Doka Xpress

The Formwork Magazine

2012 · www.doka.com

Highrise edition

Super-high
Reach for new heights with Doka

doka
The Formwork Experts

Editorial

Dear Readers;

The highrise sector is one of the construction industry's fastest growing worldwide markets. On skyscrapers with complex structure geometry, 'normal' applications technology soon reaches its limits. For work to proceed smoothly on projects like these, wide-ranging know-how, tried-and-tested solutions and comprehensive services are all absolutely essential. Here, experienced Doka specialists are on hand to support construction firms throughout the world with powerful, dependable formwork solutions. Our experts are also completely familiar with the diverse construction methods commonly used in different markets, and provide the input needed for developing market-specific formwork systems. Over the past decades, Doka has been involved in the building of very many highrise towers all round the globe. The huge experience this has given us is a competitive advantage that cannot be copied.

This issue of Doka Xpress brings you a round-up of several of the most interesting highrise projects that we are currently working on. Join us on a trip from Seoul to New York and from Paris to Riyadh, where we and our customers are 'rising' to tough challenges on some exceptional projects.

We hope you'll enjoy reading this highrise edition!

Yours, Josef Kurzmann
Chairman of Executive Management, Doka Group

Doka News

Landmark project won: Minerva Tower in India ▶

Named after the ancient Roman diety of wisdom, the super-highrise Lokhandwala Minerwa building is to be constructed with Doka formwork in Mumbai. The prestigious building in 82 storeys will be one of the most luxurious addresses in Mumbai.

▲ The first automatic climbing project in Poland

Neptun, Poland's newest landmarking Highrise project in Gdansk will reach 83 m height when it is ready. Doka is supporting the construction works with Xclimb 60 climbing formwork for maximum safety.

▲ World's tallest A-shaped pylon completed

In September 2012 Vladivostok hosted a summit meeting of the Asia-Pacific Economic Forum (APEC). By this time the volume project had been finished according to scheduling, on time and opened for traffic welcoming the participants of the prestigous ecomomic forum.

Index

Impressum: "Doka Xpress" is a publication of the International Doka Group. **Publisher:** Doka GmbH, Josef Umdasch Platz 1, A 3300 Amstetten, Austria. **Editor-in-chief:** Jürgen Reimann. **Duty editor:** Zsolt Kovacs. **Editors:** Katharina Ebetshuber, Sonali Maheshwary, Diana Sanicki. **Layout design:** COMO GmbH, Linz, Austria.
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.

No matter how high your requirements …

… Doka climbing systems take you to new heights. Over a period of more than 50 years, Doka's capability in the highrise sector has developed enormously.

During this long period, Doka has done more than just amass huge experience: time and again, it has enhanced its capabilities with innovations that enable Doka Climbing Technology to offer cost-effective and safe solutions for the highrise sector of the construction industry. At the Formwork Experts' corporate headquarters, more than twenty experienced specialists provide support for the world's premier highrise projects. The services we provide are truly comprehensive, starting right from the planning phase and providing full support throughout the whole construction process.

Our goal is to help our partners succeed, and so we aim at understanding the challenges that they face, and at putting together the most suitable solutions, exactly tailored to the individual situation and to the requirements of the project. Throughout the whole build, the Doka Highrise Team keeps in constant touch with the client, ensuring the reliability and safety of the planning. Among a number of services, 3D planning, a site supervisor and ongoing consultation between Doka and its partners are the markers of shared success. Doka branches regularly offer mandatory SKE training certification for customers' decision-makers and site crew, leading to the award of a certificate allowing personnel to operate our systems on site. Maintenance of client-owned and Doka rental-park SKE equipment, with a particular focus on the hydraulic systems, is a key service offered by the Doka Reconditioning Service at many Doka branches.

'Safe. Fast. Efficient' – the motto of Doka Climbing Technology – characterises the partnership from the project-development phase all the way through to project close-out. The construction industry looks to formwork engineering to deliver innovative solutions that are designed to maximise cost efficiency and are fully compliant with stringent safety standards. The modular climbing-formwork solutions from Doka are the answer to all these 'super-high' requirements. The Doka HQ Highrise Team is strongly backed by the experts of our Business Development Unit, with their huge experience and specialised technical knowledge, when it comes to supporting Doka's key-account partners. This unit adds its construction and project-management know-how to the technical know-how of Doka's central Competence Centres and local branches to ensure professional support for all super highrise projects throughout the world.

▲ The experts at Doka's Highrise Competence Centre and its Business Development Unit support partners all the way through the project, from the planning phase until close-out.

"No matter how high your requirements … Doka climbing systems take you to new heights". Doka's new worldwide communications campaign aims to convey its highrise capabilities to the customer.

www.doka.com/highrise

On completion, the 555 m Lotte World Tower will be the tallest building in East Asia.

Lotte World Tower: the height of elegance

Thrusting skyward in the South Korean capital Seoul is what will soon be the tallest building in East Asia – the 555 m Lotte World Tower, which will add a striking new facet to the city's skyline.

The Doka formwork solution fielded here uses SKE100 and SKE50 plus automatic climbers and the Protection screen Xclimb 60, and is ensuring swift, safe construction progress. In a formwork-engineering 'first', the Formwork Experts are using telescoping protection screens and platforms to deal with the structure's continuous taper.

The Lotte World Tower is a project on a superlative scale. Once this skyscraper is completed, its 123 storeys will house not only shops, offices and small apartments (known locally as 'officetels'), but also a 7-star luxury hotel. The top ten storeys, with a viewing platform and café on the rooftop terrace, will be given over to public use. According to this megabuilding's architects Kohn Pedersen Fox, the visual design of the gently tapered tower, with its uninterrupted curvature, was inspired by elements of traditional Korean ceramics, porcelain and calligraphy. The client, the Lotte Group, is incorporating photovoltaic panels, wind turbines, exterior shading devices and rainwater harvesting systems into the building. "Elegance of form" was one of the prime objectives. The facade will be clad in light-toned silver glass accented by a filigree of white lacquered metal.

Keeping time with automatic climbers

For the formwork of the immense reinforced concrete core, which has now (early November 2012) reached a height of 140 m, Doka is again deploying know-how that has seen many such megaprojects through to a successful conclusion: 132 SKE100 automatic climbers, combined with Large-area formwork Top 50, are being climbed ahead of the floor-slabs, in casting sections that are 4.5 m high in the typical storeys. Another twelve SKE100 automatic climbers are being used to raise the three concrete placing booms in sync with the forming cycles. Eighty SKE50 plus automatic climbers carrying Large-area formwork Top 50 are being used to construct eight 318 m tall, solid-cross-section mega-columns on the outside of the structure, to give it extra stability and safety. Work has been progressing very satisfactorily, says Doka Project Manager Klaus Eckstein: "Despite the tight timeframe, we finished all the planning work in good time. The formwork deliveries all went to plan and work on the site is moving ahead well."

Telescoping protection screen

At present, the work platforms are enclosed with netting and tarpaulins. A 20 m high Protection screen Xclimb 60 will soon be providing a gapless enclosure around the top four and a half storeys at any one time, probably from the beginning of 2013. All operations can then be carried out sheltered from climatic influences and high winds. The constantly changing shape of the structure presented the Formwork Experts with a great challenge in the planning phase. The Doka project team's answer was to develop a new, telescoping protection screen specially for the Lotte World Tower; this screen takes little or no modification to adapt to tapering structure shapes. The screen elements can be adjusted to widths of between 3 m and 5 m. Says Eckstein: "One of the exciting things about this assignment was that there were more than 20 of us in a single team based in three different countries – Korea, Singapore and Austria – all working together to devise and implement individualised solutions for the Lotte World Tower."

The Facts

CLIENT, INVESTOR Lotte Group

CONTRACTORS Lotte Engineering & Construction

ARCHITECTS Kohn Pedersen Fox Associates

START OF PLANNING WORK AT DOKA May 2011

FIRST FORMWORK DELIVERIES Beginning of August 2011

COMPLETION scheduled for 2015

OVERALL HEIGHT OF STRUCTURE 555 m

HEIGHT OF REINFORCED CONCRETE CORE 498 m

HEIGHT OF MEGA-COLUMNS 318 m

SYSTEMS IN USE Large-area formwork Top 50, Automatic climbing formwork SKE100, Automatic climbing formwork SKE50 plus, Protection screen Xclimb 60

The Solution!

A pathbreaking solution as a formwork-engineering 'first', Doka is using telescoping protection screens and platforms to deal with the structure's continuous taper.

▼ The solid-cross-section mega-columns will give the skyscraper additional stability and safety.

▲ Doka's complete formwork solutions were used on multiple projects at the World Trade Center Site, including the Memorial Fountain & Museum, Tower 2, and Tower 4.

Rebuilding Ground Zero

Doka USA supported the rebuilding work at New York's Ground Zero with some high-performing formwork solutions.

http://www.youtube.com/DokaNorthAmerica

Professionals Rebuilding Ground Zero share their experiences working with Doka systems.

In addtion to providing formwork solutions on Tower 2, the Memorial Fountains and Museum, Doka's provided wall, slab, & climbing formwork on the 72-storey, 297 m tall Tower 4. As the concrete work completed in late 2012, Tower 4 will be the 4th tallest skyscraper at the new World Trade Center site.

Architecturally, this office tower stands out for its two distinctly shaped floor plates and metallically lustrous glass facade. Up as far as the 47th floor, the building layout resembles a parallelogram. Above this, up to the 63rd floor, the storeys have a trapezoidal layout. The whole structure tapers as it rises,

appearing to be straining towards the Freedom Tower, the tallest building at Ground Zero. Like most skyscrapers in New York, Tower 4 has a steel frame that is stiffened by a CIP concrete core on the inside and stabilised by 'mega-columns' on the outside. Installation of the steel frame took place between six and eight storeys above the CIP concrete core. This meant that co-ordination of the structural-steel and concreting work was a key challenge here.

The very special formwork-engineering demands made by the tower's distinctive design were being fulfilled by Doka USA in a highly professional manner: "Tower 4 is one of the more difficult skyscrapers having been built here at Ground Zero. The differing storey heights, varying layouts and wall thicknesses, and the logistics, all present us with some really big challenges", said Mike Schermerhorn, Doka Senior Account Manager for Tower 4. The up to 90 cm thick CIP concrete floor slabs were cast using ready-assembled Dokamatic tables and the versatile Dokaflex hand-set formwork system.

Slab and walls cast in one pour

To increase productivity, the 27 m x 27 m structure core of the tower, which will house the stairwell and elevator-shafts, has been divided up into four mutually independent casting sections. A high-performing duo of Automatic climbing formwork SKE100 and Xclimb 60 has been fielded inside the core. SKE100 has a massive load capacity of 10 t per climber, making it ideal for repositioning the large working platforms and the formwork units assembled from Top 50 large-area formwork elements.

For this reason, SKE100 was used for the 'mega-columns' on the outside of the structure. The highly economical Climbing formwork Xclimb 60 served as a hoisting device inside the shaft, enabling building materials to be transported upwards on load platforms. Lightweight Framed formwork Frami was in use for the outside of the shaft. As the contractors Roger and Sons Concrete cast the CIP concrete floor-slab together with the walls of the CIP concrete core in a single pour, the formwork panels were placed by hand. This system's optimised hollow-section steel frames and weight-reduced Xlife sheets made for light and easy handling of the panels here. The Frami Xlife panels had earlier been used to form the V-shaped fair-faced concrete columns in the entrance concourse.

Tony Rodrigues Sr., President of Roger & Sons Concrete, put it like this: "We have complete confidence in Doka, because we know this is where we get reliable, cost-saving formwork solutions. On this project, too, like on all the others in the past, Doka has treated us to a level of service that you won't find anywhere else in the industry."

Photo: Joe Woolhead

◀ Construction work on Tower 2 has already got underway, with support from Doka.

The Facts

PROJECT
World Trade Center – Tower 4

CONTRACTORS
Roger & Sons Concrete, Inc.

SYSTEMS IN USE Xclimb 60, SKE100 and MF240 climbing formwork systems; Framed formwork Frami; Dokamatic tables; Large-area formwork Top 50

OVERALL HEIGHT 297 m

LAYOUTS two changes of floor-plate shape

FORMWORK PLANNING
Doka USA

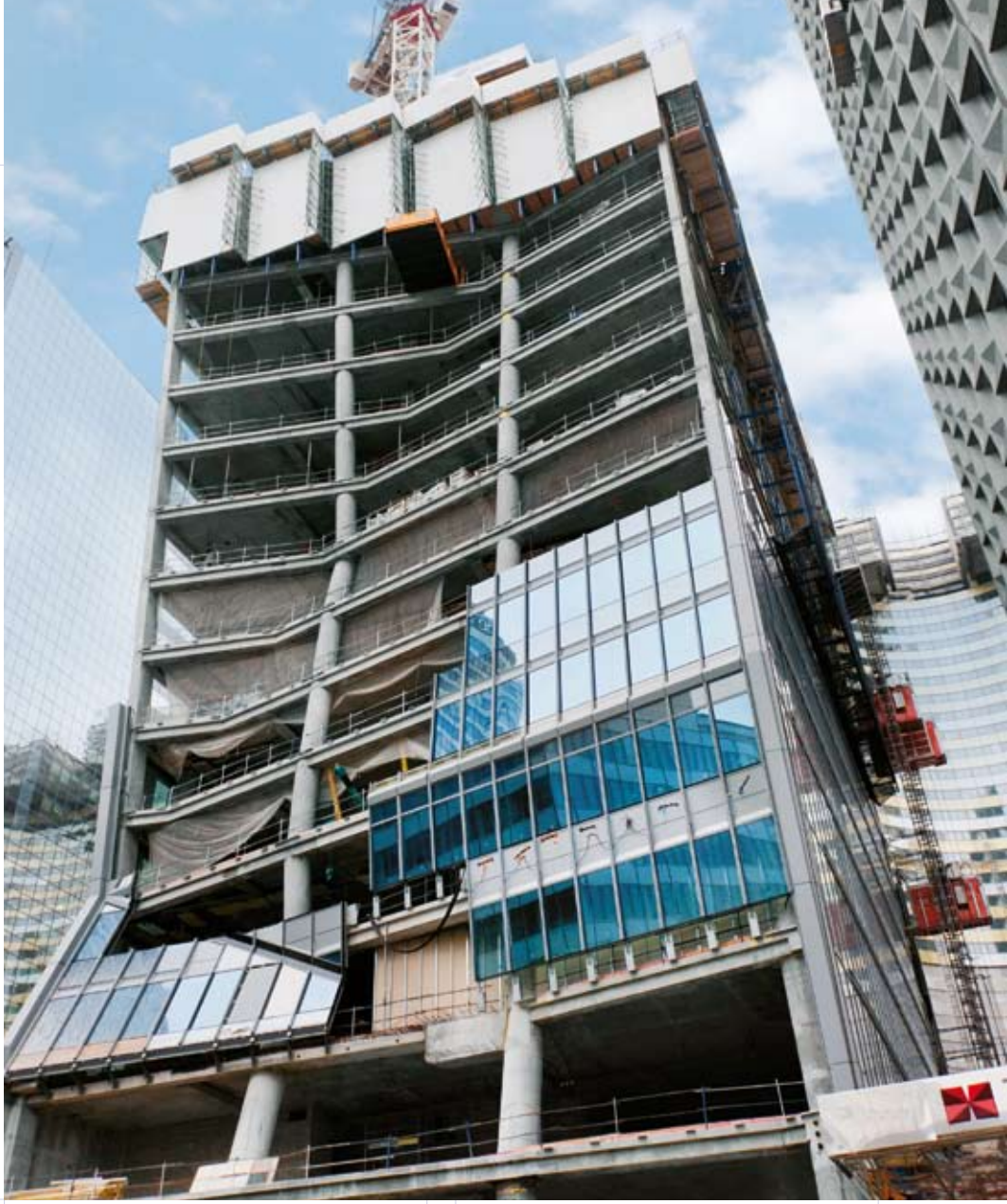
FORMWORK PRE-ASSEMBLY
Doka USA

The challenge

Constructing a highrise tower with varying layouts and differing storey heights. Structural steelwork installed ahead of concreting operations.

The solution!

By combining various different climbing-formwork systems, the Doka Formwork Experts had a positive impact in terms of material-flows, forming operations and smooth structural steel work.



▶ **With its distinctive alternation of set-back and projecting floor-slabs, the facade on the narrowside of the building proved to be particularly challenging during the planning process. The difficulty was to find a way of permitting continuous vertical climbing that did not have to follow the alternating pattern of the slab-edges but still ensured a high degree of safety.**

The Facts

PROJECT Tour Carpe Diem

CONTRACTOR JV of SCGPM & Besix, Aviva

BUILDING DATA 38 storeys, 45,000 m², incl. shops, cafés and an 18 m tall conservatory

SYSTEMS IN USE Large-area formwork Top 50, Automatic climbing formwork Xclimb 60, Framed formwork Framax Xlife, Automatic climbing formwork SKE

The Challenge

Stringent safety requirements in force, alternating pattern of the slab-edges and a need of continous vertical climbing presented Doka specialists with several challenges.

The Solution!

Doka Protection screen Xclimb 60 is a self-climbing system supplemented by adjustable floor supports. This provides a perfect solution for all requirements.

Rapid construction progress amid tight space constraints

La Défense is a modernistic highrise commercial district in Paris. With over three million square metres of floorspace, this is the biggest office location in Europe, accommodating more than 150,000 office staff.

1,600 firms – among them some of the biggest corporations in both France and the world – are represented in La Défense. A new prestige project is the 166 m 'Tour Carpe Diem' tower being built for the insurance group Aviva. Designed to Green Building Standards, it is scheduled for completion in 2012.

The Doka automatic climbing formwork SKE50 plus system is keeping operations moving ahead very fast on this project, despite the cramped conditions on the site. Used here as a protection screen, the Doka Automatic climbing formwork Xclimb 60 system is ensuring high workplace safety on this build.

The Tour Carpe Diem was designed by the firm of Robert A.M. Stern Architects. On its 38 storeys, this prestigious tower will soon house 45,000 m² of office space as well as shops, cafés and an 18 m tall conservatory. The office complex is being built by a JV between the firms of SCGPM and Besix.

The stringent safety requirements in force in France, the shape of the facade and the very tight space constraints on the site all presented the Doka technicians with a number of challenges. With its distinctive alternation of set-back and projecting floor-slabs, the facade on the narrowside of the building proved to be a particular planning challenge. The difficulty here was to find a way of permitting continuous vertical climbing that did not have to follow the alternating pattern of the slab-edges but still ensured a high degree of safety. The solution: the self-climbing Protection screen Xclimb 60, which since last year Doka has also been able to supply with adjustable 'Floor supports'. To go with this new product, Doka technicians have devised a special profile to which the adjustable floor supports are attached. This allows the working platform to be moved forward and back in a certain range. Also, four hinged gap-decking units were made for each platform; these can be tilted up and down by a block-and-tackle to close the gap between platform and floor-slab as needed. Each protection screen covers the working platform and two further levels.

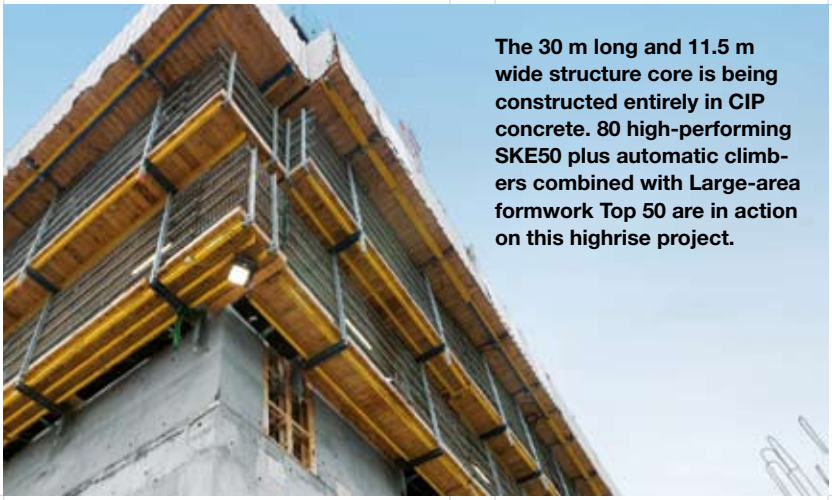
Pre-fabricated formwork ensures smooth workflow

Doka France pre-fabricated all the formwork elements at the Paris branch and delivered them to the site just-in-time. The heavy traffic in the densely built-up La Défense district, and the fact that the formwork systems can only be delivered during certain time slots, mean that the logistics are a critical factor for construction progress here: "Because there is so little space, on-site storage or assembly are not an option. We've planned all the operational steps needed for delivering and installing the formwork systems right down to the last detail, and this has ensured a smooth workflow", explains Project Manager Ibrahim Bara of Doka France. The forming operations were planned by the engineering office of Doka France with support from the Self-climbing Systems Competence Centre and the Applications Technology Department at Doka HQ in Amstetten, Austria.

High-performance climbing

Work on the Tour Carpe Diem got underway in March 2011. The 30 m long and 11.5 m wide structure core is being constructed entirely in Cast-in-Place Concrete (CIP) concrete. 80 high-performing SKE50 plus automatic climbers combined with Large-area formwork Top 50 are in action on this highrise project. For the structure core with its many smaller shaft cores, the modular design concept of SKE50 plus is ideally placed to deliver fast cycle times and superlative cost efficiency. On the inside-shafts, the special SKE50 plus shaft system is ensuring optimum adaptability to the structure geometry, combined with quick and easy operability. The wall formwork is fixed to Framax Stripping corners I to make formwork boxes that can quickly be backed off the concrete in a few simple steps. 1,500 m² of Doka's Top 50 timber-beam system are being used as the wall formwork here. The 4.47 m high custom elements make for rapid progress on the 4.07 m casting sections, enabling the CIP concrete core to be raised in a weekly cycle. Workplace safety is being assured by SKE50 plus working platforms with four levels: Level 0 is enclosed in trapezoidal sheeting to provide protection against the weather, while all other levels are enclosed in netting.

▲ To safeguard the forming operations on the building-facade, 11 platforms of the Automatic climbing formwork SKE50 plus system are being used on the broadsides of the structure, and 12 Protection screen Xclimb 60 platforms on the narrowsides.



The 30 m long and 11.5 m wide structure core is being constructed entirely in CIP concrete. 80 high-performing SKE50 plus automatic climbers combined with Large-area formwork Top 50 are in action on this highrise project.

▶ The shaft core of the CMA Tower is now at 50th floor-level and has already climbed above the 250 m mark.

The Facts

THE PROJECT CMA Tower

LOCATION
Riyadh, Saudi Arabia

CLIENT SBG Ltd.

DATA OF BUILDING height: 400 m, 76 storeys, concrete core of 40 m cross section

SYSTEMS IN USE
Facade Formwork Top 50, Load-bearing Tower Staxo 40, Automatic climbing formwork SKE

Tough assignment on CMA Tower

Set to top out at 400 m, the 76-storey CMA Tower in Saudi Arabia will be the tallest building in the city of Riyadh, in whose King Abdullah Financial District it stands.

▼ Doka's Automatic Climbing Formwork SKE provides an efficient solution for achieving weather-independent construction workflow and maximum crew safety

The CMA Tower is being built by SBG, a firm with a huge fund of experience in highrise construction. The tower stands out for its gigantic nine-sided CIP concrete core, whose 40 m cross-section makes it big enough to be a skyscraper in its own right. An ingenious formwork solution from Doka is in use for the 100 casting sections. At present, SBG has an uncommonly tough challenge to deal with: incorporating a three-storey-high steel construction into the concrete core but since this challenge was already coped with and fine tuned by both Doka and SBG, the workflow for the upcoming executions shall be even smoother.

Work on the up to 2.50 m thick reinforced concrete wall of the structure core has now reached the 50th floor, in some cases progressing in a 4-day-cycle. The colossal structure core serves as the bearing element for a gigantic steel construction to which the exterior facade and floor-slabs are to be attached. This steel construction will take several weeks to install, a procedure which is now repeated at the 50th floor for the second time.

2,800 tonnes of structural steel, 2,000 tonnes of rebar

The complex fitting operations has to be carried out from the 49th to the 52nd floors. In these three storeys, the steel construction is embedded in the concrete core as this is poured, to assure a tension-proof connection between the core and the exterior facade. In order to achieve this, 10 cm thick steel plates of up to 14 m in height were erected ahead of the casting operations, ready to be diagonally embedded. In addition, 12 m high reinforcement rods were also emplaced. Placement of the horizontal rebar proved particularly laborious, as every single rebar item had to be bolted onto the steel construction by way of welded couplers. The result, in the so-called 'outrigger levels', is a reinforcement ratio averaging 1,500 kg per m³ of concrete. With so much steel in the concrete, tying the two formwork-halves and preparing the suspension points for the self-climbing system is quite a challenge.

Overclimbing a 70 cm wall-return

Another big challenge is a wall-return from 2.50 m to 1.80 m, which has to be hydraulically overclimbed by the platform levels. For this 70 cm set-back, the climbing scaffold is pushed away from the finished casting section, causing the scaffold to slant inwards in the next casting section. For this reason, Doka uses extension shoes in the casting section for the set-back, enabling the climbing scaffold to be pushed upwards and slanted inward by 20 cm in this casting section.

Doka's vast experience and wide-ranging project management are making it possible to solve the highly demanding requirements directly on the site, in teamwork with all the professionals involved. In consequence, the complex worksteps are proceeding as planned. Due to the decreasing rebar quantities, once the steel construction has been installed the site team is even aiming for a 4-day cycle.

The Challenge

To deliver high-tech Highrise formwork solutions which are able to meet tough scheduling deadlines and special security requirements.

The Solution!

Doka's Climbing Formwork SKE provides for the 4-day concreting tacts for 100 casting sections.

▼ A three-storey-high steel construction has been incorporated into the core as a tension-proof link between the core and the exterior facade.

The Twin Towers are rising skyward to their final height of 185 m above Doka, Qatar. They will house a luxury hotel and offices.

Twin Towers Qatar: Double impact on Doka climbing tasks

In recent years, Doha, the capital city of Qatar, has seen many spectacular new skyscrapers rise above its 'West Bay' business district. Currently under construction, the Twin Towers will add another showcase project to the already striking skyline of this city.

The Facts

CONTRACTORS
Arabtec Construction LCC

START OF CONSTRUCTION 2010

COMPLETION
scheduled for 2013

HEIGHT 185 m

SYSTEMS IN USE Large-area formwork Top 50, Automatic climbing formwork SKE50, Climbing formwork MF240, Load-bearing tower Staxo 40, Framed formwork Framax Xlife, Timber-beam floor formwork Dokaflex 1-2-4, 'Universal' supporting construction frames

Following completion, the two 185 m towers will house a luxury hotel and offices on 48 floors. Having supplied its Automatic climbing formwork SKE50, Climbing formwork MF240, Large-area formwork Top 50 and Load-bearing tower Staxo 40 systems, Doka is playing a key role as comprehensive solutions provider to ensure fast, safe construction progress on the Twin Towers.

The contractor, Arabtec Construction LLC, a leading construction group headquartered in the United Arab Emirates with major ongoing projects across the GCC region, is building two 185 m skyscrapers in the brand-new business district of West Bay in Doha. The two towers will each house offices and hotel rooms on 48 storeys, complete with three podium levels of multi-storey parking space and two basement levels. Work began in 2010 and is scheduled to take 30 months.

Keeping pace with SKE50

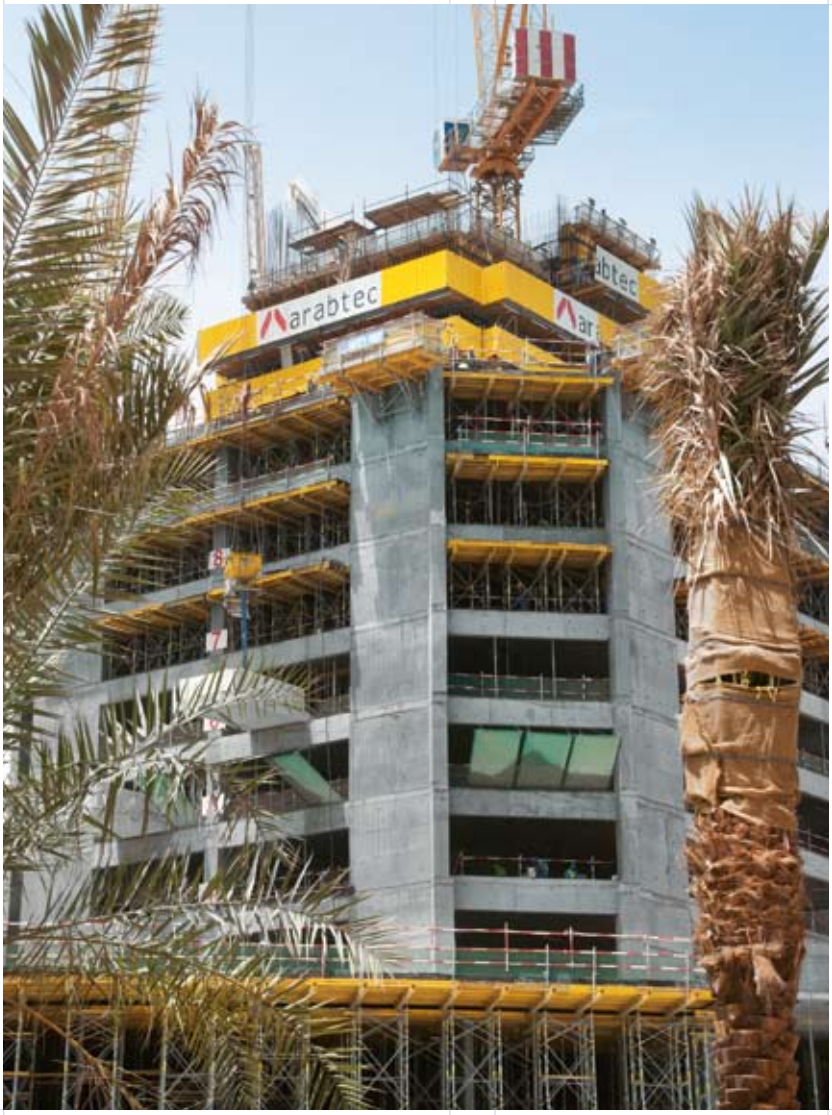
Doka climbing formwork SKE50 is setting the pace on the building of the two CIP concrete cores. Both cores are being climbed ahead of the floor-slabs using a total of 94 automatic climbers SKE50 and 1,800 m² of Large-area formwork Top 50. The modular design concept of this crane-independent automatic climbing formwork system allows efficient and cost-saving formwork solutions for every type of structure. The climbing scaffolds come with completely railed-in working platforms and are anchored to the concrete at all times – ensuring the greatest safety for the site crew even in high wind conditions. Live loads can be left in place on the platforms while the system is being climbed, so high-speed working is guaranteed. Arabtec Project Manager Mohammed Ali Nada is very satisfied with the construction progress: “Our collaboration with Doka Qatar has gone very smoothly, both in the planning stage and during the build itself. The economical formwork systems that we have in service here are easy to handle and are crucial in helping us to work more effectively and save time.”

Plenty of space for safe working

To form the stiffening shear walls at the slab-edges, Doka supplied its Large-area formwork Top 50. This versatile system, nearly 830 m² of which is in use on each casting section, adapts readily to the changing structure geometry. The 2.40 m wide platforms of the crane-jumped formwork system MF240, also in use here, provide ample room for safe working. The versatile Dokaflex 1-2-4 floor-slab system is being used for the typical storey floors, while the high slab supports needed in the podium zone are being provided by Load-bearing towers Staxo 40. This weight-optimised load-bearing tower system is engineered for high user ergonomy, enabling fast assembly and dismantling times while ensuring high workplace safety. In this way, Staxo 40 makes a crucial contribution towards greater efficiency in the construction workflow. Says Mohammed Ali Nada: “The Doka team displayed precise technical knowledge, right from the very beginning of the planning stage. My team has benefited hugely from this formwork know-how, from Doka’s on-time deliveries, and from the fact that its climbing systems and timber-beam formwork systems are so safe to use. The after-sales services were first-class as well.”

The Solution!

Not only are scheduling plans kept with Doka solutions but safe working conditions with plenty of space for the workforce is also ensured on the working platforms of Doka MF240 Climbing formwork.



▼ The Automatic climbing system SKE50, crane-jumped formwork MF240, Large-area formwork Top 50, the floor-slab system Dokaflex 1-2-4, Framax Xlife column formwork and Load-bearing tower Staxo 40 are all in use on these construction operations.

▶ **Doka SKE enabled the entire exterior climbing formwork to be raised as a single platform, bringing all 4 sides of the core wall safely to the next level in 20 minutes or less.**

The facts

JOBSITE Sama Beirut

LOCATION Lebanon

CUSTOMER MAN Enterprise

SYSTEMS IN USE Large-area formwork Top 50, Dokaflex tables, automatic climbing formwork SKE50 and SKE100 for CPB

Sama Beirut Surging Toward Completion

The solution!

For this luxurious high rise tower consisting of 8 office floors and 75 apartments, Doka supplied all formwork for typical floor beam & slab support and 100 % of all corewall formwork + SKE50 platforms.

Beirut will soon have the new tallest tower in the country – SAMA Beirut, standing at 186 m. Doka engineered a solution for the highest number of re-uses with a design adopted from Burj Khalifa. The building will be the city's first landmark of this caliber.

For this build which started in 2011 with an expected completion in 2014, formwork planning challenges included taking into account assembly at an offsite location, an extremely tight construction schedule, and coping with heavy steel reinforcements (seismic design) and deep excavation work.

Hydraulic system the perfect choice

Doka automatic climbing formwork SKE50 was the key formwork solution for the project. With the system's utmost flexibility, it gave the client the ability for fast and efficient climbing of the main core wall. A cycle of seven days was reached easily, taking into consideration how quickly the site crew familiarized themselves with the system. Around 750 m² of the Large-area formwork Top 50 panels were coupled with the SKE system to give the shafts very easy forming sequences, and fair faced concrete as well.

Equalizing speed of vertical and horizontal elements

The perfect combination of SKE50 & SKE100 climbing brackets has been chosen, to meet the requirements of an economical system. Also meeting the requirement for lifting the very heavy loads wherever required, such as a concrete placing boom or large inside shaft cells. The high load capacity of 10 metric tons per bracket and the tall formwork-platform scaffolds allow work to proceed simultaneously, making it possible to "de-link" the forming and rebar operations. Each shaft cell has it's own automatic climbing platform - allowing the time-intensive rebar installation works for the next level to start immediately after curing of concrete - without waiting for formwork stripping, cleaning & climbing. More than 2,000 m² of Dokaflex tableforms were utilized in order to keep casting the horizontal elements in step with the rate of vertical progress.

Sami Mekanna
Project Manager
Sama Beirut

The professional

"MAN Enterprise was able to reach the project's requirement because the Doka system used less manpower. We were able to achieve on time the pouring of vertical and horizontal elements as well."

Highrise centre concentrates expertise

Doka's Highrise Centre in Singapore brings together and focuses its automatic-climbing capabilities in the East Asia & Pacific Region.

Thousands of miles away from the Group's HQ in Austria, its building-construction clients can benefit from the concentrated expert knowledge and service offerings of one of the global formwork-technology sector's leading players. 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.

Michael Eder put it like this on opening this new regional service centre: The building-construction sector in the Far East is one of the fastest growing markets anywhere in the world. Particularly in the super-highrise segment – by which we mean buildings rising to over 300 m – China, Korea and Malaysia have huge potential. On super-skyscrapers like these, with their complex structure geometry, 'normal' applications technology quickly reaches its limits. For work to proceed smoothly on projects like these, wide-ranging know-how, tried-and-tested solutions and comprehensive services are all absolutely essential. True to its pathbreaking approach to customer care, Doka thus decided to set up a regional Competence Centre directly in Singapore. Here, experienced climbing-technology specialists are on hand to support construction firms in Singapore, Malaysia, China, Japan, Korea and Australia 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.

▲ **Michael Eder highlights safety and reliability are the values that define their daily work to provide outstanding customer support.**

www.doka.com/highrise

◀ **The casting of the 555 m tall Lotte World Tower is processing smoothly according to scheduling.**

www.doka.com/highrise