The Formwork Magazine

Doka Xpress

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High speed and safety when forming slabs

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automatically climbed ... Page 3

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with no need for a crane ... Page 4

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doka
The Formwork Experts

Editorial

Dear readers;

Ladies and Gentlemen, our experience, and the know-how we have gained from five decades of working on countless construction sites all over the world, are a 'knowledge bank' that gives you a sharp competitive edge. To make sure that you can benefit from this quickly and easily, our planning offices throughout the world all have direct access to this fund of shared experience. For particularly important areas of construction, we have our own Competence Centres to support our planning offices in the many different countries in which we work. Simply get in touch with the Doka branch nearest to you. No matter how complex your project, you can look forward to receiving first-rate advice and support that is right up with the formwork-technology 'state of the art'.

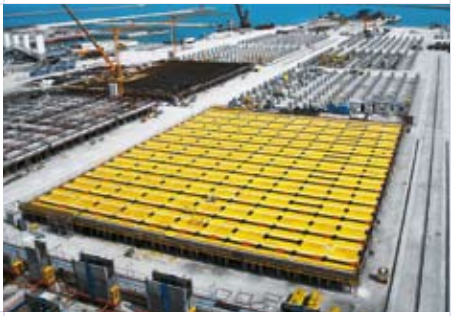
You'll find plenty of examples in this issue of Doka Xpress, too. Like in Singapore, where the Table Lifting System TLS has been saving costly crane time. Or in Seoul, where the Protection screen Xclimb 60 is ensuring safe slab-forming operations. In Tokyo, Framax Xlife framed formwork is saving 80 % of the manpower that would be needed by traditional formwork, while in China – thanks to Doka automatic climbing technology – a supertower is rising in a 4-day cycle.

Wishing you
an enjoyable read,
yours, Josef Kurzmann

Doka News

Venice rescued ▶

The epic flood protection system MOSE in Venice consists of 78 flood gates to shut off the Venetian lagoon from the Adriatic if flooding threatens. Doka Italia has supplied 13,500 m² of slab formwork and 15,500 m² of Framax Xlife panels to ensure speedy site progress of the 18 foundations.



▲ World's tallest clock tower

After 8 years under construction, the giant "Development of King Abdul Aziz Endowment" in Mecca has recently been completed. The project comprises 7 high-rise buildings, the tallest of which is the 603 m high Zamzam Tower. More than 450 Doka automatic climbing units acted as a pacemaker for on-time construction progress.

▲ Into the fast lane!

Magyar Doka has supplied several cantilever forming travellers for the Tisza Bridge in Hungary. After its extremely positive experience with this bridge, the Hungarian construction group Hídépítö, which specialises in the construction of traffic structures, has ordered two more pairs of cantilever forming travellers for a bridge project in Slovakia.

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▲ **The concrete core of this 245 m tall building is being climbed using Doka's SKE system.**

Landmark tower climbed safely

The Changzhou Modern Media Centre consists of five interconnected buildings and is a true mega-project in Jiangsu province, eastern China. Doka China supplied the formwork solution for the 332 m tall main tower.

The 245 m tall concrete core of this tower consists of 58 storeys, which have to be cast-in-place. Keeping to the construction schedule on this core is vital for the progress of the whole site. Contractor China Construction Third Engineering Bureau has only 48 months in which to complete the five buildings. In order to assure a fast cycle under safe working conditions, Doka China supplied SKE50 self-climbing formwork for the core walls, as well as Climbing formwork MF240 for some parts of the inner core wall. With this solution, the site crew is able to achieve a typical four-day cycle on the 4.15 m high concreting sections.

Safe, fast, efficient climbing formwork
28 automatic climbers SKE50, shaft platforms, climbing brackets MF240 and around 1500 m² of Large-area formwork Top 50 are in service at this site.

The SKE system stands out for its high operational safety, speed and efficiency. Maximum safety in all phases of the work is guaranteed, since the climbing scaffolds are anchored to the structure at all times. The wide working platforms offer plenty of working space, are enclosed on all sides and the automatic climbing operations can be managed with complete precision using radio remote control.

Further timesavings resulted from the assistance which Doka gave with assembly of the SKE 50 automatic climbing formwork and Large area formwork Top 50 on the site. The experienced Doka field service technician also instructed the crew in how to handle the formwork equipment correctly. This helped to ensure trouble-free forming operations, and smooth construction progress.

The facts

JOBSITE Changzhou Modern Media Centre

LOCATION Changzhou, China

CUSTOMER China Construction Third Engineering Bureau

BUILDING HEIGHT 245 m

NUMBER OF STOREYS 58

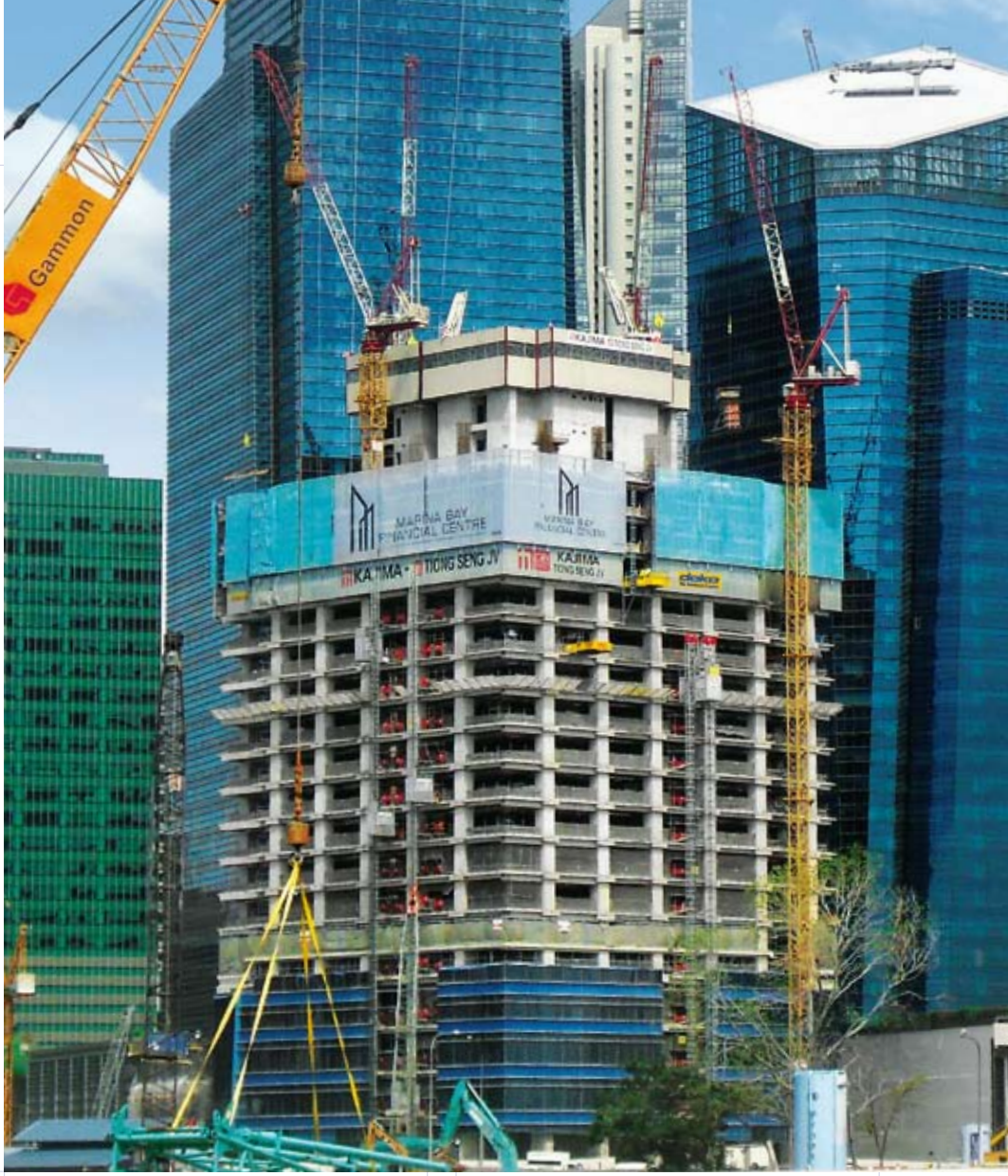
CONSTRUCTION TIME 48 months

USE TV and radio tower, hotel, office, media centre

PRODUCTS IN USE Climbing systems SKE50 and MF240 combined with Large-area formwork Top 50

The solution!

The reinforced concrete core of this multi-storey building is being climbed in a 4-day-cycle, using Automatic climbing formwork SKE50 on the outside and shaft platforms on the inside. As well as the high-speed forming procedure, the fact that these operations are independent of both the weather and of the tower-crane is a huge benefit for the forming team.



▶ **Dokamatic tables and the Table Lifting System TLS together ensure fast slab-forming, with no need for a crane, at the Marina Bay Financial Centre in Singapore.**

The facts

JOBSITE Marina Bay Financial Centre, Tower 3

LOCATION Singapore

REQUIREMENTS Fast slab forming operations for the 47 floor levels, with minimum use of crane time and maximum workplace safety

PRODUCTS IN USE Dokamatic tables, Table Lifting System TLS, Protection screen Xclimb 60

The solution!

Moving the Dokamatic tables up to the next floor with the Table Lifting System TLS is saving up to 131 crane cycles for each storey. The automatic climbing Protection screen Xclimb 60 safeguards the workplaces on the top four storey levels.

Top-speed slab-forming without a crane

The combination of Dokamatic tables and the Table Lifting System TLS is ensuring fast construction progress at the Marina Bay Financial Centre in Singapore.

Otaka Hiroyuki
Deputy Project Director Kajima Overseas Asia Pte Ltd

The professional

"The Doka TLS is a good solution. It helps to free up the crane for other activities. I believe that with the TLS we've managed to cut at least 1.5 days from each floor cycle. Now we are moving at 6-7 days per floor!"

Swift, cost-optimised forming operations are a high priority in construction of the 230 m tall Tower 3 of Marina Bay Financial Centre, where just twelve months have been allowed for completion of all work on the structure shell. To construct CIP concrete floor slabs, the contracting JV of Kajima and Tiong Seng is relying on a cost-optimised formwork solution from Doka that is designed for maximum speed. Large-area Dokamatic tables, pre-assembled ready for operation, are in action here to ensure fast forming-times. To speed up the slab-forming operations still further and permanently ease the pressure on the available craneage, the tableforms are moved

around the storey levels on shifting trolleys fitted with attachable drive units, and moved up to the next storey level by two Doka Table Lifting Systems TLS.

Crane-time and manpower savings
The advantages of these high-performing repositioning solutions speak for themselves: Using the shifting trolley means that instead of the usual team of up to five workers, it now only takes just one crew-member to transport the tableforms around each storey level.

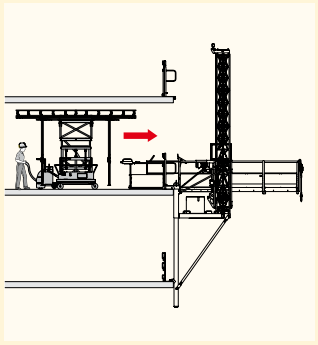
And on the Marina Bay Financial Centre build, moving the Dokamatic tables up to the next floor with the Doka Table Lifting System TLS is saving 131 crane cycles for each storey constructed – meaning nearly 5000 fewer crane cycles on the project as a whole. The only time a crane is needed is for repositioning the TLS itself. The table-lifting operation is so efficient that it couldn't be any easier: A worker moves the tables from their usage locations and wheels them onto the TLS platform.

Jumping the tables to the next storey is done at the push of a button and takes only a few seconds. In the storey above, a second worker takes delivery of the tables and then – also using an electro-hydraulically powered shifting trolley – wheels them to their new usage locations. With this high-performing formwork and repositioning solution, the site crew are achieving a 1-day cycle for each storey.

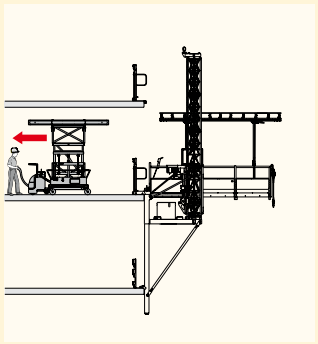
Maximum safety in any height
In order to ensure a safe working environment during the slab forming operations, the top four floors are constantly enclosed by a large protection screen Xclimb 60. Furthermore this enclosure is hydraulically climbed to the top without any crane assistance. In combination with the TLS the crane capacity can be reduced to an absolute minimum at this construction site.

Safe. Fast. Efficient.

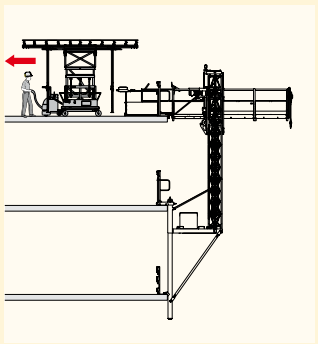
Table lifting at the push of a button



- Send the Lifting platform TLS to the floor in question.
- Set down the table on the lifting platform.



- Wheel out the Shifting trolley DF from under the table.
- Raise the table to the next floor on the lifting platform.



- Wheel the table off the platform.
- Send the Lifting platform TLS back down to the floor below

▲ A high-performance, fully hydraulic Doka tunnel forming carriage is being used to construct the two Y-branch structures in the Erstfeld section of the Gotthard Base Tunnel.

Fully hydraulic forming for complex cross-section

A fully hydraulic Doka tunnel forming carriage is ensuring extremely short cycle times during the casting of the inner shells of two Y-branch structures in the 57 km long Gotthard Base Tunnel in Switzerland.

Beat Blindenbacher, Project Manager AGN Strabag

The professional

"On account of their geometry and the logistical constraints, the two tubes of the branch structure are extremely challenging parts of the project. Doka's engineering know-how and field support are making an essential contribution toward the successful completion of this project."

A significant change in cross-section from 5.72 m wide by 7.92 m in height in the first concreting section to 17.65 m in width and 10.40 m in height in the last concreting section is a crucial design feature of the Y-branch structures. Construction work is big-end first, so the Doka tunnel forming carriage, consisting of rentable system components, has to be "trimmed down" for each successive concreting section, 37 in all.

Each time it has to adapt to the newer, tighter cross section. Contractor AGN Strabag specified short cycle times, straightforward forming up and stripping out procedures and economically optimised progress on the project, so the tunnelling specialists at Doka planned an all-hydraulic forming carriage attuned in every detail to the project specifics but with rentable system components nevertheless accounting for 75% of the make-up.

Tremendously strong and totally safe

As the name says, Doka's SL-1 heavy-duty supporting system is built for heavy loads and provides the torsionally rigid bearing structure for the two-part crown-arch formwork for the tunnel roof. The starting cross-section is so wide that for the first 12 concreting sections the forming carriage uses six rows of propping structures set up to allow portals for the in-tunnel service railcars and other site traffic. The forming carriage is also CE-approved and has fully enclosed platforms on all working levels and ladders with integral cages to maximise safety for the entire crew. The crown-arch formwork consists of Top 50 beam formwork sections and is carried by a total

The facts

JOBSITE Gotthard Base Tunnel, Erstfeld section

LOCATION Switzerland

REQUIREMENTS A highly adaptable tunnel forming solution to overcome the significant changes in cross-section and to ensure short cycle times.

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

of 144 heavy-duty screwjacks. Adaptation of the formwork to the structure's changing width has to be easy and practical, so the large-area formwork assemblies that make up the two halves of the crown arch retract inward section by section on powerful hydraulic rams. The superfluous formwork segments are then removed and the arched formwork is precision-closed.

This soundly planned solution ensures that rapid and regular working routines can be maintained through each concreting section in turn. After concreting section No. 12 in the eastern branch and No. 14 in the western, the cross-section tapers to the extent that two rows of props have to be removed from the supporting structure and new crown-arch formwork put in place.

170 metric tonnes repositioned at the touch of a button

16 high-performance hydraulic rams make forming up and stripping out, lowering and moving the huge forming carriage fully automatic operations, with straightforward pushbutton control. Each routine advance moves a supporting structure and formwork weighing 170-plus tonnes rapidly and accurately into position for the next concreting section.

The solution!

The tunnelling specialists at Doka planned an all-hydraulic easily adaptable forming carriage attuned in every detail to the project specifics but with rentable system components nevertheless accounting for 75% of the make-up.

◀ Forming up, stripping out, lifting, lowering and advancing are all fully hydraulic, push-button-control operations with this 170-tonne Doka forming carriage.

▲ The lifting procedure is fast and crane-independent. Small, lightweight hydraulic cylinders push up the protection screens into the next floor.

Slabs in a 4-day-cycle

Samsung is building a new Global Engineering Centre in Seoul, Korea. In order to carry out the slab forming operations on this building in a safe and fast way, contractor Kwangyoung Construction is using the Protection screen Xclimb 60.

The facts

JOBSITE
Global Engineering Centre

LOCATION Seoul, Korea

CUSTOMER
Kwangyoung Construction

BUILDING HEIGHT 59.2 m

NUMBER OF STOREYS
13 storeys

CONSTRUCTION TIME
20 months

USE Office Building

PRODUCT IN USE Protection screen Xclimb 60

The new building expands Samsung's headquarters and concentrates its engineering expertise in one location. The new office building consists of two towers, which have to be built within the short construction period of 20 months. While Tower One is being constructed conventionally, Kwangyoung decided to use Doka's new Protection screen Xclimb 60 on Tower Two.

The main reason for this decision was to protect the personnel carrying out the slab forming operations, and to provide safe, wide platforms for the post-tensioning work on the concrete slabs.

Safety right from the start

Doka developed Xclimb 60 for the world's tallest building, Burj Khalifa. 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. On the Samsung Engineering Centre, 63 brackets and around 3400 m² of protection screen are in action.

◀ **The Protection screen Xclimb 60 provides wide, safe working platforms for the post-tensioning work on the concrete slabs.**

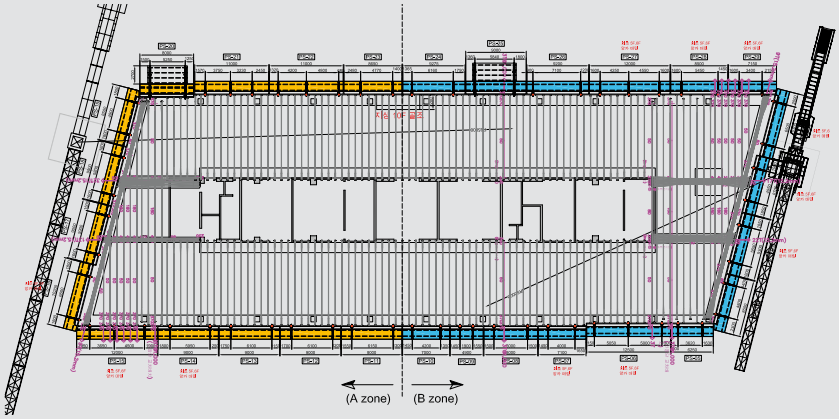
Soo-Chul Jung, Kwangyoung jobsite manager

The professional

"I am very glad to be using the Doka protection screen Xclimb 60. It is the perfect façade system because it protects our workers during the post-tensioning work on the slabs, and from bad weather."

The protection screen was easy to install, as all the platforms were delivered to the site pre-assembled. Since the system has been in use on Tower Two, the workers feel so safe that they work faster than before the protection shield was installed, and are now managing to construct the slabs in a 4 day-cycle.

Another advantage for the building team is the crane-independent, time-saving lifting operation for the Doka protection screen. Lightweight, hydraulic cylinders push up the system into the next casting step, and since the entire unit is structure-guided at all times, not even windy conditions can stop it.



The solution!

To accelerate the slab forming procedure and to protect their workers during the post-tensioning operations on the slabs, Kwangyoung Construction opted for the modular Protection screen Xclimb 60. 3400 m² of this unbeatably safe and economic system are in action at this building.

◀ **The full-area enclosure around the uppermost levels of the building enables all work to be carried out in complete safety.**

▲ This high-performing formwork solution is saving time and manpower at Tokyo's Kanamachi Water Treatment Plant.

Flawless concrete with less labour

As labour in the Japanese construction industry is becoming ever more expensive, many construction companies are looking for new ways of rationalising.

High-performance formwork systems like the framed formwork Framax Xlife help make it possible to complete construction projects even more economically.

One of the first sites in Japan to use Framax Xlife is the Kanamachi Water Treatment Plant. It is one of the largest water treatment facilities in the Tokyo metropolitan area, supplying drink-

ing water from the Edogawa River to some 2.5 million customers. In order to increase its capacity, the facility is being enlarged, and an underground facility for ozone treatment of the water is being built. There are several challenges that the contractor Kajima has to cope with. First of all, there is very little space for manoeuvering the formwork in the narrow building trench. Secondly, the constant contact of the concrete with drinking water requires a very smooth concrete surface, and tieless casting of some walls and columns. In addition, all reinforcement steel must be covered by a minimum layer of 8 cm of concrete to prevent water infiltrating and causing steel parts to corrode. Another challenge is the tight timetable of just 4 months for the structural work.

Having analyzed all these requirements, Doka Japan planned and delivered 750 m² of the very cost-effective framed formwork Framax Xlife. The initial scepticism of the construction site team about working with this new technology vanished the first time the formwork was filled. The efficiency and precision of Framax Xlife is difficult to achieve with traditional formwork. Also, the formwork handling was simple and easy: thanks to the logical system-grid the formwork panels can be combined both vertically and horizontally with a single lift of the crane whenever needed. This way, even faster casting cycles could be achieved with a much smaller team.

Single-sided walls in a single pour

To cast tieless walls, Doka combined Framax Xlife panels with Supporting construction frames Universal F. This made it possible to pour even the 5 m high walls in one continuous operation. Also, the dismantling and resetting of the formwork was easy and fast, as the forming units can be wheeled from one place to another. The solution also enhanced safety on site: the Supporting construction frames safely transferred the concrete forces, and the pouring platforms made for safe forming operations. Last but not least, the plastic-coated Framax Xlife-sheet produced flawless, smooth concrete at this site.

The facts

JOBSITE Kanamachi Water Treatment Plant

LOCATION Tokyo, Japan

CUSTOMER Kajima JV

CONSTRUCTION TIME 4 months

REQUIREMENTS Smooth concrete, tieless walls

PRODUCT IN USE Framed formwork Framax Xlife, Supporting construction frames

The solution!

750 m² of Framax Xlife-formwork and 100 m² of "Supporting construction frames" were in use at this site. The plastic covered Xlife-sheets produced smooth, flawless surfaces, and attachable drive units accelerated the handling of the single-sided formwork.

◀ Stripping of the single-sided formwork is easy thanks to attachable drive units.

In brief

News, dates, media, awards

▲ **Fukasaka Komuten at the final competition.**

▲ **Doka inspired the crowds at its booth at bauma china 2010.**

▲ **European award for safety in structural engineering.**

DOKA WINS TAKENAKA CIRCLE COMPETITION

Takenaka Corp., one of the world's largest construction companies, offers subcontractors from more than 200 construction sites the chance to participate in this special challenge. The aim is to identify the company that has best supported Takenaka in its quest to build safer, faster and more easily. Doka won this competition due to its performance at the Orix Tower, where "Automatic climbing formwork SKE 50 plus" achieved faster pouring cycles than traditional construction methods, and with less manpower.

CROWD-PULLER BAUMA CHINA 2010

The bauma trade fair 2010 took place in Shanghai, China, from 23rd to 26th November. Doka took advantage of this opportunity and presented pathbreaking products and services to a wide public. High-performing systems like Framax Xlife, Frami Xlife and Staxo 100 demonstrated impressively that modern system formwork engineering can improve speed, safety and productivity at every site. This opportunity was used successfully to establish contacts with numerous construction companies, subcontractors, architects, consultants and other interested parties in the formwork engineering sector.

DOKA WINS SAFETY AWARD

Doka has won the European award for safety in structural engineering in Spain, thanks to the high safety engineered into the Staxo 100 load-bearing tower. Spain's General Council of Technical Architecture awarded this prize to Doka in the 'innovation and research' category in recognition of its developments in effectively preventing accidents on site. The innovative Load-bearing tower Staxo 100 is characterised by its extremely safe assembly and disassembly routines. Its easy handling also goes far toward reducing labour outlays, so it has a cost-saving effect on site.

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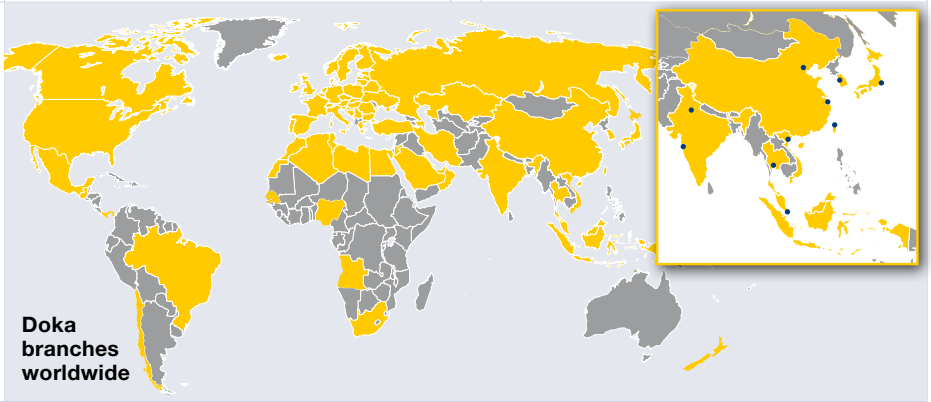

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In some cases the site photos show the situation during formwork assembly and are therefore not always complete from the point of view of safety.