
Overall length: 687 m
Carriageway width: 15.3 m
Height of bridge: 60 m
Cycle length: 25 m

Extra information
28 casting sections

Contractors
Steiner-Bau GmbH, St. Paul-im-Lavanttal

Doka systems in use
Composite forming carriage
Climbing formwork MF 240
Large-area formwork Top 50

Jablunkov bypass

Project data
Steel composite bridge
Jablunkov, Czech Republic

Structure data
Overall length: 432 m
Carriageway width: 16.05 – 18.8 m
Height of bridge: 15 m
Cycle length: 33 m
15 casting sections

Extra information
Underslung composite forming carriage, could be travelled on rollers and adapted to broadening zones in the bridge cross-section

Contractors
Alpine Bau, Vienna

Doka systems in use
Composite forming carriage
Large-area formwork Top 50

The Czech town of Jablunkov is in the region where the borders of the Czech Republic, Poland and Slovakia meet. Its new bypass is 5.2 km long and has seven bridges and 5 pipe culverts. One of these bridge constructions is steel composite bridge n° SO 211 – "Most Jablunkov". Because of the diagonal V struts in the inner cantilever-arm zone of the steel construction, it was decided to use an underslung composite forming carriage.

This was designed so that it could be travelled by means of suspension rollers in the longitudinal girders of the bridge, and roller supports at the bottom of the V-struts. The travelling gantry construction was adjustable by a total of 2.75 m in the transverse direction, for the broadening zone lying within the radius. Due to the diagonal V struts, the inner cantilever-arm zone was formed with Dokaflex, which had to be set up once again for every section. The inside formwork was towed on rollers in longitudinal U-girders (supported on the cross-members) provided for this purpose.

Bridge across the Haseltal valley

On this project there were two underslung pairs of forming carriages running on the outside longitudinal girders (supplied fully corrosion-protected) of the steel-composite box girder. A central hydraulic system made it possible to lower each of the 30 m long formwork units, complete with the cantilever-arm and folding formwork, by way of 6 hydraulic cylinders. In this way, 500 m² of formwork could be stripped by pressing just a single lever. This CE-marked construction was thus much more than just a temporary on-site contrivance, but a piece of sophisticated mechanical engineering.

Project data
Steel composite bridge
Suhl, Germany

Structure data
Overall length: 850 m
Carriageway width: 28.5 m
Height of bridge: 82 m
Cycle length: 28 m
36 casting sections (2 x 18)

Extra information
Underslung composite forming carriage, irregular “back-step” sequence with 4 half-carriages in a weekly cycle.
Track followed: straight / spiral transition curve / radius, incl. element pre-assembly

Contractors
DYWIDAG Bau GmbH

Doka systems in use
Composite forming carriage
Large-area formwork Top 50

Photo
Transportation project “German Unity N° 8”, new railway line between Ebensfeld and Erfurt (VDE 8.1)
Froschgrundsee Viaduct
Client: DB Netz AG. Project management: DB ProjektBau GmbH
www.vde8.de

Arched bridges – reference projects

Froschgrundsee Viaduct

Just north of Coburg in Bavaria stands one of the biggest concrete arched bridges in Germany: The viaduct across the Froschgrundsee reservoir is part of the new ICE high-speed railway line between Nuremberg and Berlin. The centrepiece of this 798 m long viaduct is its 270 m arch, which spans the waters of the Froschgrundsee at a height of 65 m. The superstructure was built as a single-cell reinforced concrete box girder using the incremental launching method. Deutsche Doka planned and supplied the formwork solutions for the piers and for the arch, which was constructed using the cantilever method. The outside formwork for the conical piers was an outsize column formwork based on Doka large-area formwork Top 50, faced as specified with tongue-and-groove boards. Because of the changes in the cross-section it was designed to be telescoped, without any fitting-elements. The two halves of the arch were constructed in 2 x 29 casting steps, using a largely rentable outside formwork consisting of Doka large-area formwork Top 50 on Wito cantilever forming travellers. The inside formwork is a frame construction assembled from SL1 system beams and Large-area formwork Top 50. Heavy-duty SL1 spindle struts with a quick-motion adjusting range allow the formwork to be telescoped very quickly.

Project data
Piers, arch
Coburg, Germany

Structure data
Length: 798 m
Width: 14.3 m
Height: max. 65 m
Arch span: 270 m

Extra information
Tongue-and-groove board finish on all concrete faces

Contractors
Adam Hörnig
Baugesellschaft GmbH & Co., Aschaffenburg

Doka systems in use
Large-area formwork Top 50
Climbing formwork MF 240
Heavy-duty supporting system SL-1

Photo
Transportation project “German Unity N° 8”, new railway line between Ebensfeld and Erfurt (VDE 8.1)
Froschgrundsee Viaduct
Client: DB Netz AG. Project management: DB ProjektBau GmbH
www.vde8.de

Bridge across the Seidewitztal valley

The whole length of Germany's new A17 autobahn crosses sensitive areas of unspoiled nature which the European Habitats Directive places under special protection. To minimise the impact on these ecologically valuable areas, especially in valleys, bridges such as the technically challenging 568 m long Seidewitztal Bridge between the Pirna and Bahretal junctions have been built as arched bridges. This bridge is divided into 9 spans with the following support centres: 43 m, 4 x 55 m, 154 m, 2 x 54 m, 43 m. The carriageways run on 2 separate composite carriageway decks with suitably separated substructures. The dominant design feature – and major engineering challenge – was the 154 m span of the arch, with a clear height of around 55 m at its apex. This arch was cast with a massive solid cross-section using the back-stayed cantilevering method. The special feature of the concept for casting the arch was that when work progressed according to plan, it was not necessary to retension the back-stay and tie-back cables. Any deformations resulting from the varying construction states of the arch, from temperature influences from the concrete of the arch and the cables, and from the cantilever forming travellers, were anticipated in the planning of the arch-casting cycles and in the calculation of the pre-tensioning forces needed for the cables. Also, the planning of each new cantilevering cycle was based on the respective target height of the arch in its final state, rather than on the co-ordinates obtained in the previous casting sections. The formwork solution supplied by Doka was 2 Austrian-made Wito arch forming carriages that had been technically adapted to this bridge structure. These coped brilliantly with a constant arch width of 6.5 m from the abutments up to the apex of the arch, and an arch height which tapered by 2.3 m at the abutments to 1.6 m at the apex.

Project data
Arched bridge
Pirna / Bahretal, Germany

Structure data
Overall length: 568 m
Span: 154 m
Height of arch apex: 55 m
Arch cycle length: 6 m
Springers: 7 m, 2 x 15 casting sections plus closing cycle

Extra information
Main steel girders of bridge superstructure incrementally launched; deck slab cast using Doka composite forming carriage

Contractors
Ed. Züblin AG (Deutschland)

Doka systems in use
Composite forming carriage
Large-area formwork Top 50
Climbing formwork MF 240

Bridge over the Rio Almonte

Spain's new "Autovía de la plata" crosses the Rio Almonte, a tributary of the River Tagus, between Hinojal and Cáceres. This approx. 21 km long section of motorway was built for the Spanish government in the region of Extremadura. The name "Autovía de la plata" – "silver highway" – is a reminder of the old Roman road which ran across the western part of the Iberian peninsula. The Rio Almonte is a relatively small river but has been dammed in this region to create a reservoir. This called for a very large bridge structure that also incorporates approach viaducts. The overall length, from abut-

ment to abutment, is 432 m; both arched bridges have a 184 m span. Doka worked closely with contractors Necso S.A. to develop a functional forming-carriage concept for the arches, each rising 47 m above the abutments. The resulting forming carriages had an extremely lightweight design, and – depending on the desired workflow – they even made it possible to pour the entire cross-section. Due to time constraints, pouring was carried out from both banks. In total, each half of the arch involved 17 casting sections, each of them 5.85 m long. A weekly cycle was stipulated for each casting section, including advancing the forming carriage, adjusting the formwork, placing the rebar, and pouring. Every 3rd section had to be tied back over the hollow piers by temporary post-tensioned cables. After every 5th pouring cycle, steel girders were used. The Necso team were particularly pleased with the low weight of the Doka arch forming carriage and by its cost-saving design, based primarily upon rentable system components and tried-and-tested SKE automatic climbing technology. Another plus-point was the great adaptability of the forming carriage – the arch cross-section tapered from 3 m to 1.8 m.

Project data
Arched bridge
Cáceres, Spain

Structure data
Overall length: 432 m
Span: 184 m
Height of arch apex: 47 m
Arch cycle length: 5.85 m
34 casting sections

Extra information
2 arched bridges (1 for each direction of travel) with pier-supported carriageway decks

Contractors
Necso S.A.

Doka systems in use
Large-area formwork Top 50
Climbing formwork MF 240

Svinesund Bridge

New link between Sweden and Norway

The superstructure consists of two steel hollow-box girders, suspended from the arch on both sides so as to run past it on either side at a height of 60 m above the fjord. This leaves overall clearance of 55 m x 70 m for shipping.

On the Swedish bank, four piers are needed for the foreland bridge, and one on the Norwegian side. The bridge arch has a constant radius of 1150 m and a span of exactly 247.3 m, and reaches an apex of 91.7 m. Its box-girder cross-section tapers from 6.3 m x 4.25 m to 4.0 m x 2.7 m.

The forming carriages needed for this project were a completely new development. Says Andreas Puchner, Technical Manager of Doka's Nuremberg Branch, about this contract: "Because the architects did not want any guidepieces or safety anchorages for a forming carriage on the upside of the arch, our team had to come up with a concept for a carriage that travels along the underside of the arch only. With this special construction, Bilfinger Berger wanted to eliminate any obstacles to smooth carriage travel right from the outset, and to fulfil the exacting specifications made in respect of the concrete surface. The three-month delivery deadline was a very tight one, but we still managed to keep to it. The carriage construction is designed for casting 5.50 m long segments of arch. Owing to the continually tapering shape of the arch, we needed a continuously adjustable outside formwork made up of Top 50 elements. The forming carriages are hydraulically liftable, lowerable and angle-adjustable, and are advanced using our tried-and-tested SKE 100 automatic climbing technology."

Another advantage of the forming-carriage construction was that the "springer" – the first cycle at the foundation of the arch abutment – could be poured directly. Usually, the springer has to be formed and poured using a separate scaffold before the forming carriage can be suspended from it. This special feature of the construction brought about an appreciable reduction in the total expenditure on formwork and scaffolding.

Safety was assured, too, with suitably protected working platforms integrated in the formwork and facilitating preparations for pouring. The arch was cast in high-strength concrete – a "K 70" according to the Swedish Standard, corresponding to a B 75 as defined by the German Standard. The

teams took an average of only five days per cycle.

The special design of the Doka arch-forming carriage permitted unhindered concrete delivery by cableway crane.

The bottom sections of the arch are inclined by 54°. The concrete was placed via the bulkhead formwork here. Later, i.e. further up the arch, this was done from above. In total, 25 pouring cycles were needed on each side, plus a final gap-closing cycle. The 90.0 m tall working pylons, with their rectangular cross-section of 6.0 m x 2.0 m, were erected using Doka Framax Xlife framed formwork in conjunction with MF 240 climbing scaffolds. The two abutments of the approach viaducts are constructed in reinforced concrete, as are the five piers with a groundplan of 7.9 x 2.9 m. These were raised as hollow piers using Doka climbing formwork MF 240. Their heights range from 10.6 m to 47.0 m.

The architects insisted on a consistent form-tie and joint pattern throughout. With Doka Top 50 elements and middle fitting-elements, achieving this was no problem.

Project data
Arched bridge
Svinesund, border of Sweden and Norway

Structure data
Overall length: 704 m
Span: 247.3 m
Height of arch apex: 91.7 m
Arch cycle length: 5.5 m
51 casting sections

Extra information
Steel superstructure welded together from prefabricated segments

Contractors
Bilfinger Berger AG, Germany

Doka systems in use
Large-area formwork Top 50
Climbing formwork MF 240

Bridge near Krka

This is a visually impressive structure, not just because of its dimensions but also because of its pleasing form, which blends harmoniously into the landscape. The approx. 22 m wide superstructure is 390 m long and was built as a steel-composite bridge deck with pre-cast carriageway slabs. The piers and the over 204 m long arch were constructed in CIP concrete. For the double piers in the foreland zone, the contractors used four sets of Doka climbing formwork MF 240 – benefiting once again from a modular system that had already done sterling service on other projects. An important consideration influencing the decision was to ensure ample workspace for the forming and reinforcement-placing operations, and complete safety for the site crew in all phases of the work. Two pairs of piers (with heights of up to 56 m) were "climbed" at the same time, in 5 m high casting sections. Yet again, Doka large-area formwork Top 50 gave a convincing demonstration of its huge adaptability, this time to three different cross-sections of pier. Top 50 elements – in conjunction with the Load-bearing tower d2 for the inside formwork – ensured that work progressed swiftly, also on the bridge arch itself. The arch, with its cross-section of 10 x 3 m, was built in sections of 5.2 m at a time, using the cantilever method. The growing halves of the arch were each suspended, a section at a time, by cables passing across the shore piers. In the final phase, two temporary shore piers carried out this function.
On this project, contractors Konstruktor (Split Branch) mostly used their own Doka equipment, as used by them on various previous projects.

Project data
Arched bridge
Krka, Croatia

Structure data
Overall length: 390 m
Span: 294 m
Height of arch apex: 50 m
Arch cycle length: 5.2 m

Extra information
Pre-cast carriageway slabs

Contractors
Konstruktor, Split Branch

Doka systems in use
Large-area formwork Top 50
Load-bearing tower d2
Climbing formwork MF 240

Bridge edge-beams – reference projects

Bibert Bridge, Zirndorf

Project data
Double-webbed T-beam
Zirndorf, Germany

Structure data
15 casting sections
Weight per wagon: 10.75 t
Weight: 0.67 t/m

Extra information
Despite cold winter temperatures, the 2 Forming wagons TU finished the 460 m of cantilevered parapets in only 3 months.

Contractors
Max Bögl Bauservice GmbH & Co. KG

Doka systems in use
Forming wagon TU
Large-area formwork Top 50

On the Bibert Bridge, it was mainly the alternating curves, with their tight 250 m radii, that gave a welcome challenge to the two Forming wagons TU deployed on this site. They enabled the rounded cantilevered parapets to be cast in flawless fair-faced concrete quality: The formwork stripping operation is accomplished by a combined horizontal and vertical movement. This makes the formwork move straight off the concrete, lessening wear-and-tear on the form-facing and increasing the number of re-use cycles.

Dorfbachtal Bridge

The Dorfbachtal Bridge II was built right next to the Dorfbachtal Bridge I. A Doka forming wagon TU was used to cast the median parapet, only 10 cm away from the existing structure. The outer parapet of the new bridge superstructure was cast using a second Doka forming wagon TU. This showed just how well the innovative suspension shoe of the Forming wagon TU can cope with different types of embedded components: three different non-Doka products had been embedded when the deck slab was first cast, and after they had been tested for sufficient capacity and durability it was possible to use them all as suspension points for the Forming wagon TU.

Project data
Girder bridge, box girder
Rheinfelden, Germany

Structure data
Overall length: 309.6 m
Height of bridge: 50 m
Cycle length of cantilevered parapets: 21 m
15 casting sections

Extra information
1-week cycle

Contractors
Bilfinger Berger Freiburg GmbH
Max Früh GmbH & Co. KG

Doka systems in use
Forming wagon TU
Large-area formwork Top 50


DYWIDAG

Hochbrücke Freimann motorway overpass

A 586 m long overpass is being rebuilt in Munich's northern suburbs to carry the 4-lane A9 Nuremberg-Munich motorway across two multi-lane ring-roads and several railway lines. The Doka forming wagon TU was used to cast the outer cantilevered parapets in the typical zone of this new structure. At 0.7 m high and 0.8 m wide, these parapets have relatively large dimensions. Also, only a limited vehicle clearance profile was available. This necessitated a low-floor design of forming wagon, yet with sufficient loading capacity. Dywidag coupled together six 4 m long Doka forming wagons TU from its own equipment park, enabling it to cast section lengths of up to 23.5 m. The 42 m² of rented Top 50 formwork elements for the parapet formwork were planned by the Doka Composite Bridge Expertise Centre. The resulting 24 m long forming wagon runs with its integrated Guide rail TU 4.00m on the roller supports of the Positioning unit TU on the underside of the superstructure. The Positioning units TU are suspended from the Capped support shoes TU, spaced 1 m apart in the longitudinal. A universally adjustable quick-attachment facility, using claws, makes it easier to mount the Positioning units TU and Capped support shoes TU. The Capped support shoes TU and Positioning units TU can be fixed to the superstructure from the positioning platform while the Forming wagon TU is being advanced. To speed up the construction workflow still further, the Dywidag crew mounted the suspension points from a mobile elevating work platform.

Project data
Pre-stressed concrete beam
Munich, Germany

Structure data
Overall length: 586 m
Height of bridge: 13.5 m
Parapet width: 0.7 m
Parapet height: 0.8 m
Cycle length of cantilevered parapets: 23.5 m
Approx. 50 sections

Extra information
Casting took place twice a week

Contractors
Dywidag Bau GmbH, Nuremberg

Doka systems in use
Forming wagon TU
Large-area formwork Top 50

Reference list

This reference list contains a selection of the many bridge projects that have been successfully completed using Doka systems.

2nd Liffey Valley Bridge	Ireland
4th Street Bridge over Arkansas River	USA
A2 – contract section P19, Lavant Viaduct	Austria
A2 / M2 New Medway Bridge	England
A8 Traun Bridge, contract section 1 Wels I122	Austria
Auenbach valley crossing	Austria
Austerstraumen Bridge	Norway
Banchina Est wharf, Portovesme	Italy
Bibert Bridge, Zirndorf	Germany
Bjørsefoss Bridge	Norway
Böbertal valley bridge	Germany
Bommestad Bridge	Norway
Bridge across Lauvsneselva River	Norway
Bridge across Örekilsälven River	Sweden
Bridge across River Drau at Lippitzbach	Austria
Bridge across River Drau in Villach	Austria
Bridge between Erla and	

Bermsgrün-Schwarzenberg	Germany
Bridge in Bad Lausick	Germany
Bridge in Dubrovnik	Croatia
Bridge in Volos	Greece
Bridge near Szekszárd	Hungary
Bridge on Enns by-pass, Austria	Austria
Bridge on VÄG 40 Brämhult - Rangedala	Sweden
Bridge over R. Elbe at Mühlberg	Germany
Bridge over R. Havel in Plauen	Germany
Bridge over R.Main at Dettelbach	Germany
Bridge over R.Main at Gossmannsdorf	Germany
Bridge over R.Main at Randersacker	Germany
Bridge over R.Mur at Thalheim	Austria
Bridge over R.Neckar, Mannheim	Germany
Bridge over R.Saale at Bad Dürrenberg	Germany
Bridge over R.Wupper at Dahlerau	Germany
Bridge over River Drava in Ptuj	Slovenia
Can Tho Bridge	Vietnam

Central Expressway – Section 11	Korea
Chemnitz southern bypass, B173/Südring junction	Germany
Cheongpung Bridge	Korea
Črni Kal Viaduct	Slovenia
Dambach Viaduct	Germany
Danube bridge at Traismauer	Austria
Deviation d'Embrun	France
Devil's Slide Bridge	USA
Dorfbachtal Bridge	Germany
Dultenaugraben viaduct	Germany
Egnatia Odos-Metsovo to Panagia	Greece
Enlace de la Peña interchange, structure 2	Spain
Enlace de la Peña interchange, structure 3	Spain
Farø-Falster Bridge	Denmark
Fjeset Bridge	Norway
Flyover near Lichtenfels	Germany
Footbridge in Madrid – Pasarela Peatonal, A-1	Spain
Friedrich Ebert Bridge, Mannheim	Germany
Frontier bridge, Frankfurt a.d. Oder	Germany
Gjemnessundet Bridge	Norway
Grünhübl Bridge	Austria
Gulburnu Viaduct	Turkey
Hartlsgraben Bridge	Austria
Haseltal valley bridge	Germany
Haseltal Viaduct	Germany
Hochbrücke Freimann m'way overpass	Germany
Holzmattal Bridge, south deck	Germany
Hoover Dam Bypass	USA
Hyttfoss Bridge	Norway
I-280 Bridge over the Maumee River	USA
Jablunkov bypass, bridge SO 204	Czech Republic
Jablunkov bypass, bridge SO 205	Czech Republic
Jablunkov bypass, bridge SO 211	Czech Republic
Jamarat Bridge	Saudi Arabia
Kanawha River Bridge	USA
Kanetsu Highway	Japan
Kollerbach Bridge	Austria
Köröshegy Viaduct	Hungary
Kuko Ohashi Hiroshime Bridge	Japan
Kveøy Bridge	Norway
Lichterfelder Wassertor bridge	Germany
Linesøy Bridge	Norway
Litjsund Bridge	Norway
Lüchow bypass	Germany
M43 – bridge over River Tisza	Hungary
Montan Terminal, Kapfenberg	Austria
Morbegno – Lotto 1	Italy
Müglitztal Bridge over A17	Germany
Mühlenberg Bridge	Germany
Nanclares Bridge, N2	Spain
Nessetal valley bridge	Germany
New Nibelungen Bridge	Germany
Passeo River Pylon	USA
Peracica Viaduct	Slovenia
Pilas Viaducto Cándalo	Spain
Pleissenbachtal valley bridge	Germany
Pomeroy-Mason Bridge	USA
Pont de Normandie	France
Pont Roda de Ter	Spain
Pont sur la Mentue	Switzerland
Pont sur L'Elorn	France
Ponte Strembo bridge	Italy
Pöpelholz Viaduct	Germany
Prosmyky Bridge over R. Elbe	Czech Republic
Puente Simancas	Spain
Pylon in Kampen	Netherlands
Pylon in Takashima	Japan
Railway bridge – Ulm northern tangent	Germany
Railway bridge over River Salzach Thaxam – Salzburg Main Station	Austria
Railway bridge over the Sado	Portugal
Reichenbachtal Bridge	Germany
Renovation of bridge BW 3091 on A7	Germany
Renovation of Naab Bridge	Germany
Renovation of Schönefeld Bridge	Germany
Rheinfelden bridge	Germany
Rhine Bridge at Wesel	Germany
River Bode bridge	Germany
River Suir Bridge	Ireland
Rongesundet Bridge	Norway
Run Jiang Bridge	China
Scherkondetal Bridge	Germany
Schwentine Bridge	Germany
Seidewitztal valley bridge	Germany
Senftenberg bypass, structure 7	Germany
Shenzhen Western Corridor Project	China
Shin Maruyama Bridge	Japan
Shin Tanyang Bridge	Korea
SO 206 bridge over River Vltava	Czech Republic
Southern Ring Road, Bangkok	Thailand
St. Amaro bridge São Paulo	Brazil
Sutong Bridge piers	China
Sutong Chang-Jiang Bridge	China
Thyratal Bridge	Germany
Twin pylons in Zaporozhye	Ukraine
Ulsberg Bridge	Norway
Unstruttal Bridge	Germany
Verona Bridge	USA
Vesterbukta Bridge	Norway
Vesterstraumen Bridge	Norway
Viaduc de Dunkerque	France
Viaduc de Verrières	France
Viaduct VD7, Piste Rodovia	Brazil
Viaducto 5	Spain
Viaducto de Teror	Spain
Wadi Leban cable-stayed bridge	Saudi Arabia
Wolfsberg Viaduct	Austria
Wolfsgraben Viaduct	Austria
Yang Lou Bridge / Pylon North	China
Yang Lou Bridge / Pylon South	China
Yu-Zui Bridge Pylon Project	China

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