Doka **Xpress**

The Formwork Magazine | Issue 2016

A grand expansion

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The Formwork Experts.

doka

Editorial

To our clients and colleagues,

In the wake of the price correction, which plunged the value of crude below $50 per barrel, 2016 has certainly been an interesting year for the Middle Eastern construction market. As one of the region's preferred formwork suppliers, Doka's holistic approach has placed more emphasis on the fact that its systems, products and services are specifically designed to support the needs of its clients, in particular when it comes making both their time and money go further. As a result, Doka Middle East has achieved a number of its key objectives in the last year, including record-breaking levels of business and the successful launch of Concremote, its in-situ concrete measuring device.

Aside from its achievements, Doka has also continued to invest in the region, specifically in the form of a new Middle East Material Distribution Centre. Launched on 01st January 2017, this facility based in Jebel Ali will ensure a practically limitless supply capacity within the shortest lead times.

The pages that follow cover many other items that deserve a mention. Inside this year's Doka Xpress you will find a variety of information on just some of the projects we've either worked on or completed in the past twelve months, as well as some firsthand examples of how our products, services and systems are helping our clients to deliver the best possible results.

Should you have any questions about the services or solutions covered in this magazine, please register your information at www.doka.com/connect, and a member of our team will come back to you.

In the mean time, on behalf of Doka we wish you all the very best for 2017 and hope you enjoy this issue.

Sincerely,

Peter Vogel
Director Middle East Doka

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Cover Image: Sheikh Zayed Mosque expansion project, Abu Dhabi, United Arab Emirates
Credit: Max Porechkin

Doka News

▸ Doka Group acquires Dutch technology company B I A I S

Austrian formwork provider galvanises its technology offering through the purchase of Dutch construction material-tech company B I A I S.

Doka Group has acquired the Netherlands-based construction material technology company B I A I S, according to a statement from the company. The deal is the most recent development of a long-standing partnership between the two companies, which will now seek to develop the relationship of both construction products and solutions inline with Industry 4.0. Doka board member Jens Guenther said: "This acquisition represents another positive step in our development not only for products, but also for creating more impactful solutions within the construction sector." One of the products to be launched as part of the collaboration includes Concremote, a digital in-situ device that measures the strengthening of concrete in real time. **//**

▲ DokaScaff has proved to be one of our most popular new products in 2016.

Safety first

Doka has invested in developing a wide range of products and systems that have been designed to specifically address the most hazardous areas on a construction site, and ensure they are made as safe as possible for site personnel.

Take our Edge protection system XP – a universal safety solution that provides total edge protection, while remaining fully compatible with Doka wall and floor formwork. Equipped with an all-in-one guardrail, the system is 'hot-dip' galvanised, making it extremely sturdy. It is also EN 13374-compliant with the GS mark of certified safety and can extend up to 1.20m with only one upright, and up to 1.80m with an additional upright. As part of our commitment to keep our products user and time friendly, the Edge protection system XP can be installed with an easy-click function and is twice as fast as a conventional wooden-rail solution. As an additional safety element for safeguarding slab edges and platforms, our Railing clamp XP 40cm ensures that the toe board is held tightly against the formwork, meaning no small items can be allowed to fall through. Developed as our ultimate fall-arrest system, Doka's pre-assembled Safety Net Fans can be used on any structure and adapted to any shape. Designed with triple layer nets, this product is also EN 1263 compliant, UV treated to resist sun damage, and can extend to a width of 4.8 metres, providing significant cover against any falling objects and debris to personnel below.

Another example of our versatile systems is Doka Scaff, a modular scaffold used for access, forming and reinforcing works. Thanks to its pre-defined connection points, DokaScaff is not only safety certified by DIBT, AENOR, AFNOR, NASC and SP, but also comes with tried and tested anchorage points for personal fall-arrest systems. With the added benefits of being quick and easy to assemble, Doka Scaff uses a wedge lock system meaning a strong and rigid connection is possible with just one blow of the hammer. The system itself is also extremely durable thanks to all components being galvanized. DokaScaff is much quicker to erect than traditional systems available in the market, meaning your team can can save time without sacrificing safety. //

▲ Safety Nets are the ultimate fall arrest system for any highrise building.

▲ Our Edge Protection system not only improves safety on site, but also helps to save time.

▲ Safety Net is easy to install and provides extra protection for site staff.

▲ Sheikh Zayed Grand Mosque Center, Abu Dhabi, United Arab Emirates.

The Professional

"We chose Doka because of its ability to deliver systems and services on schedule, while providing full technical support throughout. Given the significance of this project, Doka's efficiency has enabled us to remain on time and on budget."

Mohamad Majed, Operations Manager, Masri Engineering and Contracting (MEC)

A grand expansion

Located in Abu Dhabi, Doka has been working on the Sheikh Zayed Grand Mosque Center, a facility that will increase the area of the existing Holy site to include a visitors' centre and commercial establishment.

Completed on 20th December 2007, the Sheikh Zayed Grand Mosque is the largest place of worship in the United Arab Emirates. Named after the late Sheikh Zayed bin Sultan Al Nahyan as a way of honouring his legacy as the founding father of the nation, the mosque itself is capable of hosting more than 41,000 people at any given time and was completed at a cost of just over half a billion dollars. Included in the mosque's design is a 17,000m² courtyard that features a floral design and is considered to be the largest marble mosaic in the world.

Plans were drawn up to develop a visitors' centre and commercial facility that would be sympathetic to the existing architecture while providing functional facilities that would enhance the overall experience. In order to cause minimum disruption, the project was designed to be one level of slab (basement to ground floor), with a built-up area of almost 60,000m² and a floor-to-floor height over 6.15 metres. With this in mind, Doka provided a solution combining its Doka flex table using Eurex 20 top 550 props and D3 tables for beams.

The Dokaflex tables were implemented in order to provide greater flexibility in terms of height adjustment, which was necessary during movement to the next casting site, while the D3 tables, which were integrated with a beam side

▲ The center is anticipated to be handed over in Q3 2017.

▲ A rendering of the completed project gives an impression of what visitors can expect.

The Facts

Project: Sheikh Zayed Grand Mosque Center

Location: Abu Dhabi, United Arab Emirates

Contractor: Masri Engineering and Contracting (MEC)

Start of construction: Q2 2015

Opening date: Q3 2017

shutter and quick release pin, meant that the client was able to save both time and money by minimizing manpower that would ordinarily be needed for re-installation and refabricating. While time is always an important factor on construction projects, delays during the early phase had meant that the Doka team had to deliver above and beyond expectation in order meet the demands of the client.

With some of the earlier delays affecting the supply of materials, Doka's resources and highly flexible logistics, technical and operations teams meant that materials were made available, despite the commissioning quantity tripling due to the acceleration of the construction process. The construction process was further expedited thanks to an on-site assembly area, which was accompanied by our formwork instructors who were able to supervise the process and ensure any ad hoc requirements were implemented correctly, preventing any further loss of time.

With an expected handover date set for Q3 2017, the construction of the visitors' center and plaza at one of the United Arab Emirates' most iconic sites was not only an honour for Doka to work on, but also a textbook example of how a combination of attention to detail, flexibility, diligence and hard work can support our clients while delivering results. **//**

▲ The Load-bearing tower Staxo 100 provides safety, high load capacity and a economical solution in the construction and civil-engineering sectors.

Fast track towards education

With around 54-59 % of the total works of the four lines complete, it is estimated that the first train will start operations in Q4 2019.

Qatar's extraordinary transformation over the past twenty years has not only seen a dramatic change in its landscape, particularly that of Doha's skyline, but also a significant increase in its population. According to one local Qatari newspaper [1], the national population at the end of March in 2016 was 2.527 million, indicating a year-on-year growth rate of 7.7 %.

As with many metropolises around the world, the creation of a mass transportation system provides a list of benefits including an economical solution for population mobility, a reduction in road users, and therefore congestion and pollution, and in the case of Qatar, a comfortable way for people to navigate the Doha area while avoiding the searing temperatures of the summer months. According to Rachel Kyte [2], vice-president and special envoy for climate change at the World Bank, "A good public transport system must be easy and convenient to use, fast, safe, clean and affordable." With this in mind, the Doha Metro has been designed to deliver just that.

Forming an essential part of the country's macro-economic strategy, National Vision 2030, and managed by Qatar Rail by Emiri decree, the Doha Metro will form one of the core components of the country's wider railway blueprint, and will be one of the most sophisticated of its kind once completed.

Product Feature

Using our Heavy Duty Horizontal supporting platform for pier head shutters means you only have to apply one design even if your piers are of different heights.

Connecting the city and its surrounding area, the Doha Metro will comprise of four lines, respectively Red, Green, Gold and Blue. Referred to as the 'Education Line', stations on the Green Line will include Education City, Qatar National Library and Msheireb, connecting some of the country's formative cultural and educational centres as part of the national strategy to cultivate a knowledge-based economy. Once completed, the 'Education Line' will reach as far west as Riffa and as far east as Al Mansoura, just to the southeast of Msheireb in the centre of the capital.

As part of the consortium working on this colossal project, Austria-based Doka secured 75 % of the total formwork scope for the Green Line, which is estimated to cost over QAR 1 billion. Working with a joint venture that includes Saudi Bin Ladin, Porr and HBK, the Green Line will add 124 kilometres of track which will be split into 66 kilometres at-grade, 25 kilometres underground and 33 kilometres elevated.

Boasting an extensive track record of metro projects around the world including Copenhagen, Budapest and Riyadh, Doka's experience in working with a diverse range of contractors and methodologies on these complex projects has enabled it to develop its technology while working closely with the other project stakeholders. This helps to ensure construction workflows are maintained and that space inside the often minimal construction area is optimised at all times.

Engineering masterpiece

According to Qatar Rail, phase one will involve the significant development of the Red, Gold and Green Lines, including 37 stations, and will be open to the public towards the end of 2019, a timeframe that has required both precision planning and a sophisticated schedule of works. In fact, to complete the Green Line's twin-tunnel operations within the set period, a total of six tunnel boring machines were employed, each of which is capable of advancing approximately 13 metres per day.

Doka's involvement in the project commenced with providing a series of advanced technical solutions for the formwork scope, in particular for the viaducts, pedestrian bridges and stations.

The full length of the viaduct for the elevated section of the line included 72 pier heads, for which Doka supplied seven sets of pier steel moulds, providing an average of ten reuses for each mould. Thanks to their robust structure, steel moulds can be reused on multiple occasions and provide a better quality concrete finish than plywood sheets. Doka also ensured that each unit could be lifted and installed in one go, offering a significant saving in construction time. In advance of this, fabrication drawings were also prepared in 3D, providing a highly accurate impression of how the process would work.

The formwork design for the viaduct pier column was optimised to have minimum shutter modification for re-use at different pier heights. Due to a pier head size of 58 m^2 and a concrete weight of 147 tonnes, strong moulds were required to resist the concrete pressure and the mould's own weight at a height of 10 m above the ground.

Qatar Rail has stated the second phase, which will include the expansion of the three existing lines and the addition of the Blue Line, which will include a further 72 stations and is anticipated to be completed in 2026.

According to the Qatari press (Doha News - January 2017), this year will see the completion of 70 % of the total project; including the complete track installation works, the delivery of the first four of its 75 driverless trains and the delegation of key operator contracts. In a statement, Qatar Rail CEO Saad Al Muhannadi said, "We are about to embark on the most critical phase of the Rail Development Program; we will be soon transitioning from a rail developer to a rail operator."

Speaking on behalf of Doka Qatar, managing director Ralph Buerger commented; "Doka has developed a reputation for meeting challenges head-on and providing sophisticated solutions for our clients in order to get the job done on time, and on budget. Having worked on multiple metro projects around the world, we are delighted to share our accumulated knowledge and experience in developing Qatar's mass transit network, while stepping up to the challenge of completing the work within the necessary deadlines. I'm pleased with our work to date and look forward to completing phase one within the allocated schedule." **//**

▲ The robust structure of pier head steel moulds can be reused on multiple occasions and provide a higher quality concrete finish.

The Facts

Viaduct

Pier foundation formwork:
Top 50 - 854 m^2
Pier column: Top 50 - 510 m^2
Pier head formwork:
Special steel moulds - 7sets
Pier head platform:
Supporting construction frames - 9 sets
Deck formwork: Top 50 - 4800 m^2
Deck shoring: Staxo 100/40 - 46800 m^3

Pedestrian bridge

Pier column: Top 50 - 180 m^2
Pier head: Top 50 - 700 m^2

Station

Station columns: Framax Xlife - 855 m^2
Station shoring: Staxo 100 - 12500 m^3, Staxo 40 - 42300 m^3
Beam sides: Frami Xlife - 400 m^2

The Professional

"The planning team has given our project their continuous support to create a solution-oriented overall concept. In terms of products, I am very impressed by Doka's Staxo 100 due to its unique design. The integrated ladder and non-skid rungs make the working environment safer."

Thomas Posker, SPH-JV construction manager

[1] The Peninsula, online edition, 2nd April 2016 - http://bit.ly/1orDArn
[2] Global-Briefing, online edition - http://bit.ly/1VlHnUd

▲ Once complete, the pergola and bridge structure will become a central part of the Seef Lusail Waterfront.

Technical style in Lusail

The Facts

Project: Lusail CP07A-1A

Location: Qatar

Contractor: HBK-QBC-JV

Acknowledged as one of the most ambitious construction projects in the region, Qatari Diar's Lusail City will cover 38 km^2 and include four exclusive islands. Rising up to meet the challenge, Doka Qatar was awarded the contract to provide a formwork and engineering solution for the pergola and bridge structure, a core piece of infrastructure which will become a part of the Seef Lusail Waterfront project.

Building a city for almost half a million people in the desert will certainly come with its share of challenges, however to date Lusail City is progressing smoothly, and was even acknowledged with an award for "Best mixed use development in Qatar" at the UK-based International Property Awards at the end of last year.

Doka are no strangers to Lusail, having completed two pedestrian bridges spanning 90 and 100 metres respectively in the marina area of the project in 2015. Not only were Doka able to find a suitable engineering solution for this complicated ellipsis design in fair-faced concrete, but also deliver it punctually on budget. It was also a great example of how Doka's Ready-to-use service saved time, while offering a versatile solution without sacrificing quality. Based on both the company's recent performance and technical knowhow, Doka were awarded the design and RTU assembly for Lusail CP07A-1A, the scope of which included the provision of 6,000 m^2 of formwork for the pergola and bridge structure. Working with HBK and QBC as JV contractors, the

▲ Doka Qatar assembled and designed 6,000 m² of formwork for this project.

The Professional

"Doka played a pivotal role in the bridge construction. They have a highly responsive team whose supervisors were always available."

Mohamad Ali Zantout, project director of Lusail CP07A-1A - HBK-QBC-JV

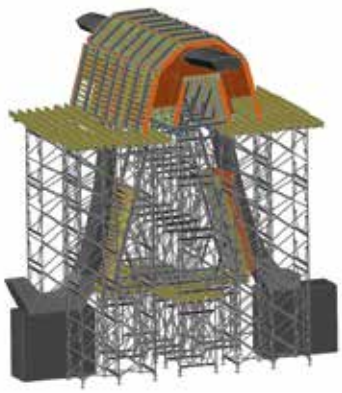
project was given a time frame of just six months, meaning finding a highly efficient solution would be essential to the project's successful delivery.

After carrying out a thorough 3D-design of the structure, Doka implemented its computer numeric control (CNC) machine, a technology that allows the team to prepare the 2,000 different shaped timbers required for the project and thereby decrease production time, while assuring accuracy for the pre-assembly. Down the line, this service also saves storage space for the contractor and minimises unnecessary carpentry work on site.

From an implementation point of view, the casting process was divided into six steps, the first three focusing on the columns, the fourth and fifth on the pergola area and the sixth on the bridge itself.

In delivering this project Doka Qatar succeeded in designing and assembling 6,000 m² of formwork, a statistic that includes cutting and shaping the equivocal of 63 kilometres of timber, ensuring the perfect fit for each of the sealed plywood joints (due to SCC concrete), before final inspection and handing over.

As projects go, this is an excellent example of how Doka's innovation, logistical efficiency and technical knowhow all converged to deliver the successful handing over of this highly unique project, while ensuring Qatar's 'city of the future' is one project closer to completion. //



▲ 3D rendering helped to improve accuracy and reduce costs on the project.

▲ Once completed, the hospital expansion will add a further 265,000 m², providing 617 beds over 11 floors.

Health, care and attention to detail

Located in the Kuwaiti capital, the New Al Sabah Hospital will provide a state-of-the-art facility, which will support the country's public health care system.

The Facts

Project: New Al Sabah Hospital

Location: Kuwait

Contractor: Shapoorji & Pallonji & Co. Ltd.

Client: Kuwait Ministry of Health (MOH)

Consultants: TRO Jung Brannen

Delivery date: 2017

Systems in use: Large area formwork Top 50, Framed formwork Frami Xlife, Doka Load bearing tower Staxo 40, Dokaflex 20

As a state that provides full and free of charge health services to its citizens and residents, the importance of Kuwait's healthcare facilities has been a long-standing priority for its government. According to the 39th edition of the Statistical Review, Kuwait's population in 2014 was 3,767,415, all of whom were being served by 17 general and specialist public hospitals, 91 health care centres and 12 private hospitals.

Constructed as an extension to the existing hospital, the new development will add a further 265,000 m² facility, with 617 beds over 11 floors. As an insight into the detail of this project, the design, which was produced by SSH, ensured that 80 % of the rooms and wards have a sea view. Commissioned by the Kuwait Ministry of Health, Doka was appointed to provide a complete services solution that included technical design, approvals and site supervision. Using large area formwork Top 50, Doka provided 600 m² for the foundation up to a height of 1.80 m, 1,020 m² for the retaining walls up to a height of 5.10 m and 7,354 m² for the core walls up to a height of 4.20 m. A further 73 sets of Frami Xlife were used for the columns, which was particularly useful given that the system's flexibility allowed Doka to deal with the varying column sizes and height changes.

Using the combination of the Doka Load bearing tower Staxo 40 and Dokaflex 20 system for slabs and beams worked particularly well thanks to their mutually compatible decking components. In total 17,000 m² of formwork for the slabs and beams up to a height of 6.0m was delivered to site. The same ability to work with varying floor heights also helped to overcome changes in structural design, which occurred after construction had started.

With a delivery date set for next year, the feedback on Doka's performance has been very positive. Not only were all shop drawings and calculations submitted on time, Doka's complete safety concept, in conjunction with the timely delivery of products and systems, meant that the project has continued to run smoothly and once completed will provide a highly valuable addition to Kuwait's healthcare sector. //

Future of construction

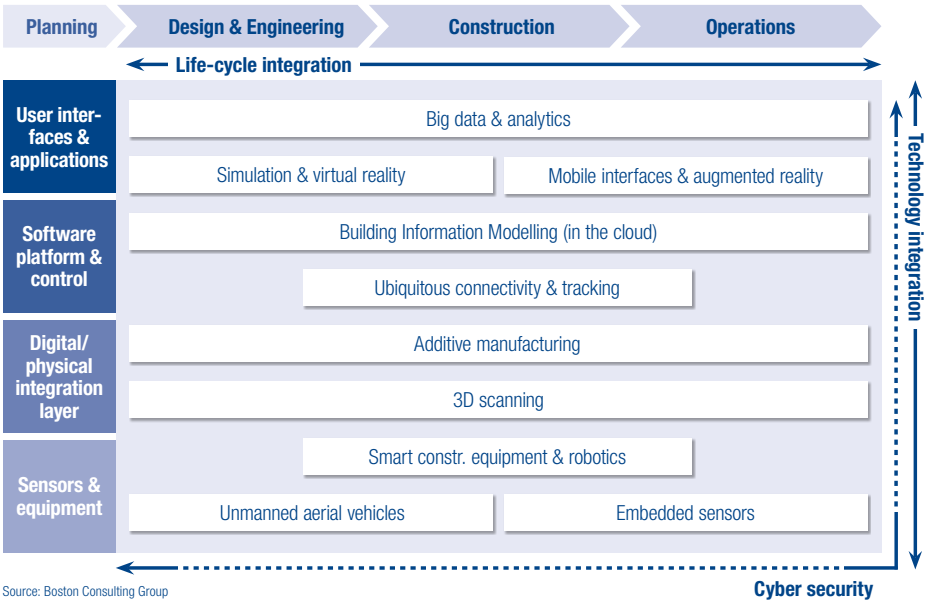
As the GCC prepares for many significant milestones and events including Expo 2020 in Dubai and FIFA 2022 World Cup in Qatar, we take a look at how the region's construction industry is integrating technology in order to support its vast infrastructure developments and address the impact this will have on the engineering and construction sector in the future.

For the film buffs amongst you, 21st October last year signified the date in which Michael J. Fox's character, Marty McFly travels into the future from the year 1985 in the blockbuster movie franchise, Back to the Future. While we may still be a few years away from flying cars or abolishing lawyers, the film did in fact accurately predict a number of technologies which are now commonplace today such as drones, mobile payment technology, biometric devices, hands-free gaming and live video chat.

Indisputably, the past thirty years have seen some of the most profound technological leaps in human history, so it begs the question, why hasn't the same level of progress been made in the engineering and construction sector? According to a paper published earlier this year by World Economic Forum, E&C has been "slow to adopt new technologies, and has certainly never undergone a major transformation. As a result, productivity has stagnated over the last 40 years, or in some cases, even declined."

It would seem that while other sectors such as ICT and manufacturing have made steady progress, E&C has been left lagging, only till recently. In general terms the common theme shared between all progressive sectors has been digitisation, and construction is no different. In the past few years there's been a pick up in the usage of digital sensors, bespoke software and the integration of our ubiquitous mobile devices, each of which has been

Many digital technologies can be applied along **the E&C value chain**



▲ Source: The Boston Consulting Group - the engineering and construction value chain and at what stage digital technologies can be applied.

designed to make progress on and off site faster, safer and more cost effective. The E&C industry has also seen a wider usage of building information modelling (BIM), a centralised platform that enables all major stakeholders to see the physical and functional characteristics of a project in real time.

The true importance of digitisation can be understood more clearly once you take a step back and look at the life-cycle of a building and how technology can be applied to the E&C value chain from conception to demolition.

While still being slowly integrated, the optimum application of tech in today's construction life-cycle might work as follows: by using BIM the tendering process is made more transparent, while potential design clashes and constructability issues are spotted early on therefore eliminating the requirements for corrective work. The centralised nature of BIM also means that all essential stakeholders are kept up to date in real time, meaning highly complex projects become faster to implement.

Once entering the construction phase, drones are able to inspect the site from the air, while prefabrication technology such as 3D printing can help to keep build costs down and site space clear. Workflows can be optimised through the use of GPS and RFID by tracking material, equipment and workers, while robots and autonomous vehicles can be guided to engage in the actual labour.

From an operational perspective, built-in sensors provide an ongoing flow of information ensuring corrective measures can be implemented at the earliest possible opportunity, while harvesting big data from site, including traffic movements and energy consumption, means these can be analysed, the information from which is used to improve general efficiency. While this list only scratches the surface of the potential technology in the E&C market, the pick up for implementing such changes has been slow. In the words of McKinsey's 'Imagining Construction's digital future' report, "The construction industry is ripe for disruption."

Statistics from The McKinsey Global Institute estimate that the world will spend $57 trillion on infrastructure by 2030, so in order to give you an idea of the scale of construction in the GCC, a study published by EC Harris estimates the combined infrastructure spend of U.A.E., Saudi Arabia and Qatar alone to be $710.8 billion by the same year, or 1.247 %. The question remains, to what extent will the GCC implement E&C technology, and what will be the residual effect?

In April 2016, His Highness Sheikh Mohammed bin Rashid Al Maktoum declared that 25 % of Dubai buildings should be 3D printed by 2030, as part of the Emirate's 3D printing strategy. A month later he opened the world's first 3D printed office at the foot of Emirates Towers, commenting to the media that, "the UAE has emerged as one of the major incubators of innovation and future technology in the world today, and its focused initiatives to shape the future have become global models that can be emulated in all sectors." With the printer alone measuring 20ft in height, 120ft in length and 40ft in width, the labour cost was reduced by 50% when compared to a conventional structure of the same size and took just 17

days to deliver. While this example may only apply to Dubai, statistics released by International Data Corporation (IDC), indicate the sector is growing across the MENA region, with spending estimated to grow by $830 million between 2015 - 2019."

One of the more unanimous tech-centric movements in the GCC construction sector would be a drive towards improving building performance. While typically a building's construction cost would represent just a small percentage of the building's lifecycle cost, the various state visions have led to a drive towards region-specific Green Building regulations, building-retrofit programmes and nearly zero-energy buildings. According to statistics published by United States Green Building Council (USGBC), the U.A.E has increased the number of LEED certified buildings from 10 in 2010 to 170 in 2016, Qatar from 12 in 2012 to 25 in 2016, Saudi Arabia from 2 in 2012 to 37 in 2016, Oman from 3 in 2015 to 4 in 2016, Kuwait from 1 in 2014 to 2 in 2016 and Bahrain remaining stationary with one since 2013. While clearly there is a staggered level of progress across the region, the aggregate movement is a positive one, and one which will have profound effect on the region's future in terms of sustainable development, in particular towards energy consumption.

Another area that will likely see an increase in usage is the application of higher-definition surveying and geolocation. Cited by McKinsey's 'Imagining construction digital future' report as "a major reason that projects are delayed and go over budget," the increase in use of high-definition photography, 3-D laser scanning, and geographic information systems will help to expose "discrepancies between ground conditions and early survey estimates and in so doing prevent costly last-minute changes to project scope and design," the added benefit of this technology being it can be integrated with project planning tools such as BIM.

Overall, there is a clear movement in the E&C sector to play catch-up and apply the increasing array of technology that is available to it. According to estimates from the World Economic Forum, "full-scale digitalisation will lead to huge annual global cost savings. For non-residential construction, those savings will be $0.7 trillion to $1.2 trillion (13 % to 21 %) in the Design & Engineering and Construction phases; and $0.3 trillion to $0.5 trillion (10 % to 17 %) in the Operations phase."

In terms of how this will apply to the GCC, a combination of forward-thinking leadership, better-than-average-liquidity and a blank canvas for its major infrastructure projects will make it an ideal region to adopt and implement technology faster than many other economies, and perhaps even be a pioneer in the future. //

Rise of ‘The Hills’

Located on the south-western periphery of the Emirates Golf Club and bordered by First Al Khail Street in Dubai, Emaar’s latest luxury residential, hotel and serviced apartment development, ‘The Hills’ is beginning to take shape.

The Professional

“Doka has been excellent from a technical point of view in the design of the formwork systems and the suitablility of said systems for our task. They worked with us to make sure we had an accurate supply for the height of the towers, crane lifted core systems and table forms for the typical floor slabs. They also provided a purpose built stair form system for the fire stairs of the project.”

Bill Parker, senior project manager, CCC

According to Deloitte’s ‘Middle East Real Estate Prediction: Dubai 2016’ report, hotel occupancy levels of between 70 - 75 % can be expected to represent the ‘new normal’; which will certainly come as welcome news to Emaar whose ‘The Hills’ project will be a mixture of residential, serviced apartments and a hotel.

Conveniently located adjacent to Sheikh Zayed Road, the main artery for many of Dubai’s commuters, ‘The Hills’ is within a short distance of Dubai Marina and Jumeirah Lake Towers, the latter of which being home to the middle east’s largest free zone (DMCC), making the mixed residential-hospitality development very convenient for tourists and business travellers alike.

The project includes four buildings, which share a common basement level, ground floor and podium, upon which two 14-storey residential buildings and two 16-storey buildings, the latter comprising a hotel and serviced apartments are currently being developed.

Main contractors Al Ghandi & Consolidated Contractors International were awarded the

▲ The project includes four buildings including a hotel and serviced apartments overlooking Emirates Golf Club.

contract for the raft foundation at the end of 2014 and subsequently won the second contract to build the towers in July 2015 and with an anticipated handover date set for Q3 2017, all stakeholders are well aware they will need to work efficiently in order to meet the deadline.

Speaking with Bill Parker, senior project manager at 'The Hills', we asked what made Doka the preferred choice on this project, and how Doka products and systems have helped to keep the development on time and on budget.

"I've worked with Doka on various projects for at least eight years in countries including the UAE, India, and Kazakhstan. Doka are one of our primary suppliers for formwork systems. They won this contract on competitive tendering for all of our formwork systems. I also have a very strong relationship with one of the chief designers, Martin Hörlesberger. He's worked on towers for me in excess of 116 storeys and we've developed a very good rapport. I think the flexibility of the product but also the approach by Doka is to sell us what we need, not just what they want to sell us. That's the very first and primary issue. When we review what's required for the project, it's an interactive conversation about what's really needed and what's best for us economically.

We're using internal climb form systems, Staxo support systems for our cantilever floor slabs in the lower floors which are all five metres plus in height, and tall prop systems, but with traditional formwork. When we get to the floors from level two and above, we're using table forms, which are suitable for this style of job where you have repetitive floors."

With less than a year till the anticipated handoover, 'The Hills' will soon be another popular addition to Emaar's portfolio of successful developments. //

▲ Al Ghandi & Consolodiated Contractors International are the sole contractors for the raft foundation and the four towers.

▲ Jordan has delivered a number of major highway infrastructure projects over the past twelve months inlcuding the Zarqa - Azraq City rehabilitation.

From A - Z in Jordan

Stretching from Azraq City to Zarqa, Doka's expertise has helped to develop the first phase of this 56 kilometres highway project in Jordan.

The Facts

Project location: Jordan

Contractor: JV Masar United Contracting Company-Ahmad Yousef Al Tarawneh & Partner-Shibh Al Jazeera Contracting Company

Start of construction: April 2015

Opening date: Q2 2017

Systems in use: Large-area Formwork Top 50, Heavy-duty supporting system, Load-bearing tower Staxo 100 and special steel formwork for piers

The Professional

"Doka's systems allowed us flexibility in terms of bridge design. The Staxo 100 system was an ideal solution for our project. "

Eng. Ayed Al Nairab, construction manager.

The past twelve months has seen a number of highway infrastructure projects reach completion in Jordan including the Amman Development Road, which now connects the capital to its surrounding cities. Another significant project included the government's plans to rehabilitate and upgrade the road from Zarqa to the Al Omary border, which after tender was awarded to Masar United Contracting Company, Ahmad Yousef Al Tarawneh & Partner, and Shibh Al Jazeera Contracting Company as a joint venture contract by the Jordanian Ministry of Public Works and Housing (MPWH).

Included in the scope of work was the rehabilitation of an existing dual carriageway and the construction of another, totalling two 3.75 m travel lanes in each direction, plus a 3.0 m outer shoulder and 1.8 m inner shoulders and a central median of 2.0 m in width. Additional work included the construction of service roads at each side for approximately four kilometres, two fully directional interchanges and three overpasses as well as slip ramps, cross roads, diversions, tapers, retaining walls and draining structures.

Thanks to a combination of competitive pricing, existing products and systems and a well-designed solution, Doka was able to support these works by providing a tailored solution that worked for all stakeholders. While standard Top 50 was used for the pile caps and abutments, special steel form, with a customised rubber for the architectural grooves had to be used for the piers. For the bridge deck, a combination of 6,720 m^3 of Staxo 100, IPE and H20 were used, while the bridge shoulder used both Top 50 and heavy-duty spindles.

From a workflow point of view, the foundation was completed first, followed by the vertical elements of the pier and abutments and finally the horizontals of the bridge deck and shoulder. Thanks to the flexibility of the Top 50 system, the client was able to cast up to 10 metres in height without any issue, while Doka's bespoke system allowed the concrete to be held at a high temperature, giving the unique shape a perfect finish, not to mention being cast in one shot at a height of nine metres. As the project consisted of 12 bridges, each with a different height and design, the Staxo 100 system provided the necessary flexibility and load bearing qualities to make it the ideal solution to this project.

From a planning perspective, Doka's foresight to see how material could be used to serve each of the different bridges without having to reorder material or systems meant that the client could save money without sacrificing safety or time. As standard, all material and systems supplied by Doka met the highest standards, as endorsed by European certification. From the clients' point of view, each of the Doka systems were easy to learn, and the shop drawings supplied were extremely easy to follow. Only a supervisor was required for the custom-made items, giving the client the confidence to get on with the job in hand and improve the highway conditions for motorists for many years to come. //

Retail has a new address in Choueifat

Located to the southeast of Beirut, one of Doka's latest projects is set to become the latest retail outlet in the city of Choueifat.

Breaking ground in 2015, the Danco Commercial Center (DCC) Mall is a $60 million development that will provide a diverse mixture of retail space just outside of the Lebanese capital. The project is on track to be completed in just over a year from now. Working with Al Idrisi Contracting, Doka was awarded the contract to provide multiple formwork solutions, based on both crane dependent and independent systems.

Based on a plot of 8,000 m^2, the gross leasable area of the mall will be 25,000 m^2 and once completed will be spread over a 3B + G + 5 configuration, including parking capacity for 400 vehicles. As a solution, Doka provided 370 m^2 of Framax for the core wall and four sets of Frami for the columns. In addition to this, Doka also provided 1,500 m^2 of Dokamatic tables and the same area again for Dokaflex 20.

The Framax was selected in order to meet the requirement for multiple reuses, and Frami in order to cover the crane independent zones. Dokamatic was selected for its speed in repetitive areas and Dokaflex for irregular and crane independent areas. As standard with all Doka projects, all working platforms were provided with handrails to ensure the safest possible environment for the site staff. In providing a combination of high endurance products, engineering support, product availability and site supervision, the project has benefited from an ahead-of-schedule delivery date that has enabled the client to secure two further projects.

Following the appointment of Michel Aoun as the new president of Lebanon, Aoun designated Saad Hariri prime minister with the aim of forming a national unity government. The end of the political impasse is widely expected to boost business investment and unlock much-needed economic reforms and infrastructure programs in the coming year. A group of the world's leading economists, the FocusEconomics panellists, projected that Lebanon's GDP will grow by 1.6 % in 2017 on the back of a mild recovery in oil prices, with a matching rise in the startup of major infrastructure projects and remedial work throughout the country. Though the effects of instability in the recent past can still be felt, welcome signs of recovery and a return to normality are becoming increasingly widespread. The construction industry in particular has a major role to play in restoring the infrastructure and prosperity of the country. **//**

▲ The Danco Commercial Center (DCC) is being developed at a cost of $60 million.

The Professional

"Doka's different line of products helped our staff to finish ahead of schedule and save up to 40 % in labour costs. In general, Al Idrissi company believes that Doka provides the best value for money in the formwork industry."

Ahmad Aoun, general manager and owner, Al Idrissi SARL

Seven-star luxury hotel rising with Doka know-how

Work is currently in progress on La Luna, the seven-star luxury hotel set to become a new landmark in Azerbaijan's capital city, Baku and a beacon for the country's increasingly opulent property market.

With its highly futuristic design, the hotel and the other structures in the Crescent Bay development will likely characterise Azerbaijan's architectural landscape. The Crescent Bay urban development project has been ongoing since late 2009 and its 450,000 m² footprint covers an entire man-made island in the Caspian Sea, with the crescent-shaped hotel inspiring the project's name. Along with La Luna, which will cover 125,000 m², the project also includes the Crescent City shopping and leisure-time centre and the Crescent Place office and residential complex, both of which have been completed with the help of Doka formwork solutions in 2015.

Once finished by its planned completion date in late 2017, La Luna, the super-luxury hotel with 230 rooms, 74 apartments and 16 villas is tipped to be the premium address for visitors in Azerbaijan's capital city, Baku. The concept as a whole was drafted by South Korean architects, Heerim Architects & Planners, who were instructed by the project owner, Azerbaijan-based Gilan Holding.

Faster progress on the build despite extreme weather conditions

The challenging weather conditions and the architectural concept with its unique crescent-moon shape required Doka to create specific safety features for this project, the results of which reaffirming why İlk İnşaat MMC has come to rely on the products and engineering services of the Doka Group.

The Facts

Project: La Luna Hotel (Crescent Bay)

Location: Baku, Azerbaijan

Project owner: Gilan Holding

Construction work by: İlk İnşaat MMC

Construction start: December 2014

Scheduled completion: Late 2017

Building height: 123 m (28 storeys)

Cycle time: 5 storeys per month

Formwork technology:
Systems: Protection screen Xclimb 60, Automatic climbing formwork SKE50 and SKE100 and SKE50 plus and SKE100 plus, Large-area formwork Top 50

▶ La Luna's unique shape calls for bespoke formwork solutions by Doka.

▲ La Luna hotel will offer 230 rooms after its completion in late 2017.

"We appreciate Doka as a long-standing partner on the construction projects we undertake, particularly on account of the special know-how that Doka contributes to every project and also because of the cost benefit that derives from safer and faster construction with its products," commented Mert Ersoy, project manager with İlk İnşaat MMC.

Very strong winds can blow for days in this region, so it is difficult to use cranes for working high above ground level. SKE50 and SKE100 automatic climbing formwork from Doka, along with SKE50 plus and SKE100 plus, were used to ensure smooth progress on the build even when outdoor conditions were extreme.

The Doka engineers on the project recommended the use of automatic climbers in order to optimise progress on the build, which consequently had a very positive effect on the schedule, increasing the build rate from the planned three storeys per month to five. In combination with the SKE50 and SKE100 with SKE50 plus and SKE100 plus automatic climbers, the formwork of the building core used an all-hydraulic system with the climbers on the outside of the hotel structure moving the large working platforms from one storey to the next.

From a safety aspect, the project included the Protection screen Xclimb 60 which helped to shield personnel from both the elements and potential falls. Not only did the system improve productivity thanks to the increased level of personal safety for the team, but also helped to reduce costly crane time and unnecessary manpower. //

◄ Baku's new urban development project is named after the crescent-shaped hotel, La Luna. Photocredit: www.aecom.com

Matching philosophies

Shaksy Engineering Services and Doka Muscat LLC team up to deliver a high quality business traveller hotel exactly on time, while adding significant value to Muscat's business and tourism sector: introducing the **Sundus Rotana Airport Heights** four-star business hotel.

In April 2015 Sundus Investments Projects, a specialist in mixed-use developments, signed a deal with Iman-based Shaksy Engineering Services to develop the first phase of the Sundus Airport Heights project in the Sultanate's capital, Muscat.

The Sundus Rotana Hotel will feature 215 guest rooms including suites, a ballroom, six meeting rooms, an executive lounge, a boardroom and a fully equipped business centre. Guests will also have access to a state-of-the-art fitness centre and swimming pool, an all-day dining cafe, and 'Teatro' - Rotana's signature fine dining concept.

Phase One of the project includes the construction of the Sundus Rotana, a four-star business hotel, which is set to open its doors in February 2017, according to Mohammed Mahfoodh Al Ardhi, the chairman of Sundus Investments Projects. His comments came after signing the deal with Said Al Shaksy, CEO of Shaksy Engineering Services.

Sundus Airport Heights has been designed to cater to business travellers and conference visitors. Located centrally on Al Maaridh Street in the Al-Seeb district, the site offers a panoramic view of the sea as well as the magnificent Hajjar Mountains, and will contribute to driving Oman's ambitious mandate for the tourism sector as outlined in Oman's Vision 2020.

"Sundus Investments Projects is committed to enhancing the sultanate's potential through developing high quality properties that add significant value to Muscat's tourism sector. We are confident that our synergistic partnership with Shaksy Engineering Services will help us achieve the successful launch of the hotel in 2017," stated Mr. Mohammed Mahfoodh Al Ardhi.

Shaksy Engineering Services (SES), is a leading civil engineering company with operations in Oman and the UAE. Established in 2009, the vision of Shaksy Engineering Services is "to create a successful construction company that focuses on a new level of quality and timely delivery". This vision has guided SES through its growth to a team of over 1000 employees with the capabilities in-house to successfully deliver a wide array of large-scale landmark projects in the construction sector.

In 2014, Mr. Dirk Noack, an internationally experienced civil engineer from Germany joined Shaksy Engineering Services as General Manager. He leads the drive for reliability and quality of project execution, and is the liaison between company owners and general management. For the role of project manager, SES secured the services of Mr. Agustin Rayo Luengo in 2015, a Spanish projects manager with two decades experience in successfully managing and executing complex construction projects.

The common goal of Shaksy Engineering Services and their newly appointed managers is to encourage and establish thinking and working to European Standards in all aspects related to work preparation and safety, as well as strict quality and progress oriented execution.

Groundbreaking took place mid May 2015, and the concreting of foundations started in July 2015. The first vertical building members were cast in early September.

Due to the tight construction schedule, all concreting work had to be finished by 15th February 2016 during which time the management of SES selected Doka Muscat LLC as project formwork supplier. Mr. Noack and Mr. Luengo were both familiar with Doka formwork from their past experience in various countries.

"As a modern company, Shaksy ES look for compatible subcontractors and suppliers. Partners who understand the value of time and quality and share our "time-is-money" philosophy thrive by their collaboration with us. Knowing Doka formwork and Doka organisations in Germany and other countries both in and outside of Europe, I can compare the business standard Doka Muscat LLC holds. I am delighted that there is no difference between the service quality I am used to from Doka Germany and Doka Muscat. Even the prices are more or less the same."

The high standard of services like formwork planning, site and staff training, site supervision and material maintenance locally available, the flexibility towards material availability on sale and especially

▲ Doka's easy to erect d2 stair tower assures safe and fast building access at each floor, even at heights of over 40 metres.

▲ Dokaflex 20 proves its versatility and investment value for all different floor areas and heights.

◄ Doka's highly efficient logistical coordination enabled Shaksy ES to reduce its overall concreting schedule to 4.5 months.

on rent, even for short periods of use made our decision to appoint Doka Muscat as our formwork supply partner particularly easy, despite a higher but overall fair price. The overall progress and fast adaptation of our workers to these new and unfamiliar innovative formwork systems validates this decision. The collaboration between Shaksy Engineering Services and Doka Muscat can be called an ideal match of philosophies towards quality and reliability of job execution."

Prior to signing the supply contract on 1st September 2015, several technical meetings between both parties took place to jointly agree on the ideal formwork systems, the right quantities of formwork and the most economical split between purchase quantities and quantities on a rental basis.

"We have 654 calendar days to finish this OMR 15 million (MEP value w/o fit-out) contract. We finished all structural concrete works within 4-½ months. Casting the final slab of the total 22,000 m^2 took place on 11th February 2015 - actually a few days ahead of our schedule."

"It is entirely due to the Doka formwork systems and the services and flexibility of Doka Muscat that we could fulfil this ambitious target. I know Doka and the advantages of their formwork systems from my past experience as projects manager of many different projects in the civil and building sector in Europe.

Initially we took some time to ensure that our workers were fully familiar with modern formwork systems. With the initial trainings of the Doka formwork instructors and some intermediate on-site-support by them, and my work philosophy of delegating responsibilities and constantly raising and keeping the focus of all my staff on the manifold micro-management issues of such a complex project, soon everyone realised the ease of utilization of the formwork and its flexibility in adapting to all the different structure shapes. My workers appreciated the ease of handling and the logic behind the vertical as well as the horizontal formwork items and systems. If a crane is available they can shift larger assemblies with relatively little effort. When the cranes are occupied, they can dismantle the forms completely and easily move the individual lightweight parts without losing much time because dismantling and re-assembling goes so fast.

Budget-wise we decided to hire all vertical formwork (FramiX-Life light-weight panel forms). This system works very quickly and is adaptable to nearly all wall and column shapes, so we could cast all verticals promptly, with a minimum quantity of formwork.

For all the various slab areas we went for a mix of renting and purchasing. The rental option we have chosen for the "non-typical" floor slabs and the re-propping. We purchased two full sets of the typical "tower" floors. This Dokaflex 20 slab forming system is so adaptable to all kinds of slab forming requirements that we can utilize it in many further projects over the coming years.

Site safety and ease of material handling is one of my focus points. In these aspects Doka Muscat also added value to our project by supplying cantilever platforms for the easy movement of material, and a stair-tower system of a high standard, allowing my workers to safely access and move between all building levels.

To me, all site details matter. And it is always my aim to inspire my staff, my team members and to develop the same thoroughness and foresight in all their daily challenges. In order to engage all our workers efficiently we constantly review our progress and see whenever there is a part of the structure finalised and ready for the next work-step. We focus on strict "housekeeping", a very important aspect of safety on site as well as fast material supply and movement within the site. All our different work-steps go "hand-in-hand," which is the key to successful and on-time execution of every project, which aims to deliver a quality finish. Early and proper progress planning, constant site-monitoring and progress control, the right equipment and the collaboration with experienced and reliable supply partners is what I and what we in Shaksy Engineering Services understand as professionalism. Doka Muscat matches this philosophy in an ideal way." **//**

Doka formwork engaged

Frami X-Life light-weight handset panel forms: 1.300 m^2

Dokaflex 20 in combination with different prop sizes of 3,00, 3,50, 4,00 and 5,50 m height: 8.000 m^2 plus adequate props for re-propping

Doka d3 – heavy duty support system for the 8 m high slab areas: 3.000 m^3

Doka d2 stair-tower: 40 hm

The Professional

"I am delighted that there is no difference in service quality that I am used to from Europe compared to Muscat. The high standard made our decision to work with Doka particularly easy."

Agustin Rayo Luengo
Shaksy Engineering Services (SES)

▲ The most ideal solution for this demanding project came from Doka engineers as a result of a 4,100 hour study.

Award-winning engineering solution

The Istanbul Marina project is comprised of five buildings in different geometric shapes (two resembling an 'S' and three resembling a 'C'). Here, a maximum-security working environment has been created by completely sealing the buildings using Doka Protection screen Xclimb 60.

The Facts

Project Name: Istanbul Marina
Investment Company: DAP YAPI INŞ. SAN. TİC. AŞ. & ELTES İNŞ.TES.SAN. TİC.A.Ş. ORTAK GİRİŞİMİ
Floors: Tallest building has 38 floors
Height: Tallest building is 145 meters
System used: Doka Protection screen Xclimb 60

The Istanbul Marina project, which is currently being built on the Kartal coast of Istanbul, has already begun to attract attention due to its stunning views and the eye-catching architecture of its buildings. Composed of five buildings comprised of spaces intended for residential, business and commercial use, the project has managed to achieve its fame in part due to the engineering solutions provided by Doka. In a competition held between offices in all the countries in which Doka operates, it earned the top prize for the "Most Demanding Engineering Solution" category.

All round protection

One of the most significant elements that have contributed to the demanding nature of the project is its unusual geometric architecture. The project, which is composed of five buildings in

different geometric shapes, has been provided with all-round complete closure through the use of Protection screen Xclimb 60. As a result of intensive engineering studies this screen allows itself to be adapted to the different geometry of the buildings. As the building rose level-by-level, the panels could even be easily fitted in the areas of the crane support struts without the need to use a crane. Thanks to these plates that Doka engineers developed especially for the project, crane capacity could be reduced while at the same time providing a seamless maximum-security working environment in all weather conditions.

Hand-in-hand solution

Furthermore, the engineers included the spaces in the cladding of the C-shaped buildings into their calculations, thereby ensuring that these areas would also be sealed without gaps. By creating special solutions for these areas it meant that the panels could continue to be raised without interruption. When it came to the S-shaped buildings, a system was specially designed for the balcony sections which varied according to the height they were at. This ensured that the panels could be raised automatically in accordance with the balcony structure of the next level without the need for a crane.

As a result of the intensive labour spent on every detail, the Doka engineers created the most economic and ideal solutions for the investment company. They also ensured that the building could be erected in a secure and efficient manner in high winds without using crane towers through the use of a contiguous hydraulic raising system. They used this system for the structure and the structure's façade which meant that the construction of the core was not impeded in any way. //

The Professional

"Thanks to Doka Xclimb 60 Protection Screeen, our project which architectically pushed boundaries continued development without any interruption, unaffected by bad weather conditions which is typically one of the biggest risks when working in the high rise buildings' construction sites."

Boray Özdek, deputy general manager, Dap Yapı

In brief

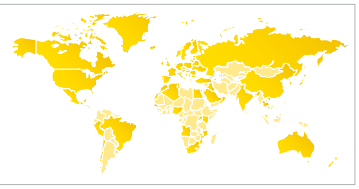
News, dates, media, awards

Vital Launch in Qatar

Following an initiative created by colleagues from Umdash Group, six employees created VITAL Qatar in 2015. With the company's commitment to promote activities that focused on the improvement of the wellbeing and fitness of its employees in the workplace, the Vital Qatar team got together to engage in encouraging, helping and guiding their colleagues to follow a healthy lifestyle that focused on three main Vital topics: movement, nutrition and mind. The team created a Vital Corner in each department where employees can relax, find related information on the Vital Impulses, enjoy flavoured waters, herbal teas and fruits. Still focused on the three main topics of Vital, the Vital Qatar team promotes activities such as walks around the yard, quizzes, sports tournaments, smoothies, "deskercises" and pilates balls to sit at the desk.

Doka Muscat conducts hands-on training seminar to students

A seminar was presented to a group of 28 engineering students. These types of training are conducted regularly at Doka Muscat for local students and also contractors. The students were able to interact with the various systems after learning about the products in theory. The seminar consisted of an introduction to Doka Muscat and the Doka Group with particular emphasis on the Middle East regional presence, a general presentation of the Dokaflex floor formwork including Tables formwork, Frami framed formwork, Shoring towers d3 and Top50 formwork. A maintenance demonstration of our products was also carried out, in particular the cleaning of Frami panels, selection of panels requiring maintenance, how to repair the facing of panels, as well as minor structural repairs.



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