Doka **Xpress**

Middle East I The Formwork Magazine I Issue 2014

Hollywood inspires Dubai

Kuwait

A new university campus is built on 6 million m^2.

Qatar

Two highrises set new architectural accents on Doha's West Bay.

Saudi Arabia

The port city of Jeddah receives a luxury residential tower.

Editorial

Dear customers,
dear readers,

faster, more efficient and safer construction – this topic concerns contractors and formwork experts alike. High-performing and easy-to-use systems provide the basis for achieving this. However, intelligent solutions for every phase of a construction project can only be derived from such systems in conjunction with customised services. We are now introducing one of these “smart” services in Doka Xpress: Concremote®. This innovation measures the strength development of concrete and thus offers an important contribution in terms of optimising the construction process.

In addition, we present formwork solutions for current construction projects in the Middle East – highrise buildings and hotels as well as airports, bridges, universities and tanks for the petrochemical industry. Focusing on rail, we emphasise our competence as your reliable partner in this sector. I am delighted to share with you a selection of solutions which we developed and implemented together with our clients.

Sincerely,

Peter Vogel
Director Middle East
Doka Group

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Doka News

Mega-infrastructure project ▸

One of the most important road construction projects in Austria is the 22 km long S10 Highway. This mega project demands near-perfect planning, coordination and implementation know-how. Doka functions as competent formwork partner and supplies sophisticated solutions that result in efficient and safe construction of the many tunnels and bridges.

◂ Upgrade for dam

With a formwork solution for the Bergeforsens Kraftverk hydraulic power station in Eastern Sweden, Doka proved its competence in power station construction. In order to increase the total discharge capacity of the dam, a second gated spillway is under construction. Doka supplies Framed formwork Framax Xlife, Large-area formwork Top 50 and Load-bearing tower Staxo 100.

Residential hit ▸

For the construction of the Station Condominium in Toronto, a mixed-use office and residential building, Doka supplied a formwork solution including a 25 m long truss table, a unique size. In total more than 3,400 m² of trusses are on the project. Combined with Doka’s Super Prop the contractor needs fewer props, resulting in savings on money and labor.

Concremote® – ‘know-when’ for the site

When forming and pouring, it is vital to make sure that the right worksteps are carried out at the right time. To do this, it is necessary to have reliable information on the strength development of the concrete. Concremote® allows users to measure the early strength development of concrete on the site in real-time, making targeted management of the forming and concreting operations much simpler.

Developments in concrete technology have had a major influence on site workflows, and thus on the formwork technology used. The requirement is for construction work to take place swiftly, safely and in high quality, and a key parameter affecting the construction workflow is the compressive strength development of the concrete during construction.

The stripping and curing times, and the time for pre-stressing, are all influenced by concrete-strength development. Concremote® concrete monitoring allows users to find out what steps need to be taken, on the basis of measured concrete-strength values, to optimise the construction process.

Concremote® measures the concrete strength by way of sensors inserted in the concrete during pouring, without anyone needing to be physically present on the site to read out and record the measured data. These sensors regularly measure the temperature development of the fresh concrete and transmit these data to the Concremote® computing centre. Here, the ‘de Vree’ weighted maturity method is used as the basis for calculating and providing reliable, standards-compliant information, in real-time, on the strength development of the concrete.

Concremote® uses two types of sensors: slab sensors, which are inserted in the fresh concrete after this has been struck off, and cable sensors that are incorporated directly into the form-facing of the wall formwork and repositioned together with the formwork.

Wireless transmission of the non-destructively measured values starts automatically. The system’s long-life batteries, sturdy sensors and cableless data transmission make it highly user-friendly. The measuring results can be accessed at any time on a secure web portal. Also, users can be alerted by e-mail or text message as soon as the specified early strength has been reached.

Concremote® offers wide-ranging possibilities for optimising the construction process: if a customer has entered a specific target value for a site, the strength values enable him to make precise recommendations regarding e.g. the earliest time for stripping the formwork, climbing and pre-stressing, and for the end of curing. The real-time measured data can also be taken into consideration for optimising the concrete formulation.

Concremote® concrete monitoring is an innovative method that helps to ensure process reliability in the construction operations, based on proof of the compressive strength of the concrete in the structure member, and that also opens up scope for optimisation. Concremote® is a tried-and-tested product (monitoring and process management system for the construction sector) from the BIAIS concrete-engineering consultancy in the Netherlands. //

▲ ‘Know-when’ for the site: with Concremote® concrete monitoring, users can optimise the construction process on the basis of measured concrete-strength values.

▼ Concremote® is very easy to use: slab sensors are inserted after the concrete has been struck off, and start measuring automatically.

▲ DokaCC is an innovation especially for the cut & cover construction method used in tunnels: quick, efficient and safe.

Formwork expertise for rail programs

Current urban developments present numerous new challenges calling for lasting infrastructure solutions. Especially in the area of public transportation, construction companies are confronted with demanding tasks. With its many years of experience and high-performing systems, Doka serves as a reliable partner when it comes to formwork solutions for infrastructure projects.

In many cities this requires far-reaching and sustainable renovation of the existing infrastructure to be embedded into current traffic solutions. With customised services and high-performing products, Doka covers the entire spectrum of up-to-date formwork solutions for tunnel, bridge, station and road construction. Doka customers benefit from years of formwork engineering experience gained while working on various infrastructure projects, such as railway tunnels, station buildings or underground traffic hubs around the world. Due to its special expertise, Doka serves as a particularly strong partner for solutions where conventional concepts and systems are no longer adequate. From project development stage through to completion of construction, the range of services offered by Doka Engineers is impressive and comprehensive. Customers can benefit from savings in space, time and manpower

by using Doka's formwork Pre-assembly and Doka Ready-to-Use Service.

A wide-ranging product portfolio adapted to regional requirements contribute to smooth construction processes and enables Doka customers to fall back on flexible systems that meet their project demands. Above all, this includes a well-conceived logistics concept. Doka makes investments in an extensive network of distribution and logistics sites to be near its customers anywhere in the world. The result is a company able to respond quickly to regional particularities and also demands for material on short notice. In conjunction with the option of system renting, the range offered by Doka provides economical and reliable solutions.

Flexible and complete product lines for complex demands

The Load-bearing Tower system SL-1 is universally suitable for demands presented by tunnels built in accordance with mining practice, the cut & cover method and especially for underground railway stations and long caverns. Regardless of form and load, the modular configuration of SL-1 ensures speedy and economic construction progress. In combination with the flexible Large-area formwork Top 50, this quickly assembled system realises any form. With its new Tunnel formwork DokaCC, Doka developed an innovation especially for the open construction method also known as cut & cover method. DokaCC allows for quick, efficient and safe construction of various traffic tunnels, in particular in the initial approach and gathering area of the underground railway.

When it comes to building station and operational structures, Doka offers a wide range of slab and wall formwork for a variety of applications and project requirements. Doka Supporting construction frames and Large-area formwork Top 50 deliver powerful and yet flexible results with underground structures as well as above-ground stations and operational buildings. Using the integrated heavy-duty wheels, these high-performing supporting construction frames are transported quickly from one pouring section to the next in spite of their height and weight. Framed formwork Framax Xlife is suitable for high walls to accelerate construction processes.

Flexible standard systems such as Staxo 100, Staxo 40 and Doka slab formwork offer interesting system expansions for any shoring tower design. The heavy-duty supporting system is easily adapted to different construction sites. The new Panel floor formwork Dokadek 30 is ideal for building large-scale slabs in station areas quickly and above all easily and economically. The convenient concrete maturity meter Concremote® easily and accurately indicates the optimal time for formwork stripping.

Systematic safety

At Doka, safety considerations start as early as during the product development phase. The use of high-quality material results in long product service life. Integrated working platforms and access systems ensure additional system safety while working. Furthermore, Doka offers extra protection systems such as working platforms or guardrail systems in order to meet individual requirements at the construction site.

Light Rail in Qatar

Safety and economy are the focus of the project in Lusail City. In addition to high-performing shoring systems, various safety features such as different working platforms, protective scaffolding and access systems are used in the construction of the first rail urban transport in Qatar. Thanks to the durability of Framed formwork Framax Xlife, in combination with the Platform system Xsafe plus, the system was being re-used more than 300 times to build several stations. Rapid material delivery times and Ready-to-Use Service parts ensure that the contractor will remain on schedule until construction is completed in 2018.

Metro in Algeria

In 2011, during the Metro expansion between Hai El Badr and El Harrach in Algeria, Doka provided a timely solution and large material quantities for several station buildings and crossing areas. With its comprehensive services and flexible as well as highly versatile systems such as the Large-area formwork Top 50, Doka supported the rapid and safe construction process for complex architectural requirements. Around 6,000 m^2 of Top 50 were equipped with Dokaplex and used for fair-faced concrete work as well. Robust Supporting construction frames and D15 as well as D22 Dam formwork ensured safe realisation of the project's particularities such as single-head walls of up to 8.33 m height. //

▲ Even architectural demands such as with the Metro expansion in Algeria are realised quickly and safely with high-performing Doka products.

▲ Cross-section changes and varying structural geometries can be realised safely using the flexible Load-bearing tower SL-1.

▲ Flexible standard systems such as Staxo 100 and Staxo 40, Doka slab formwork offers interesting system expansions for any shoring tower design.

▼ Qatar is getting its first light rail transit network. It will be realised with a solution from Doka.

▲ The crane independent Automatic climbing formwork SKE50 ensures a successful corewall assembly.

Hollywood inspires Dubai

Paramount, one of the biggest film studios of Hollywood, is venturing into the hotel industry with its prestigious Paramount Hotels and Resorts project in close proximity to Burj Khalfia.

The Facts:

Project: DAMAC Towers by Paramount Hotels & Resorts

Location: Dubai, United Arab Emirates

Contractor: TAV Construction

Systems in use: Large-area formwork Top 50, Framed formwork Frami Xlife and Framax Xlife, Climbing formwork MF240, Automatic climbing formwork SKE50 plus, Panel floor formwork Dokadek 30, Dokaflex table, Dokaflex 20

Services: Ready-to-Use Service, Formwork Instructor, On-site assembly Service

Developer DAMAC, a global leader in branded real estate, has partnered up with Paramount to launch its first hotel project. For this, Doka was chosen as exclusive formwork supplier on the project. Doka was able to satisfy contractor TAV with technical requirements, impressing them with a professional approach and tailored solutions for a tight schedule and limited storage space on site.

The project will comprise one hotel and three residential towers with a common podium. Right from the beginning, Doka's engineering team was involved to support the contractor TAV with formwork solutions for all the different structures on this project.

Tailored solutions

The Doka systems deployed on site include a broad range of wall systems, including the Framed formwork systems Frami Xlife, Framax Xlife and the versatile Large-area formwork Top 50. The vertical structures, such as the corewall and the shear walls are casted ahead of the slab which allows a better planning and execution of the different structures.

Climbing formwork MF240 is used for the shear walls. In just one crane lift the entire climbing platform and wall formwork is lifted safely to the next section. The complicated shape of the corewall required a specific solution by Doka. To ensure the corewall assembly is a success on site, the proven crane independent Automatic climbing formwork SKE50 plus was selected from Doka's large climbing system portfolio, in combination with Doka's On-site assembly Service.

Doka floor Systems such as Panel floor formwork Dokadek 30, Dokaflex tables and Dokaflex 20 are

▲ The Paramount Hotels and Resorts project comprises one hotel and three residential towers.

used to construct the horizontal elements of the Four-In-One towers. Dokaflex tables are utilised around the perimeter of the three residential towers to provide a safe and fast solution for the slab edge and drop-beam design of the typical slabs.

Dokadek 30 panels allow extremely fast forming times for the flat slab area and greatly reduce the consumption of plywood. The new innovative floor formwork system is set-up and repositioned manually, which reduces crane assistance to an absolute minimum, an advantage in this constricted working space. Dokaflex 20 provides flexibility to complete the fills along the curved and irregular shaped core walls.

Tour de force

Logistically, the site is extremely tight with minimal storage available. Huge coordination is required, with all four towers being built simultaneously in a restricted working environment. With Doka's Ready-to-Use Service, the formwork was delivered to site ready for erection straight from the trailer. Doka's Engineering considered the location of the site's tower cranes and concrete booms, to avoid obstructions during construction.

Overall, TAV was particularly happy with the quality and just in time delivery of the preassembled formwork elements. The experience and efficiency of the Formwork Instructors and on-site assembly team enabled extremely tight casting cycles to be achieved from the beginning of the project. The formwork scope on the project is expected to be finished by August 2015. //

The Professional

"Doka Gulf's formwork team guided us from the early stages of the project with their expertise. By using the latest developments of Doka formwork systems, paired with their On-site Services, we have set a new benchmark in our construction program."

Ugur Anliatamer
Dubai Branch Manager, TAV

▲ Doka convinced the customer with a tailored formwork solution for the tight schedule and limited storage space on site.

X marks the spot for Doka in Abu Dhabi

In the Emirate of Abu Dhabi, the Vision 2030 growth plan plunges ahead with a project that lies at the core of the strategy to increase economic development – expansion of the Abu Dhabi International Airport.

The Professional

"I have been working with Doka for a long time on big scale projects such as the Abu Dhabi Midfield Terminal Building. Doka has proven to be a reliable partner on the project and they excessively contributed to meet our milestones with their know-how and technical solutions. They had a strong supervision on site and promptly supplied material when needed."

Huseyin Misirlioglu
Senior Project Manager, TAV

Client Abu Dhabi Airport Company signed a contract with TAV-CCC-Arabtec Joint Venture to build the Midfield Terminal Complex ready for operation by 2017. Construction of the Midfield Terminal Building as part of the complex is already underway. The architecturally striking terminal formed in an X-shape will be 1.1 km long and cover an area of 700,000 m^2. The building will be visible at a distance of 1.5 km. The entire project costs are estimated to reach USD 3 billion. Upon completion, the Midfield Terminal Complex will handle 27 to 40 million passengers a year.

Doka Abu Dhabi is providing custom engineered formwork solutions that are according to the requirements of this vast structure with its unique shape and adhere to the JV's tight time schedule. Specifically, Doka formwork is used to construct the colossal piers, which are designed to accommodate up to 65 aircraft including the Airbus 380.

Due to the sheer extent of the assignment and the large amounts of formwork technology systems which need to be delivered to the site, Doka has appointed a dedicated Project Coordinator, an on-site Engineering Team and a Formwork Instructor especially to ensure a smooth work process during all phases of this project.

Doka is the exclusive formwork supplier to the Piers section of works, with approximately 6,400 m^2 of Framed formwork Frami Xlife as beam side formwork and 11,000 m^2 of Load-bearing tower Staxo 40 tables. Large-area formwork Top 50 is used for the retaining walls and column forms.

Doka UAE manages the mega project with intensity and daily internal coordination – the Engineering Department produced 500 drawings to date.

Other ariport projects in the Middle East, where Doka was successfully involved, are the Salalah and Muscat International Airports in Oman, the King Abdulaziz International Airport Jeddah in Saudia Arabia and the New Doha International Airport in Qatar. //

The Solution

Doka-Engineers developed an economical and time-saving formwork solution for the building based on the short fifteen month completion parameter for the JV. Logistics and daily coordination for delivery schedules and maneuvering the formwork on site are important factors in the joint success of the forming scope of the project.

▸ Doka Abu Dhabi is providing custom engineered formwork solutions for the expansion of the Abu Dhabi International Airport.

University banking on Doka

▲ The new University City in Kuwait is built on a 6 million m² property.

Education is a society's greatest asset. With its new university campus, Kuwait aims to provide access to top-quality education. Doka developed the formwork solution for the architecturally challenging structure.

Demand for good educational opportunities is on the rise in Kuwait. The giant educational campus of Sabah Al Salam University City comprises more than 6 million m² with facilities separated by gender. The building contractor is Sinohydro Corporation Ltd. The company engaged Doka for supplying a pathbreaking formwork solution for the striking building design comprising five levels. Compared to the competition, Doka's reduced cycle time and just in time delivery help accelerate the construction progress.

Challenges encountered during construction are the inclined columns as well as the high round columns and ceiling heights up to 8 m. Core walls are erected using 20 units of the Large-area formwork Top 50 and Climbing formwork 150F that are flexible in adapting to any shape or size. The support wall of 2,300 m total length and varying heights is erected using the Top 50 system. 55 sets of the Column formwork Top 50 are used to pour the columns, some of them inclined. Doka Engineers recommended a combination of Load-bearing tower Staxo 40 and Dokaflex 1-2-4 for building the floor formwork. Due to the small number and light weight of its individual parts, Staxo 40 is assembled quickly and predestined for great ceiling heights. It is used to pour around 12,000 m² of floor slab. An additional 9,500 m² floor slab area is built using Dokaflex 1-2-4. This formwork system is quickly set up and can be adjusted precisely to the heterogeneous building ground plans. Since large areas of the concrete sections will remain untreated, there is the added requirement for fair-faced concrete quality. It can be achieved by selecting any type of form-facing.

From the beginning, subcontractors and foremen are extremely knowledgeable about assembling Doka formwork systems. As a result, set-up and dismantling are finished in no time, thereby allowing for adherence to the schedule without any extra effort. The client's requirements changed several times during the planning stage. As a result, direct and regular communication with Doka Engineers was extremely valuable. The same holds true for a culture of rapid feedback and turn-around of appropriately customized adjustments. It made keeping on schedule with the tight cycling times possible.

Doka trainings held before construction start ensured smooth set-up and operation of the formwork systems. Construction work will continue until 2015. //

The Facts

Project: Sabah Al Salam University City

Construction site: Kuwait City, Kuwait

Building contractor:
Sinohydro Corporation Ltd.

Systems in use: Large-area formwork Top 50, Climbing Formwork 150F, Column formwork Top 50, Load-bearing tower Staxo 40, Dokaflex 1-2-4

▲ Dokaflex 1-2-4 and Staxo 40 are combined to build the floor formwork.

▸ It takes only twelve months of concrete works for the 20-storey court house in Al Farwaniya.

▾ Floors at the Farwaniya Court Complex are formed using pre-assembled Dokaflex tables.

20 floors on fast track

A new courthouse complex comprising a total area of around 200,000 m² under construction in Farwaniya. Only a twelve-month period is scheduled for the concrete works. In order to achieve this kind of speed, the building contractor puts its trust in the expert knowledge and high-performing formwork systems of Doka.

The Facts

Project: Farwaniya Court Complex

Construction site: Kuwait City, Kuwait

Construction company: Alghanim International General Trading & Contracting Co. W.L.L.

Construction time: 12 months

Systems in use: Large-area formwork Top 50, Framax Xlife, Automatic climbing formwork SKE50, Dokaflex table, Column formwork Framax Xlife

Services: Formwork Planning, Formwork Instructor, On-site Training

The Professional

"The performance of Doka formwork systems and the solid support on site were a crucial ingredient in being able to keep within our tough schedule of only twelve months."

Eng Khalid Rabhie, Project Manager, Alghanim International General Trading & Contracting Co W.L.L.

A new courthouse with adjacent 20-storey parking garage is under construction in Al Farwaniya, a suburb of Kuwait City. It accommodates 80 court rooms, 23 conference rooms, offices and public facilities. The heterogeneous shape of the building with an inclined wall on the front elevation presented a particular challenge. For this reason, Alghanim International General Trading & Contracting Co. W.L.L., the company contracted for construction, decided on a reliable formwork partner with decades of experience: Doka Engineers were involved early on during the planning stage. This approach allowed valuable know-how and experience gathered during previous projects to be incorporated so that the tough schedule can be met. Short-term readiness of the formwork system adds an additional layer of difficulty. Doka's own branch in Kuwait ensured just in time delivery as well as good engineering and sales support on site.

A package of high-performing Doka formwork systems is required in order to meet the rigour of this type of high-speed implementation. The formwork design for the core and shear walls includes altogether 5,400 m² of Large-area formwork Top 50 and an additional 61 sets of Framax Xlife is used to form the columns. Together they allow for maximum efficiency while pouring the 20 storeys. The Automatic climbing formwork SKE50 saves costly crane use and time during construction of the building core. The automatic climbing formwork system is raised hydraulically with the push of a button and without using a crane. This way an average pouring interval of two weeks per five-metre pouring segment can be realised. A total of 85 SKE50 units is used for the construction of the large core walls.

Doka Engineers also defined the ideal formwork system to be used for the floor formwork considering all project specific requirements. Here a total floor area of 10,900 m² pre-assembled Dokaflex tables is available so that large areas can be poured in one step. In addition, they are lifted quickly in 15 m² units to the next floor. That too saves time and money. Extended working platforms at the perimeter ensure a safe work environment around the slab edge.

Since the building contractor already realised several joint construction projects with Doka, where both management teams enjoyed a partner-like and appreciative atmosphere, this time the decision was made in favour of Doka once again. The team worked well together right from the start and the crew was already familiar with the formwork systems. The On-site Training led by a Doka Formwork Instructor optimised handling of the high-performing systems, thereby allowing for a smooth and speedy progress on site. //

New cultural complex

Thanks to their shared history, Alghanim International General Trading & Contracting Co W.L.L. construction company to rely on Doka's expert knowledge.

As a reliable formwork partner with decades of experience, Doka was hired to build the Abdullah Al Salem Al Sabah Cultural Centre, the museum and cultural district in Kuwait City. Six buildings in total will cover a 50,000 m² area: a museum of natural history, sciences, Islamic art and space museum as well as a theatre with 350 seats and an information centre. The generously dimensioned buildings are interconnected by covered paths from north to south. Underground garages on both sides of the district provide ample opportunities for parking and are connected with a service tunnel. Via this tunnel goods are carried to the buildings and refuse is dispatched.

Doka developed a formwork solution that perfectly matches the customer's requirements. Large-area formwork Top 50 is used to form the retaining walls. Universal Panels from the Framax Xlife framed-formwork range are ideal for forming the columns; practical accessories make the formwork quick to assemble and reset and compatible ladderways and working platforms ensure workplace safety. For concrete beams 40 sets of custom formwork are used during pouring works. Construction started in July 2014. //

The Professional

Eng Alaa Zekry, Project Manager, Abdullah Al Salem Al Sabah Cultural Centre

With the Abdullah Al Salem Al Sabah Cultural Centre, Kuwait City is creating a 50,000 m² museum and cultural district.

Living in luxury

The Hotel and Apartment Tower is a highrise project on the West Bay. 30 storeys will create space for an exclusive lifestyle in luxury apartments and also accommodate a first class hotel. Doka's efficient automatic climbing formwork systems are also used for this skyscraper and will reduce construction time by three months.

Al Bandary Real Estate is a leading company in Qatari real estate development. By building this highrise tower on the West Bay surrounded by hotels, government buildings, offices and embassies, the builder makes an architectural statement.

For erecting the building core, the building contractor Al Bandary Engineering relies on the expertise Doka Engineers accumulated over decades. The Automatic climbing formwork SKE50 is predestined for producing the in-situ concrete works of the building core. In combination with the flexible Timber-beam formwork Top 50 that can be adapted with ease to the heterogeneous architecture, the building core will be completed in a total of 46 casting sections. The formwork is hydraulically and automatically raised, thus eliminating costly crane use. Since Dokaflex tables are quickly repositioned as a unit and without disassembly, the intervals for forming remain consistently short. The average pouring cycle per floor slab is five days. For sections with irregular building heights Doka Engineers recommended the Load-bearing tower Staxo 40, as it is easy to use and extremely flexible when it comes to adaptation. Screw jack heads and feet allow for precise adjustment to any height.

Targeted training units for the construction crew in advance and formwork system assembly, organised by a Doka Formwork Instructor, ensured smooth construction progress without delays. In case of questions, Doka employees at the Doka branch in Doha were only a few kilometres away and available to answer questions at any time. The international Doka logistics and sales network is able to provide common formwork systems on short notice; just in time delivery allows for uninterrupted construction progress. //

The Professional

"The flexibility and modernity of SKE along with sales, engineering and logistic services of Doka in Qatar assured smooth construction progress without delays."

Ahmed El Sharnoby, Project Manager, Al Bandary Engineering, Trading & Contracting Co.

▲ The high-performing formwork systems from Doka accelerate construction progress at Hotel and Apartment Tower – three months ahead of schedule.

Highrise-Twins for The Pearl

▲ Dokaflex tables keep work moving ahead swiftly through the project.

With AQ1 and AQ2 in the Abraj Quartier, another highrise project to be realized in Qatar. Two identical highrises with 41 storeys each are built on Doha's West Bay. Redco construction – ALMANA was contracted for the construction project. For formwork solutions the company relies on the international highrise expertise of Doka.

The Pearl is an artificial island off the Qatari east coast, situated roughly eleven miles north-east of the capital Doha. The urban development plan offers an area of 400 ha for luxury apartments, villas, universities, shopping malls and what will be the "pearls among highrises". One of these projects are the Abraj Quartier highrise twins, each 196 m high.

Speed and absolute reliability as well as the ability to deliver quickly were quintessential for securing the in-situ concrete contract. Since Doka Engineers were already part of the planning stage, they were able to propose an efficient formwork solution geared to accelerating the construction process and at the same time reducing manpower requirements, thereby reducing costs as well. This option was feasible thanks to the crane-independent Automatic climbing formwork SKE50 and SKE50 plus that celebrated its debut on Qatari soil with this project.

In combination with the Timber-beam formwork Top 50 it produces a casting section of 4.10 m maximum in a 4-day cycle. A total of 2,675 m^2 Large-area formwork Top 50 is available for the core walls of both towers.

The floor slabs are poured with Dokaflex tables. Their easy and practical set-up combined with high speed during lifting and adjustment make Dokaflex tables the ideal system for especially economical realization of large-area floor slabs. When used in combination with the automatic climbing formwork, the construction is completed ahead of schedule.

Here too, the close proximity to the Doka branch in Doha proved to be extremely beneficial during the start-up phase and with questions regarding set-up, assembly and operation of the highly technical formwork systems. //

The Facts

Project: AQ1 & AQ2 Highrise Twins

Construction site:
Abraj Quartier, Doha, Qatar

Construction company:
Redco construction – ALMANA

Systems in use: Automatic climbing formwok SKE50 and SKE50 plus, Large-area formwork Top 50, Dokaflex table

▲ Two highrises on the West Bay are rising toward the sky nearly simultaneously and will soon help define the skyline of the Qatari capital.

Two new features for Doha skyline

State Audit Bureau to set new architectural accents on the West Bay. Two highrises, each exceeding 100 m in height to accommodate office, residential apartment and shopping areas. When it comes to formwork expertise, the building contractor SEG Qatar puts trust in their proven partner over many years: Doka is supplying the high-performing automatic climbing formwork solution.

A new highrise project is under construction on the West Bay of Doha. The building complex is situated directly on the Persian Gulf and only a few kilometres south of the "Lusail" urbanisation project where Doka is involved as well. The State Audit Bureau is comprised of two highrises of 31 storeys each that are to create space for commercial use. One of them is designated to be an office tower reaching 137 m up into the sky, while the other, at 125 m height overall, is slated for accommodating apartments along with a shopping mall.

Doka Engineers proposed the efficient Automatic climbing formwork SKE50 for erecting the building core. Doka automatic climbing systems reduce time, are safe to use and eliminate the need for costly crane use. In combination with the available 1,642 m² of Large-area formwork Top 50, they ensure on-schedule construction progress. On average, each of the towers is adding one storey with 4.1 m per weekly cycle to its height. The flexible Dokaflex tables are used for pouring floor slabs. Thanks to pre-assembled units, the formwork system with a total area of 4,347 m² that can cover 2 floors, was used for both towers as it is easily set up and quickly repositioned.

The construction company uses additional formwork components, such as Doka floor props and H20 beams from its own stock. "Without a doubt, Doka formwork systems translate into cost efficiency thanks to several use cycles and therefore a long service life", stresses Henri Kahy, SEG Qatar Project Manager, who already realized many joint projects with Doka.

A Formwork Instructor was available to support the site crew during formwork system set-up. The close proximity of Doka's Qatari branch is very beneficial because paths are short – with communication in the language of the country. In the meantime the construction phase is in its final stages. The ground-breaking ceremony happened in 2012 and the State Audit Bureau is scheduled for completion by the end of 2014. //

The Professional

"Doka formwork systems represent cost efficiency thanks to multiple re-use cycles."

Henri Kahy, Project Manager, SEG Qatar

The Facts

Project: State Audit Bureau (two towers)

Location: Doha, Qatar

Building contractor: SEG Qatar

Start of construction: 2012

Scheduled completion: end of 2014

Number of storeys: 31 per tower

Systems in use: Automatic climbing formwork SKE50, Large-area formwork Top 50, Dokaflex table

Linking the islands

Qatar initiated a new city development project. In an area currently still a desert, a new modern city with waterways and man-made islands will be rising from a lagoon. Formwork engineering experts are needed to connect the islands: Doka was hired to supply pre-assembled formwork materials for two pedestrian bridges measuring 120 m each. Doing so will save the builder time and money.

The Facts

Project: Lusail CP3A-3 (Bridge 4A & 6A)

Construction site: Doha, Qatar

Construction company:
FCC Construction - Petroserv JV

Systems in use: Load-bearing tower Staxo 40, Large-area formwork Top 50

Services: Ready-to-Use Service

Lusail is an urbanisation project along the east coast north of Doha, the capital of Qatar. The planned city will be built on a 35 km^2 desert area starting at the West Bay Complex Canal north-east of Doha that so far has seen hardly any construction activity. It stretches seven kilometres north along the coast and extends up to five kilometres inland. After completion, this pocket of land will be home to a population

Thanks to its adjustable screw jack U-heads and screw jack feet, the flexible Load-bearing tower Staxo 40 can be adjusted precisely to the changes in bridge height.

of 200,000, offer 170,000 jobs and accommodate 80,000 visitors. To this end, comprehensive earth movements have taken place starting in 2006.

The new city will include large blocks of land and bodies of water, internal connecting channels and offshore islands. Pedestrian bridges that can be integrated into the unconventional design of the modern hot spot have to be built to link the islands, some of which are more 100 m apart. For forming two of these bridges, builder FCC-Petroserv JV relies on decades of expertise gathered by Doka Engineers.

Ellipsis design in fair-faced concrete

The bridge design looks like several ellipses strung together, with the concrete decks suspended from steel ropes attached to slender pylons. The two bridges are 120 m long each and built in parallel. This mean the quantity of the required formwork material must be double. The formwork system for bridge construction consists of the Load-bearing tower Staxo 40 and Large-area formwork Top 50 which meets all architectural requirements specified by the customer.

This includes the surface structure of the bridge deck that was to meet requirements of fair-faced concrete. Precision panel joints result in a perfect joint pattern that eliminates rework. Due to the course of the changing bridge level, the shoring tower has to be adapted accordingly for each pouring section. The flexible Load-bearing tower Staxo 40 allows for precise adaptation of the shoring tower to the building specification. Adjustable U-heads and feet of the screw jacks with 75 cm extension range allow for easy height adjustment.

In order to provide for maximum efficiency in terms of construction time, the bridge deck formwork was assembled in advance. Pre-fabrication at Doka's Pre-assembly Service saves time and space on site and at the same time reduces costs. The finished systems were delivered just in time by way of special shipment and immediately ready for use. “We are very happy with the pre-assembly of formwork systems. It saves us time and ensures quality. This process made assembling the formwork panels on the load-bearing tower quick and easy”, said Victor Gomez Lopez, the FCC Construcción Construction Manager.

Since Doka Engineers were already involved during the planning stage, they were able to provide valuable advice on all issues regarding options for formwork engineering pertaining to architectural requirements. Here, the ability to adapt quickly was also necessary, with the bridge design and consequently load-bearing tower and formwork requirements changing several times during planning. Theoretical and hands-on training session prior to start of construction were helpful for the crew. It ensured smooth implementation of processes and efficient construction progress. “Proximity to the Doka branch in Qatar allowed for quick feedback in case of questions. Thanks to the on-site Formwork Instructor, technical support was available any time”, Lopez commented further.

The initial formwork was delivered in August 2013. In-situ concrete work for both pedestrian bridges will be completed on-schedule by year-end 2014. //

▲ The bridge deck formwork was assembled in advance.

▼ Doka delivers a custom-made formwork solution for the 120-m long pedestrian bridge shaped like ellipses.

The Professional

“Pre-fabrication of our formwork systems made it possible for the builder to start forming work right away. Doing so increases efficiency, saves on logistics and space on site in addition to accelerating construction progress. All these measures translate into a reduction of overall costs.”

Victor Gomez Lopez, Construction Manager, FCC Construcción

Expanding luxury

▲ Walls and columns are poured using Framed formwork Framax Xlife.

A dream became reality. Today “Aishti”, the brand founded 15 years ago, represents the ultimate in up-scale shopping. Now the Aishti Mall Seaside is expanding and creating space for additional luxury brands. Doka experts are needed to develop the high-performing formwork solutions for the in-situ concrete works of the architectural jewel's storeys, each of which is 8 m high.

The Facts

Project: Aïshti Mall Seaside

Location: Beirut, Lebanon

Construction company:
K-build Engineering & Contracting s.a.l.

Systems in use: Load-bearing tower d2 and Staxo, Framed formwork Framax Xlife

With the Aishti Mall Seaside in Beirut at maximum capacity, it is now expanded with the help of an innovative architectural concept. To ensure successful implementation, the contractor K-build Engineering & Contracting s.a.l. relies on Doka's pathbreaking formwork solutions. Besides erecting the vertical structure with walls 7 m high, an additional challenge was to finish the surface in fair-faced concrete quality with precisely placed form-tie points.

100 kN load-bearing capacity

Pouring the 8-m high floors requires high-performing shoring towers. Load-bearing towers d2 and Staxo 100 score with their high load-bearing capacity and enable quick set-up thanks to the small number of individual parts. The result is reduced man-power requirement and a more efficient work process overall. Staxo 100 with its robust steel frames is characterised by tall shoring heights and extraordinary load-handling capacity of up to 100 kN per leg. Step-less fine-tuning that is exact to the millimetre allows for flexible heights. 100 shoring towers Staxo 100 are available for a 2,600 m² area and can be re-used for the overall 7,000 m² floor space.

In addition, integrated safety equipment such as safe up and down access ladders with anti-slip rungs offer a high level of workplace safety. Walls and columns are poured using the Framed formwork Framax Xlife. Even after many use cycles, the quality of workmanship and sturdy Xlife sheets deliver excellent concrete results, with the coordinated panel grid providing a uniform joint pattern. Thanks to the consistent 15-cm increments, time consuming filler areas can be reduced to a minimum.

Additional cost savings are realised owing to generous 1.35-m form-tie spacing that minimises the need for costly rework on tie holes. Moreover, wide spaces between form-ties reduce forming-time. 290 m² of this high-performing steel frame formwork are available and will build one level in 15 pouring cycles. An entire storey, i.e. floors and walls and/or columns, is completed within 45 days.

Doka Engineering started during planning

Doka Engineers were already involved during the planning stage. Proposed formwork systems were available promptly and contribute to construction progress even ahead of schedule. Doka Formwork Instructors were in charge of on-site formwork system set-up and, as part of training sessions, explained correct handling to the crew. Doka's own branch in Beirut allowed for quick responses to questions. //

▼ Durable Doka Xlife sheets deliver outstanding results in fair-faced concrete quality even after multiple use-cycles.

▼ The Aishti Mall Seaside is creating space for additional luxury brands in Beirut.

▲ Doka provides sustainable formwork for the Eco House.

Forming the world of tomorrow

Doka Muscat is partnered up with GUTech to provide sustainable formwork for the 'EcoHouse'.

The rapid growth of Oman's economy together with its continuous efforts to diversify the economy in different sectors and a stronger focus on tourism has led to an increase in energy consumption all over the Sultanate. With prices of fossil energies on the rise, a lot of companies are on the lookout for more energy efficient and sustainable ways to build residential houses in the construction industry. The architectural design and materials used play center stage in this scenario. For this reason, the Research Council of the Sultanate of Oman has issued a contest between five universities in the country to design a net-zero-energy building for the next generation of villas. The winner of this contest was the German University of Technology in Oman (GUTech) who now teamed up with Doka Muscat as a local partner to provide the formwork for the 210 m² indoor area of the 2-storey building.

GUTech was looking for suppliers who placed a lot of emphasis on sustainability as well as efficiency, two factors which are tightly anchored in Doka's environmental protection philosophy and corporate values. Doka provided Frami Xlife panels for the columns, the slab system Dokaflex and the Load-bearing tower Staxo 40 for the construction of the house. The Framed formwork Frami Xlife offers an incredibly long lifespan due to almost infinite reuse cycles and a highly robust and resilient steel-frame. Dokaflex was equipped with timber beams H20 eco P and floor props Eco 15 that contribute to the efficiency and sustainability on site as the design is perfectly utilized on this specific application. The Load-bearing tower Staxo 40 is galvanized, ensuring a long life-span through reduced damage infliction and sturdy frames.

Doka Muscat even has eco-friendly solutions in case that the formwork is damaged: The local 12,000 m² stockyard in Rumaiz near Barka has integrated reconditioning facilities that can repair damaged formwork elements and makes them ready for re-usage again. And even the reconditioning facility itself is 'green' as the washing booth runs on an innovative water-recycling system that protects precious resources.

Doka products are inter-combinable and highly adaptable on the jobsite, meaning for example that the Frami Xlife panels can also be used for walls while the Dokaflex can be easily shifted to another position without the need to buy additional formwork.

The executing construction company, New Innovative Technologies, came to the Doka Muscat office for joint discussions about the required formwork and the construction sequence of the building. Doka Muscat offered a solution which facilitated and accelerated the progress on site, resulting in the fact that the construction of the Eco House could be finished six weeks ahead of schedule. //

The Facts

Project: EcoHouse

Construction site: Muscat, Oman

Construction company: New Innovative Technologies LLC

Systems in use: Dokaflex, Load-bearing tower Staxo 40, Framed formwork Frami Xlife

▲ Thanks to Doka's high performing formwork systems the construction of the Eco House was 6 weeks ahead of schedule.

▲ Doka is forming 44 tanks as part of what will be the world's largest petrochemical industrial complex.

44 tanks in 18 months

Sadara Chemical Company to build giant industrial complex in Saudi Arabia. Building contractor Kettaneh Construction Saudi Arabia banks on Doka know-how for construction of 44 tanks. High-performing Doka climbing systems accelerate construction progress and meet the tight schedule.

The Professional

"Climbing formwork 150F is the ultimate in easy handling. Formwork panels and climbing platforms are lifted together in one crane lift."

Abdurrahman Qabaja, Construction Manager, Kettaneh Construction Saudi Arabia

▲ Using the high-performing Doka climbing formwork 150F facilitates pouring a 3.45-m section per week.

19 plants for manufacturing products including steel, aluminium, plastic and fertilisers are located in the 8,000-ha industrial section of Al-Jubail, a city of 220,000 residents on the Persian Gulf. One of the companies located there is Sadara Chemical Company, an enterprise established in 2011 by the US chemical corporation Dow Chemical and the Saudi Aramco mineral oil group. The most important port in the east of the industrial zone is King Fahad Industrial Port. This is where the company wants to establish the world's largest petrochemical industrial complex with a total of 26 production plants of the commodities and plastics chemical sector.

Part of this gigantic project is the construction of 44 new tanks for safe storage of chemical liquids. Known for its expertise accumulated over decades, Doka has been recruited to pour the tanks measuring more than 30 m in height and featuring a diameter of 44 m and will supply Climbing formwork 150F, predestined for such structures. The Climbing formwork 150F system is tried-and-tested for crane-lifted climbing projects and offers ease of set up and handling.

A 1.65-m wide working platform enclosed all the way around ensures safe working conditions for the construction crew. The flexible Large-area formwork Top 50 and the climbing platforms are lifted as one unit, thereby reducing the time the crane is tied-up. The average section poured per week is 3.45 m high.

Thanks to Doka's international distribution and logistics network, the formwork systems were available on-time. As a result, the project managed to stay on schedule. Overall, the formwork material provided allowed for building eight tanks at a time. Construction commenced in March 2013 and was already completed in August 2014. "Starting with the planning phase, Doka Engineers provided us with valuable advice. Formwork Instructors supported us during the assembly stage and ensured smooth operation of the formwork systems. The proximity of Doka's branch in Dammam just 100 km away, turned out to be a great advantage. This way we always had access to a contact person for spontaneous questions", so Abdurrahman Qabaja, Construction Manager of Kettaneh Construction Saudi Arabia. //

Golden landmark at the Red Sea

Golden Tower to become most luxurious residential building in Jeddah, Saudi Arabia. Skyscraper construction to be completed after just two years. In order to keep up with this pace with forming works as well, Doka to supply high-performing systems such as the Automatic climbing formwork SKE50.

With Golden Tower, the port city of Jeddah will receive a luxury residential tower as well as a new landmark on the Corniche, the 30-km coastal area on the Red Sea. At 205 m overall height, the highrise is destined to be an architectural masterpiece. To this end, the facade takes a page from style and flair of historical Jeddah buildings that is then melded with accents of modern architecture. Future residents of the 50 storeys will enjoy cutting edge interior design paired with the ultimate luxury standard.

Apartments range from 350 to 850 m^2 in size and are characterised by high ceilings and giant windows that offer unobstructed panoramic views through windows anywhere between 18 and 40 m wide. Safety and privacy are of utmost priority: private lifts will carry residents directly from the guarded parking garage into their own apartments. Swimming pools and sky gardens complete the wellness oasis at the centre of the pulsing mega-city.

Doka – the exclusive formwork supplier

The focus on top quality begins with construction. As a result, the building contractor, Al Saad General Contracting, decided on Doka as the exclusive formwork system supplier. Speed, efficiency and reliability were the decisive factors in awarding the forming work. Use of Doka Automatic climbing formwork SKE50 and SKE100 plus used for pouring the building core allow for completing a 3.8-m casting section in a five-day cycle. These automatic climbing systems are raised automatically with the push of a button, thereby saving costly use of cranes and manpower.

With its solid enclosure, the Protection screen Xclimb 60 protects workers from falling, wind and weather. It increases the sense of safety, thereby improving productivity and as a result ensuring unrestricted construction progress. Floor slabs are built using Dokaflex tables. Thanks to their easy and practical set-up and high speed during lifting and adjusting, Dokaflex tables are the ideal solution for large-area floor slab sites. Using the Table Lifting System TLS, the large-area formwork units are also repositioned without using a crane. The Framed formwork Frami eco allows for rapid forming of walls and columns. High-quality formwork sheets, robust system components as well as hollow-profile steel frames with special coating improve product quality and make for a long service life, which in turn ensures high efficiency.

A Doka Formwork Instructor organised the set-up, while some of the formwork system was already pre-assembled by Doka employees. Doing so allowed elements such as the tableforms to be put to use without delay. Swift construction progress during forming and pouring work is an essential part of building completion as scheduled by mid-year 2016. **//**

The Facts

Project: Golden Tower

Location: Jeddah, Saudi Arabia

Building contractor:
Al Saad General Contracting

Construction height: 205 m

Number of storeys: 50

Systems in use: Automatic climbing formwork SKE50 and SKE100 plus, Protection Screen Xclimb 60, Dokaflex table, self-climbing Table Lifting System, Framed formwork Frami eco

Starting in 2016, the Golden Tower on the Jeddah Cornish will offer luxury apartments on 48 storeys.

In brief

News, dates, media, awards

Best Innovative Formwork Systems

On September 17th, 2014 the Dossier Construction Awards & Summit 2014 took place in Muscat. Market-leaders in the construction industry and high ranking members of the public authorities met and discussed industry related developments. The evening Awards ceremony felicitated industry performers in different categories and classifications. Doka Oman was rewarded for its outstanding formwork technology with the Special Award for "Best Innovative Formwork Systems".

▲ Doka Oman won the "Best Innovative Formwork Systems" Award.

Go Fast. Build Smart!

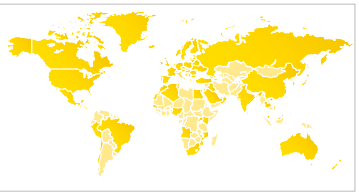
Soon available in the Middle East is Doka OneGo, a high-performing formwork system designed to cast walls and slabs in a single pour. Its lightweight aluminium panels and optimized forming sequence deliver greater efficiency on site. Doka OneGo is ideal for a wide range of use including single-family houses, apartment complexes, high-rise residential and other highrise buildings. All building elements such as walls, slabs, columns, beams, stairs as well as door and window openings can be formed with Doka OneGo. Learn more on www.doka-onego.com.

▲ With Doka OneGo walls and slabs are poured in one step.

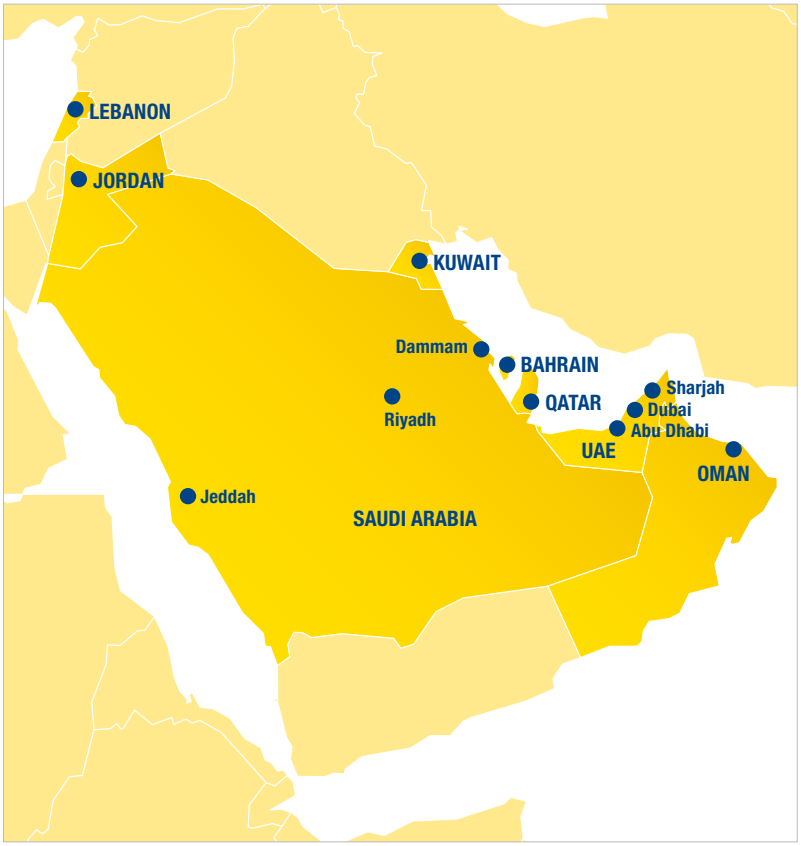
New self-climbing formwork system

The next round of Doka Group's business strategy is under way: With the acquisition of the formwork technology department of the Australian construction company Grocon, Doka established a new subsidiary under the name Lubeca Pty Ltd. In the Middle East, the automatic climbing formwork "Lubeca Jumpform" is now part of Doka's portfolio.

▲ "Lubeca Jumpform" is now part of Doka's product portfolio.



▲ **Doka branches worldwide.** With more than 160 sales and logistics facilities in over 70 countries, the Doka Group has a highly efficient distribution network.



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