

## Sustainability – one STEP at a time

### Qatar

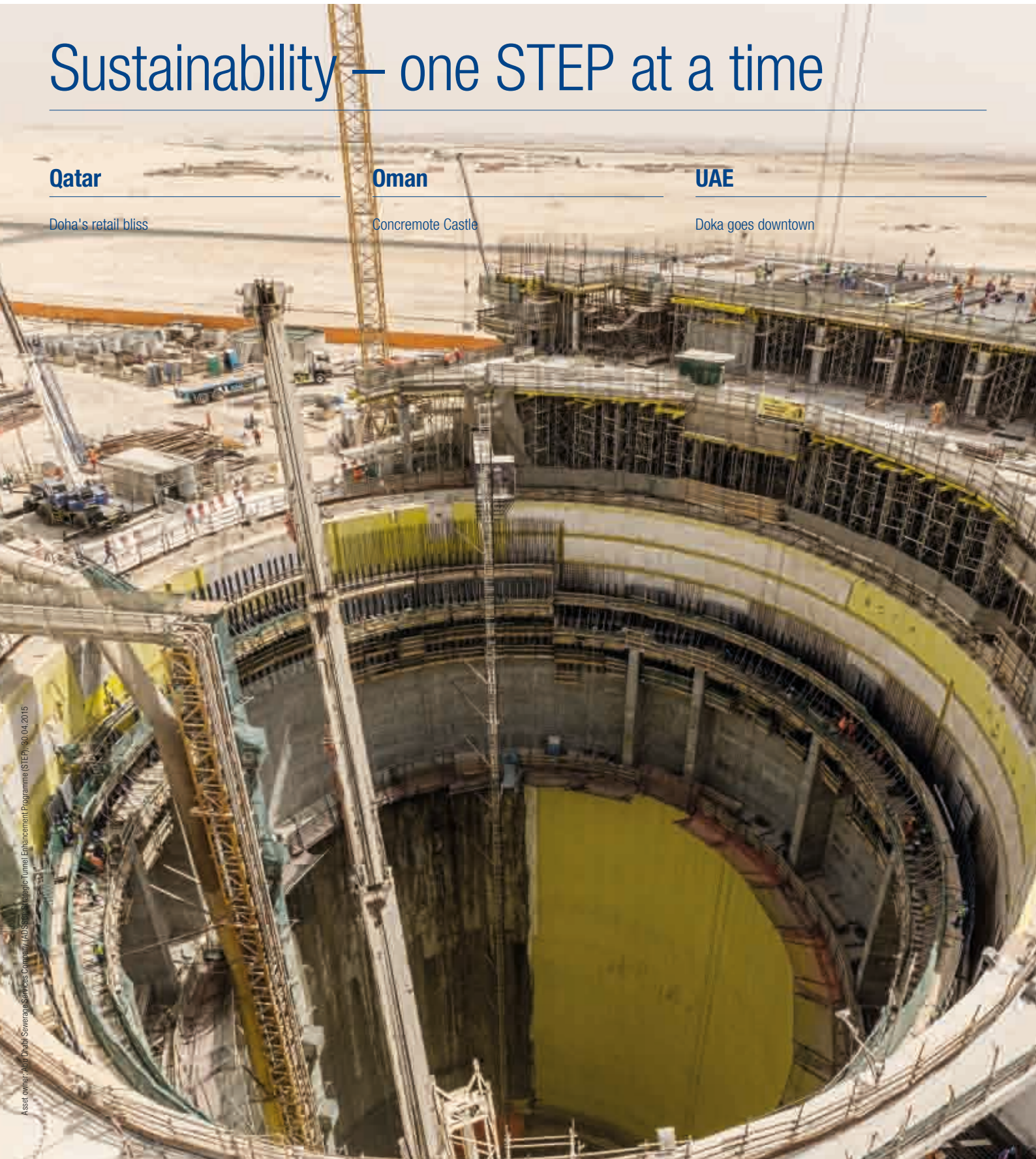
Doha's retail bliss

### Oman

Concremote Castle

### UAE

Doka goes downtown



Asset owner: Abu Dhabi Sewerage Services Company (ADSSC) | Intelligent Tunnel Enhancement Programme (STEP) | 30.04.2015

## Editorial



### To our clients and colleagues,

While our technology may have changed, our tradition of listening to the requirements of our clients and providing adaptable solutions remains as important today as it was when our company was founded over 150 years ago. By constantly questioning how we can deliver greater value, we have successfully built the Doka brand to be synonymous with innovation, excellence and efficiency.

Going beyond the provision of formwork solutions, we take into account the construction process as a whole, and therefore find further ways of saving our clients time and money, with Concremote (see page 13) being one of our most recent examples. As a device that measures concrete quality, while providing real-time updates to the smart phone or tablet device of our clients, Concremote is a perfect example of how Doka is redefining standards across the construction industry.

Based on the Middle East's robust construction outlook and coupled with the requirements of our long-standing clients, I'm pleased to announce we have continued to strengthen our presence across the region in countries including Turkey, Iran and Azerbaijan amongst others, who will be able to benefit from our existing synergies in terms of logistics, engineering and technical know-how.

Providing a valuable insight into our regional operations, the Doka XPress

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offers a comprehensive round up of our latest projects and innovations, while clearly illustrating how we can consistently offer practical solutions to even the most challenging projects.

Should you have any questions about the services or solutions covered in this magazine, please don't hesitate to contact a member of our team, otherwise it only leaves me to thank you for your interest in Doka and we hope you enjoy this issue of the Doka XPress.

Sincerely,

Peter Vogel  
Director Middle East,  
Doka Group



## Doka News

### Breakthrough in Kuala Lumpur ▼

In the project extending the MRT Sungai Buloh in Kuala Lumpur, Doka supports construction of the Merdeka underground station with an individual formwork solution that includes the Composite formwork beam I tec 20. The use of these beams is advantageous in locations where they replace the heavy steel sections.



### ◀ Premier at Korabelny Channel crossing

At the heart of the biggest infrastructure project in St. Petersburg lies the 620 m long cable-stayed bridge across the Korabelny Channel. For the pylons with their sophisticated shapes Doka supplied crane-lifted and automatic climbing formwork systems. During construction of the main piers the heavy-duty bracket HDC celebrated its premier.



▲ Once completed, this project will not only represent a masterpiece of engineering, but furthermore a landmark in terms of Abu Dhabi's status as a sustainable city.

# Sustainability – one STEP at a time

**Doka has been working on one of the most extraordinary projects in the region, both in terms of scale and sustainability.**

In the past decade, the Gulf region has emerged as a diversified economy. At the heart of this region is the Emirate of Abu Dhabi. Consistent with Abu Dhabi's world class approach to planning and growth, the Emirate has taken a patient methodology toward development. In 2007, the Abu Dhabi government revealed Plan Abu Dhabi 2030, a long-range development plan for the Emirate to become a hub for culture, business and tourism. At the core of this long-term plan is the concept of sustainability and infrastructure improvements.

The Strategic Tunnel Enhancement Programme (STEP) is a world-class solution developed by the Abu Dhabi Sewerage Services Company (ADSSC)

to relieve the hydraulic burden on the existing sewerage network and to accommodate the demand created by the projected population growth in the Emirate of Abu Dhabi.

The STEP programme is a deep gravity sewerage system designed to collect wastewater from both the Abu Dhabi Islands and mainland. The USD 1.6 billion programme includes one of the deepest gravity sewer tunnels in the world and the first and largest in the Gulf region. The 41 km tunnel varies in depth from 30 to 85 m and a finished internal diameter between 4 to 5.5 m. In addition to the 41 km tunnel, STEP includes 45 km of "link sewers" to connect the existing sewerage system to the new

## The Challenge

To provide a tailored formwork solution to this unique project while minimising crane usage and ensuring safety on site at all times.

## The Solution

Doka developed a crane-less formwork solution by using a combination of D22 Dam formwork, Automatic climbing formwork SKE50 plus and Large-area formwork Top 50. A Formwork instructor supports the working staff on site and advises on how to handle the formwork systems.



► The Liner-Above-Toe-Beam and the Liner-Below-Toe-Beam reach a combined depth of 105 m, a diameter of 50.4 m for the Liner-Above-Toe-Beam and a diameter of 45 m for the Liner-Below-Toe-Beam.



## The Facts

**Project:** Pumping Station 01, Strategic Tunnel Enhancement Programme (STEP) project

**Location:** Abu Dhabi, U.A.E.

**Main contractor:** Construtora Norberto Odebrecht S.A.

**Start of construction:** March 2012

**Systems in use:** Large-area formwork Top 50, Framed formwork Framax Xlife and Frami Xlife, Load-bearing tower Staxo 100 and 40, Automatic climbing formwork SKE50 plus (64 climbers), Dam Formwork D22 (128 D22 F brackets)

**Services:** Formwork instructor, Doka Engineer at site office

deep tunnel and one large pumping station which will accommodate an average wastewater flow of 1.7 million m<sup>3</sup> per day by 2030.

Conducted under the supervision of the ADSSC Programme Management Department and primary consultant CH2M Hill, STEP was separated into six design-build contracts with the three deep sewer tunnels being awarded to Samsung and Impregilo S.p.A. and both link sewers to Zublin.

The final contract, allocated for the pumping station (Contract PS-01), was awarded to engineering and construction firm Construtora Norberto Odebrecht S.A. who in turn brought in Doka to offer its expertise in providing a versatile range of formwork solutions on this highly unique project. Construction works commenced in March 2012, including a wide variety of structures such as offices, a fire protection plant house, fuel tank farm and odour control plant. The most challenging scope of the project has to be the pump station shaft. Once completed, it will have a design capacity to handle a sewage flow of 30 m<sup>3</sup> per second.

Doka's scope of works included the casting of the shaft liner walls (perimeter walls), for which the liner was divided into two segments: the Liner-Above-Toe-Beam and the Liner-Below-Toe-Beam reaching a combined depth of 105 m, a diameter of 50.4 m for the Liner-Above-Toe-Beam and a diameter of 45 m for the Liner-Below-Toe-Beam.

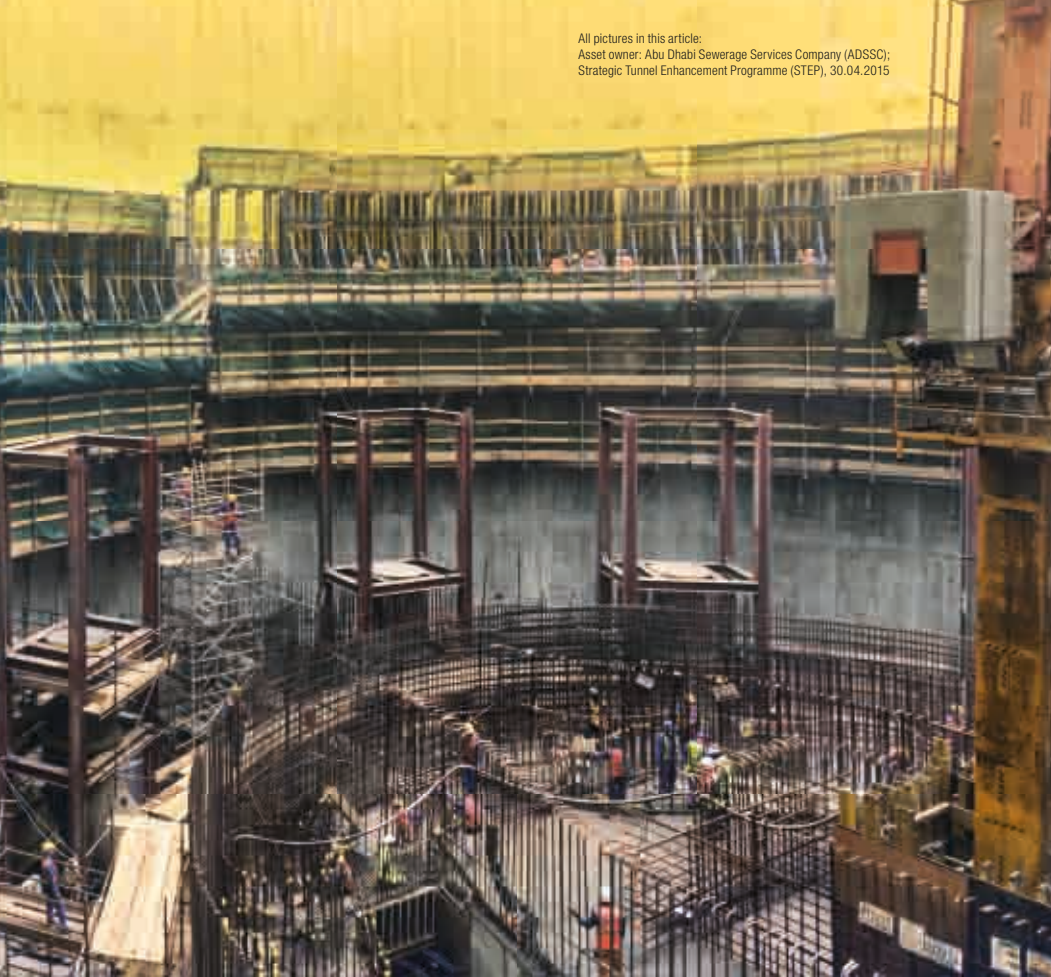
Working in close contact with main contractor Construtora Norberto Odebrecht S.A., the technical solutions provided by Doka were as unique as the project itself. Above all engineering requirements was the focus to minimise crane usage and ensure safety on site at all times, something that was particularly important given the variety of works taking place simultaneously in the shaft centre, including the sump pump, wet and dry well and mechanical works.

## Engineering feat

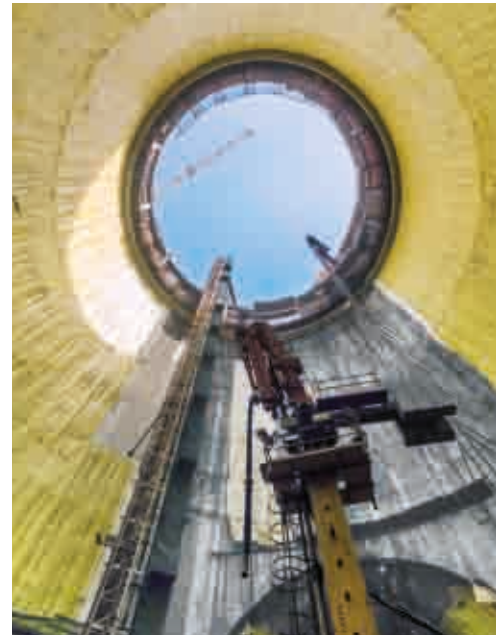
Doka devised a crane-less formwork solution by using a combination of D22 F Dam Formwork, Automatic climbing formwork SKE50 plus and Large-area Top 50 system (chosen due to its adaptability to the cylindrical shape of the shaft). The shaft liner was then connected to a single-sided diaphragm wall, which in combination with the D22 F Dam Formwork system provided workers with a 2.4 m wide platform, allowing them to easily retract formwork and clean the material after casting. A quantity of 64 brackets of SKE50 plus were included, connected to 128 D22 F brackets, completely eliminating the requirement for any cranes.

For the first time in the UAE, Doka's Dam Formwork D22 F was used in combination with Automatic climbing system SKE50 plus, to provide an optimum solution for the client. Typically, D22 F is used for single sided walls, vertical rising structures such





▼ The most challenging element is the pump station shaft.



as dams, whereas SKE50 plus is a highly utilised climbing system for highrise building construction.

The liner wall concreting of the shaft was conducted with Large-area formwork Top 50, in combination with Dam Formwork D22 F, while the Automatic climbing formwork SKE50 plus system handled the automatic climbing of the whole system to the next level. Overall, the Dam Formwork D22 F and Automatic Climbing Formwork SKE50 plus were combined to compliment the unique nature of the project and ensure efficiency and safety.

Initially, the concept was to use one set of formwork starting from the bottom of the shaft. Due to time constraints and programme changes, the contractor required another set of formwork placed at the Liner-Above-Toe-Beam. Doka came up with a solution considering material availability in the shortest possible timeframe, which involved Large-area formwork Top 50, combined with amended Suspension heads WS10, which were used as bracket platforms. The brackets were modified based on the concept of dam formwork and supporting construction frames, combining spindle struts, steel walings and suspension heads WS10, making it a full platform climbing system.

### External buildings

Doka's work went beyond the pumping station and included all external building columns, walls and

slabs. Framed formwork Frami Xlife and Framed formwork Framax Xlife were used so no panel fabrication was required, while Large-area formwork Top 50 was ideal to be modified into any shape and size due to its flexibility. For the slab, Dokaflex 1-2-4, Load-bearing tower Staxo 40 and Load-bearing tower Staxo 100 were used, with Staxo 40 being favoured for its lightweight and easy to handle properties.

Safety is always a priority and particularly with such a unique project. At each stage, every concept designed had to satisfy the concerns regarding structural stability and safety of all workers on site, with Doka even assigning a full-time formwork instructor to support and advise on-site staff in handling Doka formwork. To accommodate new design requirements and changes, a Doka engineer was based at the site office to ensure a smooth coordination with the Odebrecht team. Weekly progress meetings with the contractor were organised to discuss all design concepts, site requirements and safety issues, ensuring the wellbeing of all stakeholders remained at the forefront of people's minds.

Once completed, this project will not only represent a masterpiece of engineering, but furthermore a landmark in terms of Abu Dhabi's status as a sustainable city. //



### Practical Tip

#### Continuous height mismatch Framed formwork Frami Xlife

The continuous hardware slot in the frame means that the Frami clamp can be fixed anywhere on the frame. Thus, the panel height can be continuously mismatched, i.e. without any pre-defined grid. This means the formwork can be easily accommodated to e.g. steps, slopes and uneven ground without extra work.



## The Challenge

A tight schedule and supporting horizontal pre-cast heavy beams at a height exceeding 20 m.



## The Solution

Doka developed a time-saving formwork solution and provided 45,200 m<sup>3</sup> Load-bearing tower Staxo 100 and 175,000 m<sup>3</sup> Load-bearing tower Staxo 40.

## The Facts

**Project:** Mall of Qatar

**Location:** Doha, Qatar

**Contractor:**

UrbaCon Trading & Contracting (UCC)

**Start of construction:** 2013

**Opening date:** 2016

**Systems in use:** Load-bearing towers Staxo 100 and Staxo 40

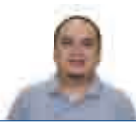


▲ Vast quantities of formwork material were required for a 33,000 m<sup>2</sup> decking area.

# Doha's retail bliss

**The eagerly awaited Mall of Qatar project, with an estimated cost of USD 1.3 billion, will be the country's largest, and one of the world's biggest shopping malls.**

## The Professional



**"We were able to meet the deadline of the MOQ project with a combination of teamwork, pro-activity and expertise."**

**Glenn Gonzales**, Project Technician,  
Doka Qatar

According to the main contractor, UrbaCon Trading & Contracting (UCC), the Mall will be ready to open its doors to the public in the latter half of 2016. The Mall of Qatar will be the first entertainment mall in the region to have its own proprietary shows which will be performed by a resident performance troupe. Entertainment will be provided throughout the mall with the main shows being performed in the Oasis. The Oasis will be located in the heart of the mall and will feature a 360 degree, custom developed, revolving stage set within a pond of dancing water fountains. The stage rigging will include acrobatic high wires and a six meter diameter central hydraulic lift with a load capacity equivalent to four fully grown African bull elephants and a top speed of one meter per four seconds.

Construction started in 2013 and UCC chose Doka as their formwork partner due to the ready availability of the vast quantities of material required for the 33,000 m<sup>2</sup> decking area. In use are 45,200 m<sup>3</sup> of Load-bearing tower Staxo 100 and 175,500 m<sup>3</sup> of Load-bearing tower Staxo 40. The Load-bearing towers also support heavy RC beams for precast hollow-core slabs.

The building is mainly composed of precast elements, however, one of the initial challenges

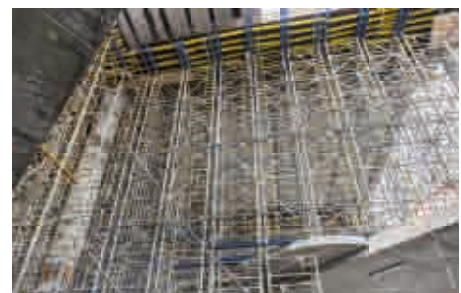
was the need to support horizontal pre-cast heavy beams at a height exceeding 20 meters, which required large quantities of heavy duty shoring towers.

As with many projects in the region, tight deadlines mean that all stakeholders on the project have to work quickly, while still ensuring the highest levels of quality and safety. Doka's project technician Glenn Gonzales says "Working on the Mall of Qatar project is like racing against time. This project has a very tight schedule and our team put in 110% effort in order to meet the client's schedule. We are excited to see the finished project."

The Mall of Qatar is expected to draw more than 20 million visitors annually and is located next to one of the main 2022 FIFA World Cup Stadiums. //

## Safety Tip

Integral ladders with non-skid rungs on Load-bearing tower Staxo 100, along with defined anchorage points for a personal fall arrest system, provide the highest levels of safety.



# Infrastructure sophistication in Doha

**Aiding both the objectives for Qatar Vision 2030 and the FIFA World Cup 2022, Doha has been supporting Qatar Rail's 'Doha Metro' project, a mass-transport system that will assist Doha's ongoing transformation into a modern centre for trade and industry.**

Currently, the project is on track for a 2018 launch where this state-of-the-art integrated metro line will be one of the most advanced rail transit systems in the world, covering four lines that span 300 kilometres and 100 stations.

Construction of the Red Line, also known as the 'Coastal Line', commenced in 2014 and has a total of 14 underground and five elevated (at-grade) stations in the first phase, with a total route length of 40 km. A total of nine tunnel boring machines (TBMs) have been allocated to the Red Line where to date, they have excavated an aggregate volume of 1.7 million m<sup>3</sup>.

## North underground expertise

Salini-Impregilo is leading the construction of the Red Line North Underground in a joint venture with SK Engineering Construction Company and Galfar Al Misnad Trading and Contracting. The first phase includes the construction of seven stations and 26 kilometres of tunnel.

Under Doka's remit, the formwork scope comprises of supplying formwork for all stations, running between 20 to 35 m below ground level. 3,700 m<sup>2</sup> of Large-area formwork Top 50 are used for the base slabs, outer lining and staircase walls, as the shape, size, tie-hole pattern and form-facing of the elements can be adapted to suit any requirement. 560 m<sup>2</sup> of the high-performing Framed formwork Framax Xlife

were applied for the outer lining walls, while 650 m<sup>2</sup> of Framed formwork Frami Xlife, ideal for fast and economical forming, were used for the column and inner platform walls.

A volume of 3,700 m<sup>3</sup> Load-bearing Tower Staxo 100 and Heavy-duty supporting system SL-1 were used for the decking of beam and slabs, with an additional 42,000 m<sup>3</sup> for shoring of the beams and slabs. Doka used the Supporting Construction Frame with a 2.40-metre extension to cast the 9.20 m high outer lining walls in one go. The task was supported by the SL-1 system that allows the passage of Tunnel Boring Machines without disrupting the casting schedule of the concourse slabs.

In order to expedite the progress on site, Doka Qatar provided pre-assembly services for the Large-area formwork Top 50 base slabs, outer lining walls and staircase walls, as well as pre-assembly of the Staxo tables for the beams and slabs.

## Royal visit

Acknowledged as one of Qatar's most important infrastructure projects, the Doha Metro North project received a visit from Qatari Prime Minister, His Excellency Abdullah bin Nasser bin Khalifa Al-Thani, on April 19, 2015, who inspected the new network from the site of Al Qassar station. //

## The Facts

**Project:** Doha Metro Red Line North Underground

**Location:** Doha, Qatar

**Construction Company:** Salini-Impregilo JV with SK Engineering Construction Co. and Galfar Al Misnad Trading and Contracting

**Start of construction:** 2014

**Project launch:** 2018

**Number of stations:** Six underground, three emergency exits and one cut and cover

**Systems in use:** Large-area formwork Top 50, Framed formwork Framax Xlife and Frami Xlife, Supporting construction frame, Load-bearing tower Staxo 100, Heavy-duty supporting system SL-1

**Service:** Pre-assembly service



## The Professional

**"The Doka system is known for its dependable quality, however in addition to this, the industry know-how amongst both the sales and engineering teams has offered a big advantage in terms of job safety and efficiency."**

**Fabrizio Fara,**  
Assistant Construction Manager ISG JV



◀ The state-of-the-art integrated metro line will be one of the most advanced rail transit systems in the world.



**“Innovation is a philosophy that has to be cultivated by people, something that is only possible when every employee is encouraged to communicate ideas as part of a team.”**

**Peter Vogel,**  
Director Middle East, Doka Group

## Innovation as a philosophy

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**Peter Vogel, Director of Doka Middle East, spoke with Lorraine Bangera, editor at Construction Business News about innovation as an art of problem solving and its functionality in making the construction processes more efficient, sustainable and safe.**

### **How would you define innovation within the construction sector?**

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I would define innovation within the construction sector under three specific points, or as I prefer to view it, a three pronged approach, starting with highest efficiency.

Our innovations help to improve the speed of processes that tremendously reduce construction time, labour and consequently costs. Secondly, sustainability. Doka is conscious of its obligation to society, the environment and its stakeholders. We deliberately invest in innovations for optimising resource consumption, minimising environmental impacts and in nurturing our relationships with stakeholders.

And finally safety – safety on site is a great responsibility for all involved in the construction

process. A professional approach to safety brings a number of significant benefits: a lower risk of accidents, higher efficiency from fast workflows, enhanced employee morale and a boost to your corporate image.

### **To what extent does innovation play a role in Doka's corporate philosophy and success?**

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Innovation is the key to our success. Our core aim is to constantly adjust our services in line with our customers' requirements while also guaranteeing the highest levels of safety.

Innovation is simply creating solutions; solutions which are highly efficient, sustainable and safe. It is one thing to make working with formwork easier and save more time as a result. It is quite another to make working with formwork even





▲ Innovation is the key to our success. Our core aim is to constantly adjust our service in line with our customers' requirements.

more safe and more cost-efficient. As one of the market leaders, we are obliged to constantly develop new concepts and systems to support our customers' aim of improving speed and safety of the construction process. With our innovations, we always keep ourselves one step ahead of the competition. A good example for such solutions is the Xsafe plus, a pre-assembled working platform that can be folded and equipped with side railings for wall and column formwork.

Our innovation isn't limited to product development, but also to finding tailored solutions to specific projects. For example, we are currently working on the Strategic Tunnel Enhancement Programme (STEP) for Odebrecht in Abu Dhabi, which required a special-purpose formwork solution, which we created and delivered. I think cases such as this add strength to our brand as formwork professionals.

### **Is innovation something that is reserved for your engineering and technical teams?**

Absolutely not – innovation is a philosophy that has to be cultivated by people, something that is only possible when every employee is encouraged to communicate ideas as part of a team; in fact most of our ideas are developed on site. Our development department monitors the progress along with the client, which helps to stimulate the innovation process. If we come across a hurdle, we must find a way to overcome it as efficiently and consistently as possible. This is how we innovate and develop, through coming face-to-face with a problem.

Our employees are the reason for the company's success. While the Doka Group is a family-owned business, intrapreneurship is highly encouraged and supported. We invest in employees and take their personal development very seriously.

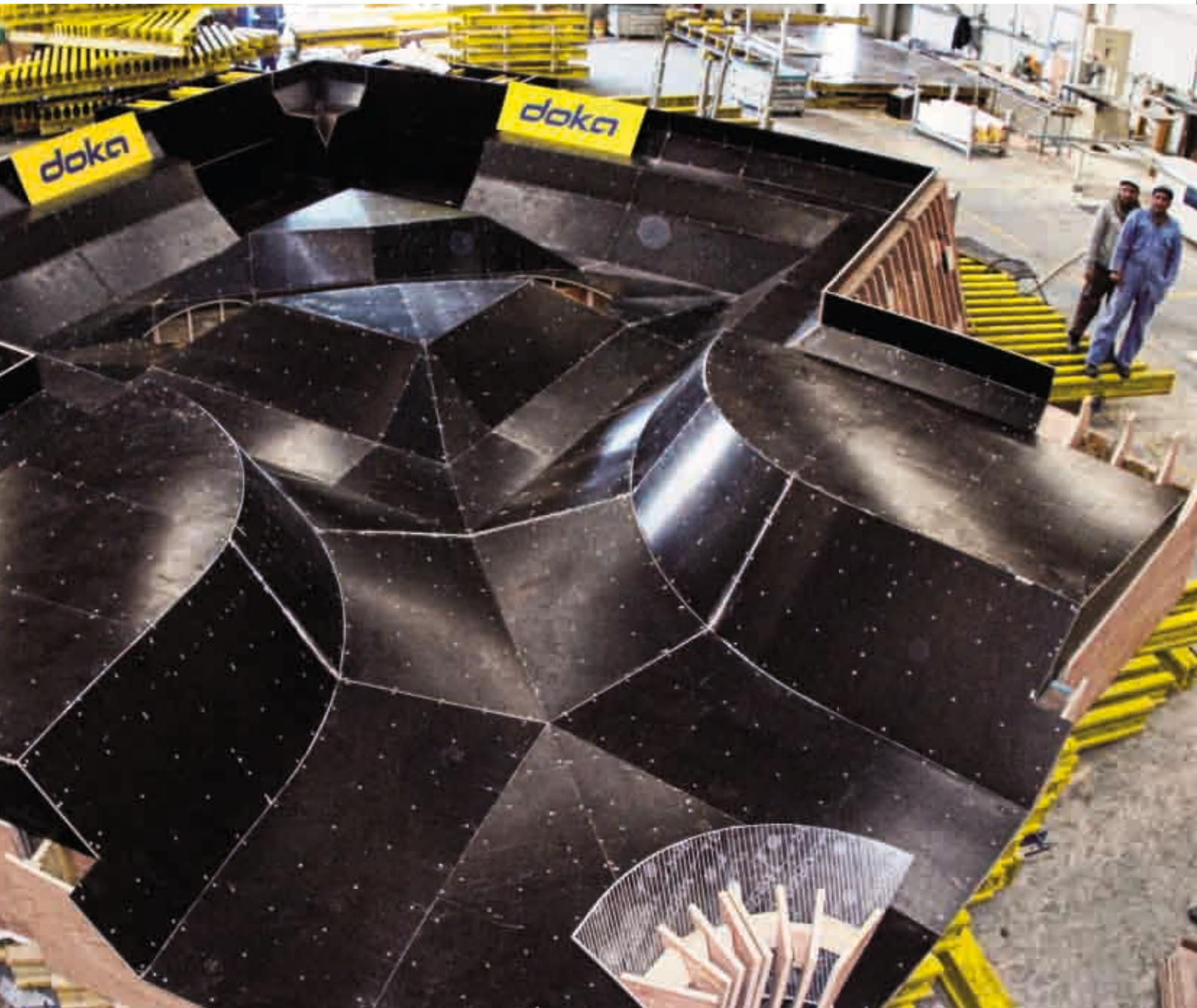
**What are your thoughts about innovation within the GCC – do you believe it is a region that embraces new ideas?**

Innovation has always been welcomed with open arms in the GCC, in particular in the UAE. Some of the shifts in the regional market especially towards sustainability have predominantly affected the construction market and we welcome such developments. As a company Doka has always prioritised sustainability as one of its core values, something that enables it to offer practical support to the UAE's federal and municipal policies on sustainable construction.

**How do you believe Doka is perceived as an organisation within the region, and what is the company's ethos?**

Typically, our projects are amongst the most complex developments in the GCC and we therefore have a reputation for finding new solutions and concepts. In Doka, everybody is passionate about what we are doing. I've been in the company for eight years, and I can't imagine finding a better company. I think our ethos pivots on the nature of our industry, which is to say, the construction industry is pragmatic, therefore so are we."

▼ Our innovation isn't limited to product development, but also to finding tailored solutions to specific projects.





# Jordan develops economic zone

## Aqaba Development Corporation progresses with the second design phase of its USD 350 million port project.

Aqaba Development Corporation, the appointed developer for the Aqaba Special Economic Zone (ASEZ), is making significant progress with the second phase of its port project, which includes the construction of a 100,000-ton capacity grain terminal.

Awarded the contract to supply and implement all formwork solutions for the silo conical walls, Doka's brief included the construction of new silos, a major storage facility (with a height of 80 m), and the supporting buildings.

In the case of the silos, it was essential to provide a versatile solution that catered for the conical shape of the silo walls, while ensuring the shuttering and cones were manageable for the laborers to maneuver. It was also important to consider the limited crane coverage inside the silos, which required a manual striking and repositioning sequence; subsequently Large-area formwork Top 50 was used as a suitable solution.

Another challenge on this project was the three dimensional shape of the Top 50 panels which required detailed engineering and site supervision in order to assemble the complex panels.

To support the high load from the concrete structure, Doka's Load-bearing tower Staxo 100 was used in combination with the Top 50 panels and spindle struts, ensuring a perfect alignment of the formwork before casting.

Once completed, the new grain terminal will take over responsibility from the existing grain terminal, and will be primarily used by Jordan Silos & Supply General Company (JSSGC). Facilities on hand will include a new grain berth, storage terminal, truck loading facilities and a bagging plant.

Speaking on behalf of the project, Mr. Omar Kussad said, "One of the primary objectives of this project is to ensure the long-term sustainable benefits for both Jordan and the Levant region. In using professional formwork solutions, we've been able to supply and carry out the necessary works to ensure this project will be completed to the highest standards."

Under the project's master plan, the end result will include three terminals consisting of a general cargo and roll on/ roll off (Ro-Ro), terminal, a grain terminal and a ferry terminal with the aim of diversifying the local economy and transforming Aqaba into a regional maritime hub. //

▲ The primary objective of this project is to ensure long-term sustainable benefits for both Jordan and the Levant region.

### The Facts

**Project:** Aqaba Port Terminal Package 2, Jordan

**Location:** Aqaba, Jordan

**Contractor:** PerTech Industrial Equipment & Suppliers F.Z.E. / Omar Abu – Saad & Sons Co. (J.V.)

**Systems in use:** Large-area formwork Top 50, Load-bearing tower Staxo100

**Services:** On-site assembly service

### The Professional



**"Using Doka's systems has ensured the project is developed to a high standard while maximizing cost efficiency."**

**Omar Kussad,**  
Omar Abu – Saad & Sons Co.



▲ The silos required a versatile solution that catered for the conical shape of the silo walls.



▲ Concremote: Redefine your program. Push progress.

### The Professional



**“Doka has earned a competitive advantage by providing innovative solutions that save our clients both time and money. Having seen the success of Concremote in Europe, we were delighted to use this innovative concrete quality assurance system for the first time on the Remal Castle project, and to allow Arkan Majan the opportunity to see its benefits first hand.”**

**Mohamed Haneefa,**  
Sales Manager, Doka Oman

### The Facts

**Project:** Remal Castle

**Location:** Bousher, Muscat, Oman

**Contractor:** Arkan Majan

**Systems in use:** Concremote,  
Framed formwork Frami Xlife,  
Dokaflex Table, Load-bearing tower d2



# Concremote Castle

**After years of research and development, Doka’s exclusive Concremote device made its regional debut at the Remal Castle project in Oman, helping to reduce costs and save time on this mixed-use development.**

With innovation standing at the forefront of Doka’s business ethos, the development of Concremote was based on a clear understanding of how to deliver greater efficiency on site, while enhancing both quality and safety.

After receiving its various international certifications, Concremote’s debut in the Middle East was made through main contractor Arkan Majan International and its Remal Castle project in Oman. Located in the Bousher district of Muscat, Concremote was implemented in combination with a bespoke formwork solution, which was also mandated to use the lowest amount of labourers as possible.

Valued at USD 57 million, the mixed-use development which includes both commercial and residential units, covers an area of 87,000 m<sup>2</sup>, spread of eleven floors plus a penthouse level. Once completed, the project will include banquet halls, restaurants and a swimming pool, as well as other health amenities. The development will also include four basement levels, which will be used for both service access and parking.

As part of the Doka solution, a Frami Xlife lightweight panel system was implemented for the vertical-building members (columns, shaft and shear-walls, perimeter walls), a choice that was

supported by Arkan Majan International thanks to its previous experience with the product for ease of use and speed. To match the speed of working with Framed formwork Frami Xlife in the vertical parts and the slab of the building, Arkan Majan International chose the Dokaflex table modules for their large slab areas of 10,000 m<sup>2</sup>/floor, with Dokaflex table modules of up to 21 m<sup>2</sup>/unit slab, enabling fast erection and shifting and subsequently only a small amount of labourers.

Used in conjunction with the formwork solution was the debut of Concremote, a device that measures the compressive strength and age quality parameters of concrete, making it possible to measure concrete strength on the site in real time.

In using Concremote, Arkan Majan International was able to gain insights on the project’s concrete quality and strength development of the slab casting. The real-time monitoring also clearly illustrated the stable strength development of the concrete, highlighting the quality of the mix-design, with an 80% nominal strength reached at all measurements within 48 hours from casting.

In addition to Concremote, a variety of Doka patented systems were also used on site, including the Framed Formwork Frami Xlife, Dokaflex Table and Load-bearing tower d2. //

# Concremote to support GCC sustainable development

## Innovation at the core of Doka's commitment to a greener future

Concremote, a device that measures the compressive strength and early age quality parameters of concrete, is set to make a valuable contribution towards the GCC construction market. Offering data in real-time, Concremote's benefits cover quality, safety and economy while helping to reduce the environmental impact made by concrete.

As a material, concrete plays an integral role in the global construction process, however accurately assessing the strength and quality of the concrete has previously been calculated using less accurate measurements. By applying the latest technology, Concremote uses the 'weighted maturity method', a process that takes into account time, temperature and the characteristic values of concrete and cement allowing for the most accurate readings possible. The data is further enhanced by the fact that Concremote devices are placed inside concrete structures and can be applicable to slabs, walls, columns, rafts, civil structures or in combination with climbing formwork, meaning results are available on an up to the minute basis, directly from the concrete itself.

With each project comes a different mix design, however before calibrating, it is important to establish the target value, which can vary depending on the application, i.e. early striking, post tensioning or climbing operations. Once established, the calibration process can take place, which involves casting six cubes and subsequently measuring their temperature development. By testing their compressive strength at a certain maturity, the correlation between maturity and compressive strength is defined.

After completing the preparation work and having placed the Concremote sensor into the concrete, the sensor will regularly measure the temperature development of the fresh concrete and transmit the

data to the Concremote data centre. The information is then processed and made accessible through the web portal allowing for a clear and accurate way of assessing temperature, compressive strength and maturity in real time.

From a practical standpoint, Concremote's benefits extend from contractor to developer. Not only does Concremote ensure a safer construction process through more accurate results, it also speeds up the build time by optimising formwork application.

Concremote provides both quality assurances by yielding 'in-place' results allowing for fact-based decision-making. In terms of the asset owner, Concremote supports a faster delivery meaning their investment is making a return at the earliest opportunity.

Acknowledged by some of the most respected international quality assurance standards, including DIN, British Standard and Eurocode, Concremote has the proven experience, industry support and cost efficiency to enhance the GCC's sustainable approach to construction, while offering multiple benefits to all stakeholders involved. //



▲ The calibration is made by casting six cubes, measuring their temperature development and testing their compressive strength at a certain maturity. This leads to a correlation curve between maturity and compressive strength.



▲ Wall sensor and slab sensor during application



## The Challenge

A fully crane independent solution was required due to limited space on site, tight schedule and strict regulations with the metro being located close by.



## The Solution

Where previously concrete placing booms (CPB) were located on the slab itself, Doka's SKE100 plus allows the CPB to be self-climbing, helping to maintain the pace of completing core walls in five-day cycles and the shear walls and columns in four.



## The Facts

**Project:** Juma Al Majid Tower

**Location:** Dubai, UAE

**Contractor:** Ali & Sons Contracting Company L.L.C

**Systems in use:** Large-area formwork Top 50, Climbing formwork 150F, Automatic climbing formwork SKE50 plus (corewall formwork), Automatic climbing formwork SKE100 (shearwall formwork), Automatic climbing formwork SKE50 (shearwall formwork), Protection screen Xclimb 60, Dokaflex 1-2-4, Panel floor formwork Dokadek 30, Load-bearing tower Staxo 40 & Staxo 100, Doka Table Lifting System (TLS)

# Doka goes downtown

**Set against the dramatic backdrop of the world's tallest building, Doka has been working on one of the latest editions to the city's skyline, located in the heart of Dubai's Business Bay district.**

Amongst the various skyscrapers, Doka's formwork and protection screens adorned in their livery of bright yellow are easy to spot, in this case attached to the 50-storey residential tower under construction by main contractor Ali & Sons Contracting Company, on behalf of eponymous client, H.E. Juma Al Majid.

As opposed to working in an area that is in the process of development, Dubai's downtown is already home to scores of highrise residential and commercial buildings, meaning all project stakeholders had the immediate challenge of working from a small footprint.

For this project, a small area close to the site was rented to accommodate the site office and

storage facilities, and subsequently, the logistical operations for coordinating equipment, workers and materials needed to be planned with extreme care and attention to detail.

Included in the specification of the project are two buildings, a 50-storey residential tower, which will include one basement level and a ground floor showroom with a second support building providing parking over 15 storeys (4B + G + 9) with recreational facilities including a swimming pool on the roof. In the residential building, each floor will provide four luxurious apartments; spread over 1,033 m<sup>2</sup> of habitable space.

Providing over ten different systems for this project alone, Doka was selected by Ali & Sons



▲ Doka's formwork and protection screens in bright yellow are easy to spot in downtown Dubai.

Contracting Company in order to provide a fully 'crane independent' formwork solution. Where previously concrete placing booms (CPB) were located on the slab itself, Doka's Automatic climbing formwork SKE100 plus allows the CPB to be self-climbing, helping to maintain the pace of completing core walls in five-day cycles and the shear walls and columns in four.

Doka's hardware had also been integrated to support the HSE aspect of the project. Using its Protection screen Xclimb 60, this hydraulic system offers a fully enclosed and safe working environment for labourers over two working slabs and one re-propping slab, while providing protection to the city's Metro line, located only a short distance from the site.

Other systems that have been used to maintain the pace of construction include Dokadek 30, which once integrated with the Table Lifting System (TLS) can move up to 40 panels (120 m<sup>2</sup> of formwork), or two tonnes of materials in one go.

Speaking on behalf of the project, Ali and Sons Contracting Company Project Manager, Munzer Hayri commented: "The crane-free solution was required due to limited space on site and a tight schedule. Doka helped us achieve much faster cycle times than anticipated, with five days for the core wall and four days for the shear wall and columns." //



## The Professional

**"We have provided both an instructor and dedicated Project Coordinator, enabling the site team to familiarise themselves with the systems being used from the beginning of the project. Our ongoing training and support is clearly reflected in the rapid cycle times".**

**Perico Callueng,**  
Project Coordinator, Doka

## Safety Tip

The hydraulic system Protection screen Xclimb 60 offers a fully enclosed and safe working environment for labourers over two working slabs and one re-propping slab.



## The Facts

**Project:** Panorama Towers

**Location:**

Mark Roukoz District, Beirut, Lebanon

**Contractor:**

Kfoury Engineering & Contracting

**Subcontractor:** VEC Contracting

**Project start:** November 2013

**Scheduled completion:** End of 2015

**Systems in use:** Automatic climbing formwork SKE50 plus, Dokamatic and Dokaflex tables, Framed formwork Framax Xlife, ProFrame panel, Bridge formwork ParaTop, Large-area formwork Top50



## The Professional

**“To date, the use of Doka systems resulted in 50% savings in terms of time and as much as 60% in cost effectiveness. From a technical standpoint, Doka’s solutions made the execution of the project considerably easier.”**

**Rodrigue Khawand,**  
Project Manager,  
Kfoury Engineering & Contracting

# The height of luxury

**Panorama Towers in Beirut are nearing completion and offer luxurious residential living just ten minutes from the coast.**

Acknowledged as one of the biggest residential projects in Lebanon in terms of square footage, the Panorama Towers, located in Beirut’s Mar Roukoz district, consist of two contemporary highrises, offering four-bedroom apartments spread over 160 metres and 29 floors.

Work started in November 2013 with Doka taking the lead for all formwork-related activities. Currently, the estimated date of completion on this USD 50 million project will be at the end of 2015.

From a practical standpoint, Automatic climbing system SKE50 plus was implemented across the five core walls, enabling the cores to be climbed ahead of the floor slabs which utilized a total of 74 automatic climbers SKE50 plus and 1800 m<sup>2</sup> of Large-area formwork Top 50.

Fortunately, the labour force was already familiar with the Doka systems and additional on site support was provided from Kfoury Engineering & Contracting to VEC Contracting (subcontractor) in a professional and timely manner, enabling the initial set-up of the automatic climbing system to be completed in record time. While other solutions were available, the team made use of the Automatic

climbing systems SKE, mainly to cope with the high wind loads and to ensure the correct alignment of the core walls. This method also led to a reduction in labour costs.

To ensure the completion of the large slab areas within the shortest possible time, 2000 m<sup>2</sup> of Dokamatic tables were used in combination with Dokaflex floor-slab. For the vertical elements, 750 m<sup>2</sup> of Framax Xlife were used with a special ParaTop solution implemented for the cantilever slab.

As an outcome, the client was extremely satisfied with the after-sales service, detailed technical shop drawings and expertise shown by the Doka Lebanon team. //



## Practical Tip

### Adapting the props

Some simple steps and a few blows of the hammer are all it takes to fix, change or remove the props. Using the integrated quick-acting prop connector, table forms are very quickly adapted to numerous job site tasks.



▲ Dokamatic tables allow for economical forming of slab areas.



# Automatic development in Baku



## The Professional

**“Doka’s formwork solution meets all our requirements when it comes to safety and efficiency on site. The formwork is easy to assemble and saves time for a fast construction progress on site.”**

**Mert Ersoy**, Project Manager,  
Ilk Insaat MMC:

**A new landmark in Azerbaijan is scheduled to be erected using Doka’s Automatic climbing formwork SKE50 and SKE100, meeting the highest standards in terms of efficiency and safety.**

Nestled between the southern most tip of the Caucasus Mountains and the Caspian Sea lies the Azerbaijani capital of Baku, a city which in the past few years has received a significant amount of interest from foreign investors, the most recent statistics suggesting a year-on-year foreign direct investment growth rate of 31.1% going into 2015.

As a by product of the country’s increasing investment, Baku has also seen an increase in the construction of residential and commercial property, a good example being the ‘Crescent City’ and ‘Crescent Place’ mixed-use developments.

Working with main contractor Ilk Insaat MMC, Doka was required to provide a formwork solution for the project, which included a 43-storey office tower (Crescent City), and an eight-storey shopping centre with an adjacent 32-storey residential tower, (Crescent Place). As a long-standing client of Doka, Ilk Insaat MMC were already aware of Doka’s comprehensive range of customisable solutions.

## Automatic climbing formwork solution

Given Baku’s location, the city often experiences periods of high winds, meaning the use of cranes would be severely limited. Combined with a tight construction schedule and the engineering complexities of the project, Doka had to produce a solution that would safely deliver the project demands without sacrificing efficiency or safety. Fortunately, Doka’s Automatic climbing formwork SKE50 and SKE100 has been proven to work under the most challenging weather conditions.

Speaking on behalf of Doka, Project Manager Thomas Staffenberger explains: “The schedule is extremely tight. Thanks to our formwork solution, our customer saves time and can manage one floor per week on average.” In the case of erecting the massive core walls, Doka recommended and implemented Large-area formwork Top 50. In constructing the floors, Load-bearing Tower d2 was used in conjunction with the Table Lifting System (TLS), which was attached to the Automatic climbing formwork, allowing for rapid and crane-independent repositioning of the floor formwork. //

## The Facts

**Project:** Crescent City, office tower and Crescent Place, residential tower with shopping centre

**Location:** Baku, Azerbaijan

**Builder:** Gilan Holding

**Construction company:** Ilk Insaat MMC

**Building height:** Crescent City 203 m, Crescent Place 170 m

**Cycle time:** 1 week per floor

**Systems in use:** Protection screen Xclimb 60, Automatic climbing formwork SKE50 and SKE100, Large-area formwork Top 50, Load-bearing tower d2

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

▼ Automatic climbing formwork SKE50 and SKE100 ensure unrestricted construction progress in both highrise buildings during windy weather conditions.



## The Challenge

High wind speeds in Baku represent great challenges during the construction. Use of cranes is limited accordingly. In addition, the project underlies a tight construction schedule.

## The Solution

The Doka automatic climbing formwork systems ensure unrestricted construction progress during any wind and weather condition.





# A first for self-climbing formwork in Istanbul

## The Professionals



**“It is important to understand the functionality of the equipment we use, which is why we appreciate Doka’s efforts to ensure all supporting material, information and training was available in Turkish.”**

**Metin Ardalı** and **Mesut Eryılmaz**,  
Project Managers, Akdeniz Construction Inc.

## The Challenge

Short construction cycle time, most efficient cost structure, highest safety for employees.

## The Solution

The Doka self-climbing formwork system achieves a very short cycle time to accelerate the process of construction – six working days for each floor. The Doka protection screen maintains security for employees against all weather conditions.

**As one of many new mixed-use developments under construction in Turkey’s most populous city, one of its most exciting projects is Ağaoğlu Maslak 1453, a 325,000 m<sup>2</sup> district which will include office buildings, residences, a hotel, contemporary shopping mall and entertainment centre, for which Doka has been working on five of its skyscrapers, each with their own unique architectural features.**

Straddled on the Bosphorus strait, the ancient city of Istanbul has been under constant development in its various identities for over two thousand years. Acknowledged as one of the most densely populated cities in the world, Istanbul subsequently has a high demand for residential, office and entertainment spaces which is what makes one of its latest districts a highly anticipated development.

Combining a mixture of traditions and cultures with an environmentally sustainable structure, Ağaoğlu Maslak 1453 will include 24 residential

and office towers, providing 4,800 residences and offices and 500 stores.

Working with main contractor Akdeniz Construction Inc., Doka was chosen based on its international experience and reputation as a bespoke solution provider to create a suitable formwork package that could cater to the varying architectural styles involved on the project. With the shaft and the slab being concrete-casted at the same time, the Ağaoğlu Maslak 1453 project also represents the first time Doka’s automatic self-climbing formwork is being used



▲ Once Maslak 1453 is finished, it will count 24 residence and office towers.

in Istanbul. Thanks to its short cycle time, the construction process is accelerated, resulting in a floor being cast approximately every six working days.

With its high performance and load-bearing capacity of 40 tones, the building cores were formed using the self-climbing Platform SCP in combination with the Large-area formwork Top 50, the two primary benefits being lower labour and material costs, and the elimination of requiring a crane (as the repositioning of the formwork is automatic).

### Safety first

Similarly to the 'Crescent City' project in Baku, Doka's Protection Screen Xclimb 60 was used to provide security and protection for labourers while the Load-bearing tower d2 was used due to its easy assembly and high load-bearing capacity. In all, twenty sets of Column formwork Top 50 was used, in order to ensure rapid progress was made on the building walls. //

### The Facts

**Project:** Ağaoğlu Maslak 1453

**Type of project:** 5 skyscrapers

**Location:** Istanbul, Turkey

**Contractor:** Akdeniz Construction Inc.

**Cycle:** 6 days for each floor

**Systems in use:** Self-climbing platform SCP, Protection screen Xclimb 60, Large-area formwork Top 50, Load-bearing tower d2, Floor formwork Dokaflex

**Services:** Formwork planning, Assembly assistance on site, Formwork instructor



▲ Protection Screen Xclimb 60 enables safe and weather shielded working conditions while the self-climbing system SCP moves the formwork automatically.



▲ Doka developed the formwork solution for the five highest skyscrapers.

# In brief

News, dates, media, awards

## Third award for Concremate in Middle East

Doka Oman received the trophy for "Most innovative concrete quality assurance system". This is the third award for Concremate in the Middle East. Already last year Doka was rewarded for its outstanding formwork technology with the Special Award for "Best Innovative Formwork System". Visit our website [www.doka.com/concremate](http://www.doka.com/concremate) to learn more about this innovative device!

## Celebrating safety on site

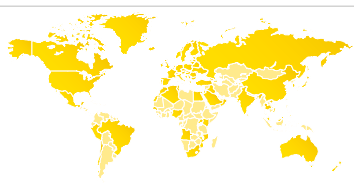
Doka successfully took part in the first annual safety training fair hosted by KEO in Qatar's Al Wakrah Stadium, a proposed venue for the 2022 FIFA World Cup Qatar™. To date, the Al Wakrah Precinct has successfully completed over one million hours of work without a lost-time incident. This has only been possible thanks to the combined diligence of all stakeholders involved in the project.

## Connect with us!

We have launched our Doka Middle East LinkedIn account. Follow us to stay well informed about formwork matters and the participation of Doka within the industry. We will also regularly communicate career opportunities for a variety of positions!



 Follow Doka Middle East



▲ **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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