

Doka Xpress

The Formwork Magazine

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**High-performing
formwork solution**

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doka
The Formwork Experts

Editorial



Dear readers;

Doka has had a presence in Asia for several years now, with its own branch operations and a comprehensive range of service offerings. Last year, we went a step further and established a foothold on a brand-new continent, by setting up Doka Australia. What this expansion of our distribution structures means for you is that we have moved even closer to our customers – as underlined by the relocation of our entire Regional Management team to Singapore:

To be able to give you faster, better and more direct support with your projects, I moved my Regional Headquarters to Singapore at the beginning of this year. By being in closer contact, and with shorter decision-making channels, my team and I can cater to your needs even more effectively and thus develop the very best solutions for you. Being a strong link between HQ and the country organisations means that we can liaise directly with the Group's central departments in Austria, for example to speed up the development of new products and services tailored to your particular needs. I look forward to working with you even more closely and wish you every success with all your construction projects!

Yours sincerely,
Gerold Heinrich
Regional Manager
East Asia & Pacific

Doka News

▼ **Bridge-building in record time**

A 26 km long 4-lane motorway, the M51, is being built to link Kliplev and Sønderborg in southern Jutland, around 15 km away from the border between Denmark and Germany. This PPP project also involves the building of 72 bridges and crossings – 11 overbridges, 30 underbridges and 31 smaller culverts. Only Doka formwork is being used for all the concreting works – e.g. 9000 m² of the extremely adaptable Large-area formwork Top 50, and more than 4750 basic frames of the heavy-duty Load-bearing tower Staxo 100 system. Around 725 m² of Framed formwork Framax Xlife had to be transported to the site for forming the foundations and smaller culverts. At the same time, work began in the Doka Ready-to-Use Service on assembling the Large-area formwork Top 50.



▲ **Landmark project won**

Doka India has won another landmark, the super-highrise Lokhandwala Minerva building in Mumbai. Looming out of a 12-storey parking podium, the skyscraper will top out at 300 m and feature 82 storeys in two separate towers. Named the 'Minerva' after the Roman goddess of wisdom, the design for the tower comes from Hafeez Contractors, and bears a similarity to an oversized letter 'M'. The tower will be for residential use only and aims to be one of the most luxurious addresses in Mumbai. For the core walls, automatic climbing formwork SKE50 and SKE100 will be in use. In order to guarantee an optimal construction workflow, each core will be split into two individual working zones.

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Lotte World Tower



Bridge over the River Mureş



Panama canal

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◀ Special suspension shoes adapted the Protection screen Xclimb 60 to the curved slabs.

The facts

JOB SITE Boulevard Vue

LOCATION Singapore

CUSTOMER China Construction (South Pacific)

NUMBER OF STOREYS 28

CONSTRUCTION TIME 20 months

USE Luxury residential building

PRODUCTS IN USE

Protection screen Xclimb 60, Dokaflex 1-2-4, Load-bearing tower Staxo 40

High-end formwork for deluxe apartments

The 28-storey 'Boulevard Vue' development in Singapore comprises luxury condominiums which are being built by the contractor China Construction (South Pacific). Doka Singapore planned and delivered a high-performing formwork solution.


Each storey of the project features one complete 418 m² luxury apartment. Two duplex penthouses, each of 1000 m², occupy the top four levels. From the formwork-engineering point of view, the high-raised, unusually shaped beam slabs with staircase & lift-core walls were the major challenge on this site. The developer of this high-end condominium wanted a safe, top-quality system and so opted for a formwork solution from Doka.

Flexible hand-set formwork

Doka Singapore planned and delivered the fast, versatile hand-set formwork system Dokaflex 1-2-4 for the unusual shaped concrete slabs. A highly ergo-

nomous shoring system was required for the building edges, and so Doka supplied its Load-bearing tower Staxo 40.

Highly effective edge-protection

To give maximum protection to the site crew operating the slab formwork, Doka proposed its Protection screen Xclimb 60. The full-area enclosure around the uppermost levels of the building enables all work to be carried out in complete safety, protected from all climatic influences. A challenge Doka had to meet was the unusual shape of the slabs, with many curves. The solution was found in specially designed suspension shoes for the Protection screen Xclimb 60. 

The solution!

The hydraulically climbed Protection screen Xclimb 60 protects the site crew that is operating the hand-set Dokaflex 1-2-4 slab formwork. In order to adapt it to the curved slab, special suspension shoes were developed. The ergonomic Load-bearing tower Staxo 40 is in use at the building edges.

Du Ti Ping,
Senior Project Manager

The professional

“Doka’s formwork systems greatly improved both our productivity and also the sustainable construction environment. They were safe and easy to handle. This is definitely the right way to deal with a market situation where labour is tight. That’s what I call ‘smart building!’”

Interview:

New Highrise Centre concentrates expertise

► Michael Eder, Doka's Engineering Manager for the East Asia & Pacific Region, talks about a new dimension of customer care.



▼ To convince the Lotte World Tower clients at first hand of the feasibility of this revolutionary protection screen, Doka set up several segments in a fully functional life-size display.



Doka's recently created Highrise Centre in Singapore brings together and focuses its automatic-climbing capabilities in the East Asia & Pacific Region. The Doka Highrise Centre in Singapore is headed up by the Engineering Manager for the East Asia & Pacific Region, Michael Eder, who talks here about this new dimension of customer care:

What was behind the decision to set up the Highrise Centre in Singapore?

The building-construction sector in the Far East is one of the fastest growing markets anywhere in the world. On super-skyscrapers, with their complex structure geometry, 'normal' applications technology quickly reaches its limits. Here, experienced climbing-

technology specialists are on hand to support construction firms throughout Asia with powerful, dependable formwork solutions. Our experts are also completely familiar with the diverse construction methods commonly used in each of these markets, and provide the input needed for developing market-specific formwork systems.



▲ In order to optimally integrate the climbing cycles into the overall construction workflow, Doka also offers the services of a project manager.

◀ The first casting segments of the 555 m tall Lotte World Tower have been successfully completed.


What, specifically, does this support entail?

To achieve a smooth construction workflow, it is not enough to look at the formwork solution in isolation. Because the climbing cycles dictate the pace of so many other operations on buildings of this size, it is essential to optimally integrate them into the overall construction workflow.

When is the best time to place the reinforcement? When can pouring be carried out with the least possible disturbance? What time-windows are available for work on the facade to take place in?

These and many other questions will be answered for you by the same professionals who helped plan the construction sequence for the world's tallest building.

What project is the Doka Highrise Centre working on at the moment?

A truly superlative project which will one day be the tallest building in the Far East: the Lotte World Tower will top out at 555 m and stands out for its constantly varying structure-geometry. As well as the self-climbing formwork solution for the complex core and the 'mega-columns' running up the outside of the structure, Doka has also developed a completely new protection screen that adapts to the tapering shape of the building without needing any modifications. To convince our clients at first hand of the feasibility of this revolutionary system, we invited the decision-makers to our headquarters in Austria, where we had set up several segments of this foldable, 20 m high protection screen in a fully functional life-size display. 



*Michael Eder,
Doka Engineering
Manager for East
Asia & Pacific*

The professional

“It is important here to do more than just minimising the actual workplace risk, but also to make the crew feel as if they were working ‘on the ground floor’. Knowing the differing local construction methods and requirements as well as we do, we always succeed in selecting the most economical combination of formwork systems.”

Towering over southern Mumbai, the Sky Tower is one of the most prestigious projects being worked on by developer Indiabulls.



Reaching for the sky

With nowhere to grow but ‘up’, densely populated South Mumbai is increasingly studded with skyscrapers. One of them is the Sky Tower, currently being built by renowned contractor Indiabulls. Doka India has supplied an Automatic climbing platform SCP for the central core walls and shear walls.


Situated in a world-class financial district, the Sky project is a branded luxury residential development on approximately 20 acres of prime real-estate in downtown Mumbai. The approximately 750,000 m² project is master-planned to creatively integrate the existing office development with luxury residential towers, making them some of the most iconic and visually arresting structures in the city.

The Sky Tower is 257 m tall, with 2 basement levels, 11 parking floors, 2 clubs, 2 transfer floors and 41 residential/refuge/service floors. The main structural form consists of a reinforced-concrete peripheral frame and shear walls with central core walls. The tower is being built with two transfer floors due to the different layouts of the parking and residential floors. Outrigger beams and walls have been provided at refuge levels, to connect the outer frame and central core and improve the lateral stiffness. The core and staircase walls are 600 mm thick. The core walls are typically linked by a series of six 900 - 1300 mm deep RC link-beams. The link-beam width typically matches the thickness of the adjacent core wall. The dense, heavy reinforcement does not allow the use of normal concrete, hence the use of self-compacting concrete (SCC) here.

Space constraints overcome

Neighbouring residential towers and functioning office premises pose constraints on the working hours, logistics and scheduling of construction activities. Moreover, the space constraints and the need to ensure safety at great heights were also major issues. Doka India therefore proposed fielding the Self-climbing platform SCP to reduce the construction time by taking

the core-construction out of the critical path. Based on the core geometry and predetermined construction sequence, the compact platform achieves a weekly cycle per floor and provides sufficient space to stack material on the platform. Indiabulls also benefits from the assurance and reliability, maximum safety, time-efficiency of fast assembly, and full round-the-clock technical support from engineering staff. The formwork inside the platform comprises 480 m² of Framax Xlife panels, which stand out for their high number of re-use cycles and the smooth concrete surfaces they deliver.

The site crew is very enthusiastic about the safe SCP platform, which makes life much easier for them by eliminating the fear of heights and protecting both people and objects from any risk of falls. With the platform, the complete core zone climbs ahead of the following storey floors. ‘De-linking’ the various structure components in this way speeds up work and improves productivity. 

The facts

JOBSITE	Sky Tower
LOCATION	Mumbai, India
CUSTOMER	Indiabulls
BUILDING HEIGHT	257 m
NUMBER OF STOREYS	58
CONSTRUCTION TIME	48 months
USE	Luxury residential building
PRODUCTS IN USE	Platform SCP, Framed formwork Framax Xlife

The solution!

To assure fast, safe construction progress and to overcome space constraints, Doka India provided an automatic climbing solution consisting of the Platform SCP and Framax Xlife panels. The platform provides a safe working environment and allows equipment and the concrete placing boom to be lifted together with no need for a crane.

▼ **A great place to work: Doka's self-climbing platform SCP gives all-round protection, providing a safe working environment and efficient formwork operations.**





▲ An automatic climbing formwork solution from Doka was used by lead contractor Mostovik to erect a 320-metre A-shaped suspension tower in Vladivostok.

World's tallest A-shaped pylon

In Vladivostok a four-lane motorway bridge is being erected to link Russky Island to the mainland. Doka delivered a self-climbing formwork solution for the world's tallest A-shaped tower.

The facts

JOBSITE Pylon Vladivostok

LOCATION Vladivostok, Russia

CUSTOMER Mostovik

BUILDING HEIGHT 320 m

USE Bridge link between Russky Island and Vladivostok

PRODUCTS IN USE
Automatic climbing formwork
SKE, Top 50 beam formwork

Russky Island will host a summit meeting of the Asia-Pacific Economic Forum (APEC) in September this year. With a suspension tower height of 320 m (20 m taller than the Eiffel Tower's steel construction) and a free span of 1104 m, the bridge link breaks

two world records at once. Construction company Mostovik is responsible for on-time completion of the mainland tower. In order to have the world's tallest A-shaped suspension tower completed on time by the beginning of 2012, Mostovik decided to go for

a high-performing reliable formwork solution from Doka. The decision was leveraged primarily by the experience that Doka had amassed on the building of the 306 m A-shaped suspension towers of the Sutong Bridge in China.


On the Vladivostok project, however, it was not just the geometry of the structure that challenged the formwork planning to the utmost. The extremes of this geographic location, with frequent stormy weather and bitter cold in the winter months, were a major influencing factor on this build. Right from the start, Mostovik specified that compliance with a closely regulated and rapid timeline for progress on this build would take top priority. Doka planned a self-climbing formwork solution with 650 m² of made-to-measure Top 50 beam formwork.

The finely jointed and highly adaptable SKE50 automatic climbing formwork was ideal inside the tower legs, where space was at a premium, while SKE100 with its high load-carrying capability was used for climbing the outside walls. Rated at 10 tonnes lifting capacity per bracket, it was ideally dimensioned

for craneless lifting of the beam formwork assemblies and seven different platform levels.

Forming regardless of adverse weather kept the build on time

The climbing falsework was anchored to the structure at all times, so craneless, safe lifting of the formwork and platforms could proceed in virtually any weather. Extremely strict specifications for achieving optimum-strength concrete necessitated yet another formwork-engineering innovation.

The CIP concrete had to set for four days in the closed formwork before stripping out could commence. To ensure high-quality concrete placement even at extremely low temperatures, Doka enclosed all seven platform levels inside a robust scaffolding tarpaulin and built a roof consisting of seven sections. The workplace was fully enclosed inside this structure and could be heated in winter. When ambient temperatures rose and when reinforcing bars had to be manoeuvred into position, the individual sections of the roof slid one above the other on rollers. 

The solution !

Doka planned a self-climbing formwork solution with 650 m² of made-to-measure Top 50 beam formwork. The finely jointed and highly adaptable SKE50 automatic climbing formwork was ideal inside the tower legs, where space was at a premium, and SKE100 with its high load-carrying capability was used for climbing the outside walls. To ensure high-quality concrete placement even at extremely low temperatures, Doka enclosed all seven platform levels inside a robust scaffolding tarpaulin and built a roof consisting of seven sections.



◀ To ensure high-quality concrete placement even at extremely low temperatures, Doka enclosed all seven platform levels inside a robust scaffolding tarpaulin and built a roof consisting of seven sections.

► Four Doka cantilever forming travellers kept work moving ahead swiftly on the Mureş Bridge, with cycle times of only one week.

The facts

JOBSITE

Bridge over the River Mureş

LOCATION Arad, Romania

CUSTOMER Contracting consortium of Porr Bau GmbH and FCC Construction S.A.

USE Motorway bridge

PRODUCTS IN USE

Doka cantilever forming traveller, Load-bearing tower Staxo 100, Large-area formwork Top 50



Modular solution for extreme cross-sections

▼ The sizeable cross-sectional width of 27.5 m made it necessary to provide the cross-beams of the bottom grid with a standardised undertruss.



On a motorway bridge being built over the River Mureş, four Doka cantilever forming travellers and the Large-area formwork Top 50 and Load-bearing tower Staxo 100 systems together ensured smooth construction progress. Doka delivered a custom-tailored formwork solution.

In western Romania, the National Motorway Company CNADNR is building a 12.5 km long stretch of the country's A1 motorway close to the city

of Arad. This 'Arad Bypass' project crosses the River Mureş on a new bridge with an overall length of approx. 430 m and a main span of 150 m.




The solution !

For the balanced cantilever method, Doka has developed an optimum system with integrated formwork. The first factor that decided the issue for the contracting firms was the Doka cantilever forming traveller's modular design concept. This makes it possible to accommodate even unusual superstructure cross-sections using standard components. The second aspect was the formwork solution, which scored for permitting high-speed working with cycle times of just under one week per segment.

The contracting consortium of Porr Bau GmbH and FCC Construction S.A. decided to work with the Doka Formwork Experts on this technically challenging bridge-building project, as the 150 m long main span was to be constructed using the balanced cantilever method. The 305 m long cantilevered stretch of motorway across the River Mureş was constructed as a twin-cell box-girder bridge with vertical side-walls.

The cross-sectional inclination changed by between 2.5 % and 4.5 %, the radius being 900 m. Four rentable Doka cantilever forming travellers (CFTs) were fielded here for the 63 casting segments, each of which was max. 5 m in length. Due to the sizeable cross-sectional width of 27.5 m, the Doka bridge specialists designed the CFTs with three longitudinal trusses assembled from the modular system.

Efficient forming of complex cross-section

When designing the inside formwork, the Doka specialists had to allow not only for a continuous reduction in the height of the superstructure deck, but also for a significant narrowing in the inside widths of the box-girder sidewalls. The height of the superstructure deck varied from 8.5 m to 3.6 m, while the side-walls tapered from 0.6 m to 0.4 m. To allow the necessary modifications to be accomplished as efficiently as possible in every casting section, Large-area formwork Top 50 was mounted on movable custom profiles here, enabling it to be adjusted quickly, accurately and easily with heavy-duty screw jacks. A Doka Formwork Instructor was on hand to assist with erection of the CFTs on the pier-heads and with the first travelling operation, and also instructed the site crew in how to handle the formwork systems correctly. 

Porr Site Manager Sven Riedel

The professional

“Doka convinced us three times over: with its professional planning and extensive technical support in all phases of the project; with the assistance it provided during site erection; and with the troublefree operation the equipment gave us on the site.”

New continent found

Doka has taken the next step in its successful internationalisation drive by establishing a wholly-owned branch operation in Australia.



▲ **From Austria to Australia**
- Doka has opened a new subsidiary on the fifth continent.

The new Doka subsidiary Doka Formwork Australia Pty. Ltd. is based at Minto in suburban Sydney. With its 'on-the-spot' expertise and by being networked with the Competence Centres at Group HQ in Amstetten, Austria, it will be able to provide customers with the Doka Formwork Experts' entire spectrum of products and services, covering everything from building construction to infrastructure and housing construction. Besides this, Doka has a comprehensive package of service offerings for all phases of a project. This added value takes in advice and consulting, training courses and planning software, on-site assistance by

Formwork Instructors, maintenance and reconditioning as well as a ready-to-use-service for tailor-made formwork solutions. With the new subsidiary's fully equipped rental park, Doka customers can be sure of carrying out their construction projects swiftly and cost-efficiently. "As a leading player in the formwork sector, from now on we will also be helping construction firms in Australia to build quickly, efficiently and cost-effectively", says Doka Australia's Managing Director Reiner Schwarz. "Both our customers and our new employees can look forward to working with a dependable and capable partner." 



► **Doka Australia's management team from left: Operations Manager Jan Pienaar, Engineering Manager Leila Sadler, Managing Director Reiner Schwarz.**




Skills demonstrated

The Singaporean government has realised that there is great potential to raise productivity and efficiency in the construction industry if modern formwork systems and state-of-the-art construction methods are employed.

This is one reason why steady progress towards increased use of system formwork can be found throughout the country.

Singaporean contractors need to prove their productivity and efficiency at the construction site by collecting 'Constructability Points' for structural works, architectural & mechanical works and good industry practices. They need to achieve a minimum number of credits in order to qualify to bid for particular government building contracts. Contractors can only earn credits if they use one of the formwork systems which have been approved and officially listed by the Building and Construction Authority (BCA). Doka has qualified many of its formwork systems for these credits. Once again Doka Singapore demon-

strated their rationalisation potential to the Building and Construction Authority (BCA) by participating in an assessment of formwork suppliers. Doka showed how productively work can progress where Framax and Frami column/wall formwork and Dokaflex 1-2-4 slab formwork are deployed.

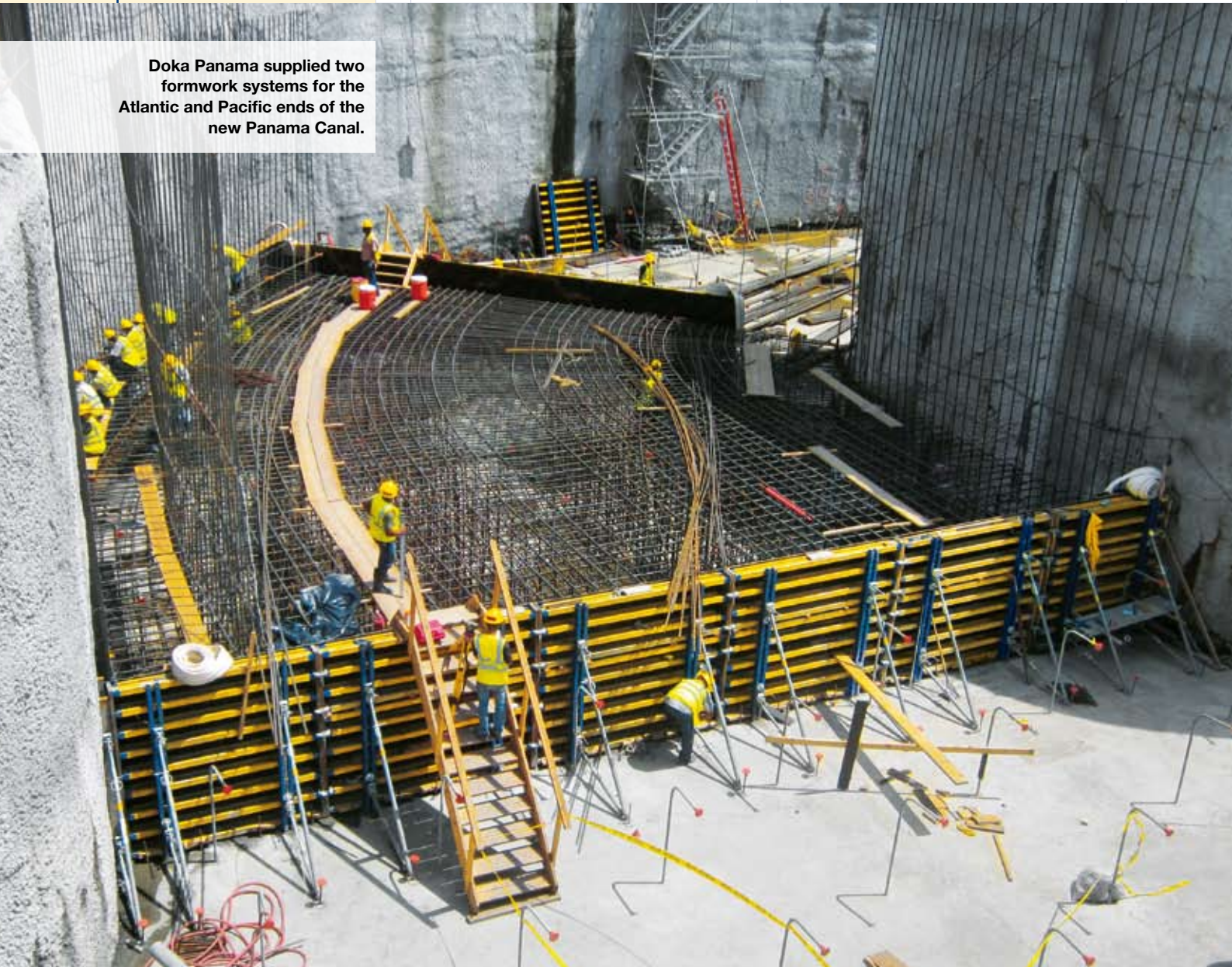
For the assessment, the formwork for a predefined typical project layout had to be assembled and dismantled in front of the officers of BCA. Mr. Chin Kim Hong, Senior Development Officer and Mr. Toh Meng Suan, Technical Officer, observed the performance carefully while Doka's formwork instructors assembled and dismantled the wall and slab formwork safely and expertly. This example shows how Doka can help contractors to build more economically. 

▲ From left: Barbara Weilguni, Team Leader Engineering Singapore, Nicholas Walker, Doka Senior Formwork Instructor, Sam Kong Wah, Doka Formwork Instructor, Yee Kong Hoong, Doka Formwork Instructor, Kok Yee Ooi, Doka Yard employee.



▲ Frami Xlife can be reset with just one lift of the crane.

Doka Panama supplied two formwork systems for the Atlantic and Pacific ends of the new Panama Canal.



The challenge

Planning an efficient global formwork system for chamber conduits with complex geometries.

Special job on the Panama Canal

The facts

THE PROJECT Expansion of the Panama canal | Construction of chamber conduits

WORK FULFILMENT

GUPC Sacyr - Impregilo - Jan de Nul - CUSA

FORMWORK SYSTEMS USED

Top 50 timber-beam formwork, D15 dam formwork, d2 load-bearing towers

Special Doka customised formwork is being used on the Panama Canal expansion project for constructing parts of new lock systems.

The huge expansion project for this 82 km long waterway is scheduled to be completed in 2014, in time for the Panama Canal centenary. Major work

is being performed on the locks, which will be considerably enlarged to permit the passage of large cargo ships. This will imply a considerable increase in

the Panama Canal's annual traffic volumes.


To construct the 'chamber conduits' of the new locks, Doka designed and supplied a high-performing formwork system that complies with the stringent requirements made by the international construction consortium Grupos Unidos por el Canal (GUPC) for efficient use in the project from all perspectives. Chamber conduits are an underground channel system through which water from the three overlapping retention tanks passes and is sent back to the large lock chambers. These chambers are concreted according to a cyclical concept to enable the formwork to be moved and reused several times. Doka Panama supplied two formwork systems in each case, one for the Atlantic end and another for the Pacific end of the new Panama canal route.

Efficient forming of geometrically complex components

The global formwork system used to form these geometrically complex structure components comprises three main groups and is constructed using the standard Top 50 system parts. The front formwork for the large foundation slabs and the complex geometrical transition of the formwork from the floor to the wall was assembled from Top 50 timber-beam formwork elements. The solid walls of the chambers are being constructed from one side (that

is, with supporting construction frames against the sloping sides of the excavated pit), and in each case with two 2.7 m high concrete sections also using Top 50 elements on D15 dam formwork corbels. They are closed using a four metre thick CIP concrete slab that is safely secured with 6 metre high Doka d2 load-bearing towers. In all, Doka Panama supplied over 2600 frames for supporting slab surfaces. For statical reasons, the large CIP concrete slabs were bevelled on all sides. In order to comply in the most efficient way with the project specifications regarding efficient use of material, Doka project technicians designed formwork (for transition area moulds between the floor and the wall) so that it can also be used for slab moulds after a few modifications have been made. This has meant that all formwork equipment at the site can be used, and that the work performed with this formwork is being completed much faster.

Guaranteed swift progress of construction work

Forward planning of the formwork, and the important on-site support given by Doka Panama's experienced Formwork Instructors and Doka's central office in Austria, led to the construction work progressing smoothly. The crew found this especially helpful when the formwork was being assembled and starting to be used, getting the work off to a very quick start. 

The solution!

Special formwork, with moulds that can be used for the floor and cover-slab alike, was designed and manufactured to the millimetre by Doka. The on-site support from the Doka Panama Formwork Instructors was a great help to the construction-site team, especially during assembly of the formwork.

▼ **Special formwork was designed and manufactured to the millimetre by Doka.**



In brief

News, dates, media, awards



▲ Years of formwork experience, including in the bridges segment.



▲ With its new 'iLOC', Doka has put its logistics on a brand-new long-term footing.

EXPERTISE ON EQUAL TERMS

The Doka experts from the new 'Business Development' unit support construction firms and local Doka organisations when it comes to building the world's tallest buildings, longest bridges and most challenging tunnel and power-station structures. Each project team, comprising the local sales organisation and experts from the Business Development unit, brings together many years' formwork experience in this particular construction segment.

ILOC PAVING THE WAY TO THE FUTURE

In the ongoing worldwide expansion of the Doka Group, logistics has a key role to play. Doka formwork solutions are in day-to-day use all over the world, and need to be made available rapidly at sales and logistics locations in more than 70 countries. With its new international Logistics Centre – 'iLOC', for short – Doka has put its logistics on a brand-new long-term footing. The 50,000 m² iLOC facility has commenced full-scale operation.



▲ Volker R. Ammann and Jennifer Kautz visited Gerold Heinrich (from l. to r.) at the Doka regional office.

TRADE COMMISSIONER VISITED DOKA

Volker R. Ammann, Austrian Trade Commissioner, and Jennifer Kautz, Commercial Attachée, visited the new Doka regional office for East Asia & Pacific in Singapore. "With its clear strategy and commitment to the Asian market, Doka will continue to be very successful in this region. The company's cutting-edge technology and highly skilled staff, with their open-minded and service-oriented approach towards clients, mean that it will continue to transform opportunities into business success", said Mr. Ammann on the occasion of his visit.

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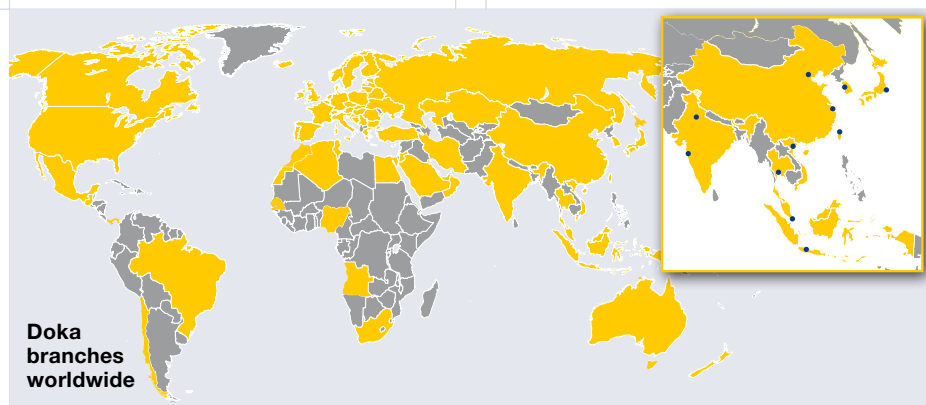
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In some cases the site photos show the situation during formwork assembly and are therefore not always complete from the point of view of safety.