

Doka Xpress

The Formwork Magazine | Review 2017

Forming the future

Interview Series

Scaffolding Megaproject

New Istanbul Airport

Friends for life

Doka Lebanon's CSR campaign



Editorial



To our clients and colleagues,

Reflecting on 2017, I'm left with the difficult task of deciding which achievements should be included in the introduction to this year's Xpress - perhaps recognition is a good place to start.

As part of our regional duties, Doka Middle East was delighted to extend its responsibility to include Africa, and it was our pleasure to welcome on board our country organisations from the continent in March.

While Doka received numerous accolades this year, one particular highlight was being awarded the Mohammed Bin Rashid Award for Business Excellence, reaffirming our approach to professional development.

As part of our commitment to innovation, Doka was selected as one of only a few companies to participate in the 3rd Cohort of the Dubai Future Accelerators, paving the way to support the country's 3D printing targets.

Supporting our CSR initiatives, Doka was proud to sponsor WorldSkills in Abu Dhabi, an event that highlighted the importance of vocational training for youth, as well as signing an agreement with SOS Children's Villages in Lebanon to provide mentorship for underprivileged young adults.

As we enter 2018, we celebrate our group's 150th anniversary, so on behalf of our Middle East & Africa team it gives me great pleasure to congratulate the Umdasch family on this landmark occasion. It's been over forty years since Doka first arrived in the Middle East, and while the skylines may have changed, Doka's approach to providing the highest levels of service has remained consistent.

We hope you enjoy this issue and wish you the very best for 2018.

Sincerely,

Peter Vogel
Director, Middle East & Africa
Doka Group

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Doka News

150th Anniversary celebrations

Umdasch Group, Doka's parent company is celebrating their 150th anniversary in 2018. What a milestone for the Umdasch family and all employees within the group!

You can view employee stories, celebrations, pictures and historical milestones on the anniversary website <https://150years.uddasch.com/>



Your strong partner in the Middle East & Africa

With more than thirty years experience operating in the Middle East from its regional HQ in Dubai, you could say that Doka's expansion has mimicked that of its surroundings. Having been involved since the very beginning of what many would consider the 'boom' period of the U.A.E.'s development, Doka's existing reputation helped to secure contracts on some of the country's most iconic buildings, most notably the Burj Al Arab and the Burj Khalifa, while its ongoing regional professionalism helped it to become a staple provider for many of the wider GCC's most ambitious infrastructure and high-rise projects. In more recent years, Doka's Director Region Middle East & Africa, Peter Vogel believes there have been several factors which have helped the company to expand while maintaining its usual high-quality approach.

"While we have made a concerted effort to expand our sales force in the past decade, I believe the decision from our head office in Amstetten to allow our Dubai operations to increase its territorial responsibility has been a major part of our success story. Thanks to the hard work, diligence and results of our team, Dubai has carved out its position as a regional leader, making us the logical choice to oversee Doka's expansion into other markets, particularly west and central Asia, and more recently the whole of the African continent. Through a combination of outstanding engineering and logistical competence, Dubai has been able to provide the necessary support to our satellite operations across the wider MEA and WCA regions. From a logistics perspective, the establishment of our Material Distribution Centre here in Jebel Ali has further provided us with a wealth of advantages, in particular reducing lead times while offering an unbeatable level of material availability on site."

Another aspect of Doka's success has been its ability to overcome obstacles no matter the project or deadline. Take for example the Istanbul Marina project, whose ideal solution for its five geometrically different buildings was found after a 4,100-hour study.

Built on the strong foundation of its Dubai operations, Doka's Middle East and Africa office is certainly well positioned, supplied and managed to play an increasingly important role in supporting not just the GCC's development, but the burgeoning markets of central Asia and continental Africa as well. //

- ▼ Since early 2017, Doka has further strengthened its presence in the African market.





▲ Behrokh Khoshnevis, President and CEO Contour Crafting Corporation.



▲ Artist rendering of 3D construction model.

▼ Doka Ventures focuses on potentially disruptive technologies.

Doka Ventures starts with commercial 3D printing

Doka Ventures, a subsidiary of Austria's Umdasch Group, is joining forces with inventor of deployable 3D construction printing Behrokh Khoshnevis.

His company will start delivering the first series-ready robotic 3D construction printers early next year. These robots reduce the time it takes to construct buildings to mere hours or days. This will help meet the rising global demand for socially acceptable accommodation and infrastructure. The company is already generating revenue by offering technology and solutions to major entities such as NASA.

Now, things could change. As first in the field, Contour Crafting Corporation from the US is poised and ready to start series production of first-generation deployable robotic 3D construction printers. The man behind the high-tech company is none other than the pioneering inventor of this technology, Behrokh Khoshnevis. Khoshnevis has taken a strong partner on board: Doka Ventures, a subsidiary of the Austrian Umdasch Group from Amstetten is taking a 30 percent stake in Contour Crafting Corporation. Their role as core shareholder is long-term and is reflected in personnel appointments to the positions of Chief Financial Officer (CFO) and Chair of the Board of Directors. Behrokh Khoshnevis remains majority shareholder and CEO of the company. Khoshnevis, a professor at the University of Southern California (USC) Viterbi School of Engineering, developed the contour crafting technologies. He worked with the USC Stevens Center for Innovation, the technology transfer office for the university, to obtain a license for the technologies to further develop them within his own company.

"Very soon, we'll have the first series-ready deployable robotic 3D construction printer" are the words in which Dr. Behrokh Khoshnevis, describes the company's unassailable unique selling point. Deployed in the field, the robot 3D printer will be able to initially print building shells layer by layer and construct entire developments. The process massively reduces the time needed for erecting an entire building to mere hours or days. Depending on the model, the first generation commercial construction robots will have a reach of between eight to twelve metres and a user selectable length which could have a substantially larger size. Tipping the scales at less than 400 kg (882 lbs.) in all, it is very light for a large construction machine. It is also very simple to put together and take apart, remarks Khoshnevis. An ordinary truck or a standard marine-freight shipping container has ample space for several of the robots. Only one or two operators certified by Contour Crafting Corporation are needed to monitor progress on the build. //





Doka addresses challenge to ‘Implement 3D printing in 25% of Dubai buildings’

Acknowledged as a ‘unique program for cutting-edge entrepreneurs’, DFA was created to attract the most highly skilled from sectors including energy, education, security, and transportation for the purposes of discussing innovative ideas for public-private partnerships, using Dubai as its ‘testbed’.

Amongst the 46 companies selected by the Dubai Future Foundation, Doka Gulf was selected for its commitment to innovation, and its shared vision for a safer, faster, and more sustainable construction industry. Doka Gulf will be supported by sister companies BIAIS Research & Technology and Contour Crafting Corporation. As a collective, the consortium is fuelling the momentum of disruptive technology within the construction sector, and supporting Dubai’s vision to be the global leader in industrial 3D printing. As a result of the program, Dubai Municipality signed a MoU with Doka during an official signing ceremony held at the Dubai Future Accelerators, formally acknowledging the partnership that will deliver the challenge set by His Highness Sheikh Mohammed, to ensure that 25% of all new buildings in Dubai will be built using 3D printing technology by 2030. The memorandum, which was signed by Doka Gulf’s managing

director, Michael Arnold, in the presence of Sheikh Hamdan bin Mohammed bin Rashid Al Maktoum, Crown Prince of Dubai and Chairman of Dubai Executive Council, marks the formal agreement between the Dubai government and the consortium of companies represented by Doka. Speaking on behalf of the consortium, Michael Arnold said, “This memorandum marks the beginning of a very exciting collaboration that will not only meet the high standards set by His Highness Sheikh Mohammed, but furthermore position Dubai as a global leader in the industrial 3D printing sector.” According to Khalfan Belhoul, CEO of Dubai Future Accelerators, “the aim of the Dubai Future Accelerators program is to connect the most innovative companies from across the globe with top government entities. We are hopeful that this partnership will accelerate the ‘3D Printing Strategy’ for Dubai and elevate the emirate as the world’s 3D printing hub.” //

▲ Overview of global participants in 3rd Cohort of the DFA.

▼ Michael Arnold, Managing Director Doka Gulf attending the signing ceremony.



Forming an innovative future



▲ Peter Vogel, Director Region Doka Middle East & Africa speaking on Doka's history of creating value.

The world's urban population is increasing by 200,000 people per day; that is according to 'Shaping the Future of Construction', a report published by the World Economic Forum in May 2016 and while many sectors have been able to efficiently keep pace with demand, the engineering and construction sector has struggled. Representing approximately 6% of global GDP (and growing), 'the E&C sector is currently the largest consumer of raw materials including 50% of global steel production and more than 3 billion tonnes of raw materials.' Peter Vogel, Director Region Doka Middle East and Africa said, "For us, innovation has always been at the heart of our corporate ethos. Having established our fully dedicated R&D department from our headquarters in Austria in 1990, we've been able to work and develop multiple products and systems that push the application of technology in the E&C sector

and make the industry a safer and more efficient place to work. As such, Doka's performance and market share has steadily increased since our arrival in the Gulf region over twenty years ago, and 2017 is on track to be another record breaking year." In addition to product and system innovation, Doka has also turned its attention to providing a whole-of-project consultancy, an approach that aims to correct 'the inadequate collaboration with suppliers and contractors', as cited in the WEF report. "While technology has helped the industry to be more communicative, Doka has been able to create a lot of value by entering the project at an earlier phase, thereby providing a number of cost and time saving solutions. As a result, we've been able to support the timely delivery of projects, and in turn save our clients money."

Interview with Harald Ziebula, CEO of Doka Group

Can you tell us what innovation means to Doka and how is it translated into your day-to-day business?

Harald Ziebula: Innovation applies to our business in many different ways. During the course of our 150 years of family enterprise and tradition, our power to innovate has been ultimately customer orientated to provide the best possible solutions for our clients. In practical terms, there are two forms of innovation, one where we focus on new products, applications and systems that are designed to deliver significant change to the construction process, and the second which evolves around looking at our existing products, listening to our clients in the field, and understanding how they can be improved. The aim of our innovation is to provide the best possible product, for the most competitive price, while supporting the requirements of our client by ensuring their job is as safe, user-friendly and time effective as possible. In today's market, we're finding that our efforts to improve or enhance our processes and our software tools are offering sometimes greater benefit to our customers than our hardware innovations.

From a socioeconomic perspective, there are other factors such as environment and safety to protect site staff from adverse conditions. Further innovation drivers are the varying requirements from our international clients.

In your capacity as chairman of the board, what significant contributions do you expect Doka to make towards the global construction market in the next decade?

HZ: First and foremost, Doka is most widely known as a formwork manufacturer, so our focus will continue to be on producing high quality products, using modern materials that allow for safer, faster and easier handling on site. In addition we are steadily increasing the range of services throughout the construction process, meaning our clients are able to benefit from an even greater level of value that extends far beyond just formwork. Doka in the future will not only be a leading provider of formwork, we will also be the internationally recognised expert for optimisation of construction methods, processes and materials for concrete structures.



▲ Harald Ziebula, CEO of Doka Group offers insight on disrupting the industry.

Interview with Michael Arnold, Managing Director Doka Gulf

As one of Doka's most outspoken advocates for innovation and disruptive technology in the construction sector, could you summarise how Doka's investment in innovation is paying off?

Michael Arnold: According to our end of year report, 40% of our revenues were produced from products and services launched in the past five years, illustrating a clear correlation between our innovative products, systems, and the supply and demand curve with our clients. From a financial point of view, innovation is certainly paying off. I believe it's extremely important that Doka's innovation strategy is in line with our business objectives. There is no point in having innovative ideas that don't support our ongoing business.

What is Doka's approach to innovation and what is the most effective way of ensuring its success?

MA: As a multinational, we are fortunate that the Doka Group provides us with many synergies, particularly when it comes to developing formwork and construction-based technologies. Our holistic approach to construction technologies means that the central R&D team is also dependent on the feedback received from our teams in the field. In order to gain clarity over the potential of our new ideas, we split them into three categories, specifically 'Quick wins', 'Breakthrough' and 'Disruptive'. In each case, we have to answer the most important question, 'How will this product or system add value for our clients?'



▲ Michael Arnold, Managing Director Doka Gulf comments on innovation being in line with business strategy.

Interview with Werner H. Bittner, Member of the Executive Board, Doka Ventures

As a member of Doka Ventures' Executive Board, could you tell us the motivation behind the company's establishment and its main objectives?

Werner H. Bittner: The starting point was the establishment of a strategic business development within the Doka Group and the decision to form a new subsidiary of the Umdasch Group. Officially the company was founded in late November 2016, but we decided to start with operational activities as of 1st January 2017 for practical purposes. The reason why Doka Ventures was established as a separate entity is very easy to explain and is fortunately something our owners understood and supported from the beginning. The problem is if you have an established organisation such as Doka and Umdasch Group, which celebrates its 150th anniversary in 2018, it becomes difficult to gain a focused perspective on new areas that require quick decisions in order to take advantage of the windows of opportunity that are synonymous with disruptive technology. As such a decision was made by the owners to establish Doka Ventures as a third separate entity. We have direct access to the owners and we have a very streamlined operational team.

Doka Ventures announced its purchase of a 30% stake in Contour Crafting Corporation, the U.S. based tech company focused towards disruptive technology within the construction

sector, in particular 3D printing. How important will 3D printing be in the future of construction, and how long before the industry at large will embrace it as a replacement to traditional methods?

WHB: I think 3D on-site construction printing will be an additional method of construction in the beginning. As time progresses, it could be used for more and more applications; however, I don't think it will substitute everything. Firstly, I don't think everything will be able to be printed at the moment. Secondly, the future markets will be so huge that you cannot possibly cover the entire market demand in the next 20-40 years by just one technology. If we bear in mind that we will have a very dramatic increase in global urbanisation, from around 52% to 85% by the year 2100, we will need a lot more homes and infrastructure. The problem is, we have only 80 years to accomplish this. Additionally, the global population will further grow to 11 billion during the same period, so that's a double self-sustaining issue that will place a lot of pressure on the construction industry. Moreover, the industry is very under-industrialised, which is a huge problem. On the other side, there is a great opportunity because the potential is obvious. A deployable 3D construction printer could complete many structures; however, I don't think 3D printing will be the answer or the solution for everything in the future. //



▲ Werner Bittner, Member of the Executive Board, Doka Ventures talks about the potential and limitations of 3D printing.



▲ Doka Safety Net Fan as part of the commitment to the wellbeing of site team members.

Doka Kuwait strives to improve national safety conditions on site

The company continuously invests in proprietary technology designed not only to make the job site safer, but also more cost effective.

Doka has launched its latest safety products and systems in Kuwait earlier this year with the aim of highlighting safety awareness across the country's construction sector. With safety systems complementing Doka's formwork equipment, its value stretches far and beyond just protecting the wellbeing of the site staff, but has also been shown to boost productivity and quality. Doka Kuwait introduced both DokaScaff UNI and Safety Net Fan to the country at the beginning of 2017. Since then, Doka's safety products can be found on more than 15 projects, not only ensuring the protection of site workers, but also reminding the Kuwaiti construction sector of Doka's commitment to providing the highest quality products and systems while offering extensive value for contractors, consultants and developers. Kuwaiti stakeholders, especially

in the Oil & Gas sector, show a growing emphasis on site safety. According to research conducted by Doka, the return on prevention model has a ratio of 2.2:1 meaning for every dollar spent on safety, the value returned to the client is \$2.2.

Speaking about the initiative, Gerald Hoermann, Managing Director Doka Kuwait commented, "Doka has held a strong reputation in Kuwait for many years now, which certainly helps when introducing new products and systems to the market. As with many countries in the GCC, a greater emphasis has been placed on safety in Kuwait and it's great that Doka has been able to contribute towards making the industry safer and to strengthen our position as a full solution provider". //



▲ For every dollar spent on safety, the value returned to the client is \$2.2.

A refined formwork solution

Located just 90 kilometres south of the Kuwaiti capital, we find out more about Doka's progress on Package 2 of the KNPC Al-Zour Oil Refinery Project and how it helped to find a technical solution.

With many of the world's oil producing economies seeking to find cleaner and more efficient ways of generating fuel oil, the Kuwait National Petroleum Company (KNPC), began construction on a new grass roots refinery named as Kuwait Integrated Petroleum Industries Company (KIPIC) designed to produce low sulphur fuel oil, thereby replacing the high sulphur fuel oil used in local power plants. Upon completion, this large-scale refinery is designed to process 615,000 barrels per day of light Kuwait crude oil or 535,000 of heavy-mix while adhering to the most stringent environmental regulations and standards.

Thanks to its long-standing relationship with the KNPC, in addition to its excellent track record as a dependable contractor, Fluor's joint venture team FDH JV was selected as the main contractor with Alghanim International appointed as subcontractor, who in turn awarded Doka the contract to supply a technical formwork solution for this section of the project. Focused towards the Utilities and Off-sites, Package 2's scope the delivery of seven buildings, namely CC-R building, Admin building, Training centre, Laboratory, Fire station, Mosque, and Cafeteria. With construction having started in February 2017, the target delivery date had been set for July 2018, meaning progress to be swift and consistent. With such a tight construction schedule and with all major buildings being built at the same time,

contractors also had to bear in mind the stringent regulations associated with the oil & gas sector to contend with. From the beginning of the project, Doka's engineering team worked closely with the contractor to deliver a full formwork solution including formwork, scaffolding and safety products, while also delivering the quantities in line with the construction schedule.

In response to the requirement of a fast and efficient delivery, Doka's team used Staxo 40 for its light weight frames and minimal single components, Frami Xlife Universal Panels for different column dimensions without the need for any modifications work and enabling the fast construction of columns without the need of any tie-rod. To increase efficiency, up to 10-metre-high walls were casted using Doka's versatile Large-area formwork Top 50. Covering the project's safety requirements, Doka used DokaScaff UNI rebar scaffolding, Safety Net Fan, Edge Protection, and Stair tower systems, ensuring all personnel could focus on doing their job to the best of their ability. With all buildings being built at the same time, Doka had to provide larger volumes of formwork to cope with the demand and at the peak of the project, 15,000 m² of shoring material was in use at one time. Doka has been providing a full-time expert on-site to solve the technical problems and give training to the staff. //



The professional



"Doka has been excellent from a technical point of view in the design of the formwork systems and the suitability 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 provided a purpose built up stair form system for easy access to the slabs, walls and columns of the project."

**Hany Gerges, Project Manager
Alghanim International**



▲ Boosting productivity with the light weight shoring system Staxo 40.

► Doka's wide range of products can be combined with our safety systems to address the most vulnerable areas on a construction site.



▲ The new Rixos hotel located on Saadiyat Island in Abu Dhabi.

Scaffolding on success



▲ The new resort will have a capacity of 374 luxurious hotel rooms.

With innovation centred at the core of Doka's products and services, the recent launch of its latest scaffolding products has proven to be particularly popular amongst its Middle East and Africa clients. In this special feature, we visit four separate projects and see how DokaScaff UNI and Load-bearing tower d3 are helping to keep projects on time and on budget while ensuring maximum safety on-site.

According to Absolute Reports, one of the major market drivers in the global scaffolding industry is the requirement for companies to meet the intensifying safety regulations associated with the construction sector. Doka's most recent scaffolding products, DokaScaff UNI and Load-bearing tower d3 were both designed not only to address the paramount issue of safety, but also make the handling and assembly process as simple as possible.

DokaScaff UNI is a scaffold system that can support reinforcement operations, while doubling as a stair tower or a mobile scaffold tower. Approved by DIBT, AENOR, AFNOR, NASC and SP, its pre-defined connection points on the rosette, and tested anchorage points for personal fall-arrest systems (PFAS) make it user-friendly during assembly and throughout the

project. As a modular system, it's ideally suited for use as a stair tower, access scaffolding, and mobile scaffolding tower while being easy to handle. It's vertically adaptable in a 50 cm height grade and allows up to eight different connecting directions in one place.

Doka's next scaffolding product, the Load-bearing tower d3 is a high-performing and cost-effective shoring system that is not only fast to assemble, but also highly versatile. With lightweight components and a minimal amount of separate units, it can be assembled without the use of tools making it highly user-friendly for site staff. The frame itself is hot-dip galvanised for a longer lifespan and has also been strengthened to sustain a load capacity of up to 94 kN per leg.



DokaScaff UNI

DokaScaff UNI is a multidirectional ring scaffold system consisting of tubular elements that provide an effective and secure way of performing the most demanding scaffolding works.

Since their respective launches just over a year ago, both products have been used on projects across the region providing a variety of benefits to Doka's clients. We look at four specific projects, and examine how both DokaScaff UNI and Load-bearing tower d3 are making sites across the region safer, efficient, and cost effective.

Located to the western end of Dubai, Doka was hired by Fix Concrete Technologies Contracting LLC for the modification of 3B+G+8 at the Ibn Battuta Lofts. The project consisted of extending the existing building by three additional floors, while also renovating the overall structure. With only a small window to deliver, DokaScaff UNI was used as the façade scaffolding, which was required to reach a height of 44 metres. Thanks to its high structural stability, easy installation and galvanised material, DokaScaff UNI was assembled without the use of a crane and delivered the perfect solution for the project.

Sitting adjacent to Ibn Battuta is Jebel Ali, where Doka was contracted by Issam Kabbabi to deliver a solution for the Jebel Ali M station power and water desalination plant expansion. Upon delivery in 2018, the new combined cycle power plant will add a further 700 MW to the installed generating capacity of M-Station, boosting its output to 2,760 MW. Amongst the project's requirements, site personnel required access to carry out steel works, installation, painting, insulating and coatings amongst other activities. Thanks to its flexibility and higher productivity level in installation and dismantling, DokaScaff UNI delivered the ideal solution for client Haris Yoosafali, Business Development Engineer of IKK Group who remarked on how "easy to install" and "user-friendly" the system was for new clients. In addition to the system itself, Doka also provided OSA and training in compliance with European safety standards.

In October 2016, Doka was awarded the contract to deliver a formwork solution for the 373-key, Rixos Saadiyat Island resort. Described as 'a palatial resort set in lush gardens, awash with Mediterranean style on the edge of the Arabian Sea,' this 43,400 m² site required a façade scaffolding solution that was both easy to install and dismantle, while adhering to the highest safety standards. With a tight construction schedule, Doka was also required to supply a suitable amount of scaffolding, which at peak construction time reached 50,000 m². Thanks to the combination of DokaScaff UNI's certified safety standards, the timely delivery of materials and the team work of Doka's on-site scaffolding crew, Rixos Saadiyat Island is scheduled to welcome its first guests in December 2018.

Our final case study covers the Al Khail Avenue Mall and Hotel, located in Dubai's Jumeirah Village

Triangle. Hired by Dhabi Contracting LLC, the contract was awarded in August 2016, with the concrete works required to be complete by March 2018. Covering an area of around 180,000 m² of cast-in-situ slabs over three levels, Doka's Load-bearing tower d3 tables were used to allow materials to be reused from the basement levels, with a height of 3.90 m, to a double height slab above ground floor of 7.55 m. Thanks to the d3 frame, the tables were fabricated below, before being reused on the upper levels without the need to refabricate. In addition, the d3 table towers could be moved without dismantling by either trolley or crane, providing valuable time-savings for the overall project. Thanks to the additional support of Doka's engineering team, this mixed-use development is on course for delivery as scheduled, ensuring another satisfied client.

For further information about Doka's scaffolding systems, or to find out how they can be applied to your next project, please contact visit www.doka.com/connect and a member of our team will contact you. //

The professional

"The scaffolding industry has come a long way from the traditional tubes and fittings to today's multi-directional ring lock systems such as DokaScaff UNI. Offering a higher rate of productivity, not to mention significant improvements to safety standards, site teams frequently comment on how fewer tools are required and how much easier the system is to use."

Fasil Mohammed, Product Manager Scaffolding Systems, Doka Gulf

▼ DokaScaff UNI is used at the Jebel Ali Power Plant extension to carry out steel works installation, painting, insulation, and coatings.



First phase departure

The Facts

Project: Istanbul New Airport IGA

Location: Istanbul, Turkey

Construction company and airport operator: Cengiz-MAPA-Limak-Kolin-Kalyon consortium

Start of construction: 2015

Scheduled completion: 2028, four phases; partial opening: February 2018

Passenger capacity: 90 million after 2018, 150 million per year after full completion

Doka products in use: Load-bearing towers, Timber formwork beams H20 eco and H20 top, Framed formwork Frami Xlife, Large-area formwork Top 50, Edge protection system XP, Doka stair tower, Doka reinforcement and working platforms; Services: Formwork Instructors on site, planning service of Doka Turkey

With the handover for the first phase of Istanbul's Third Airport, or Üçüncü

Havalimanı drawing ever closer, we get to grips with the sheer scale of this mega-airport, which upon completion will be able to handle 150 million passengers a year.

Located 35 kilometres to the north of Istanbul on the European side of the Bosphorus, Turkey's most populous city is in the final stage of construction for its third airport and if there's a common theme with this project, it's massive. Built in the Arnavutköy district, the site alone covers 76.5 km² and upon completion will be able to handle the same passenger volumes as London's four international airports of Heathrow, Gatwick, Luton, and Stansted combined. Designed to become a hub for the region, it has attracted the interest of several airlines as a potential headquarters and its integrated port on the Black Sea make it all the more appealing to cargo operators. The planning behind such a major infrastructure build originated with the logistical issues of expanding the city's two existing airports, Atatürk and Sabiha Gökçen and as a result, the former will be closed once the new 'Third' becomes operational.

Construction started on the mega-airport in 2015, during which time Doka Turkey has been responsible for approximately two-thirds of the total formwork requirement in the first phase, which includes delivering both the main and second terminal, covering 850,000 m². Once delivered, the first phase will include three runways and sufficient capacity to handle up to 90 million passengers a year.

As part of Doka Turkey's service provision, the team was strategically involved since the pre-construction phase meaning its engineers were able to provide the most suitable solution for the overall project. One of the combinations that has been widely used on the project are Timber formwork beams H20 eco and H20 top and load-bearing towers, plus Framed formwork Framax Xlife and Frami Xlife and Large-area formwork Top 50.

▼ Overview of the first phase that will handle 150 million passengers a year.





▲ Scaffolding for Istanbul's mega airport project.

The load-bearing tower frames are made from steel, making them suitable for high clearances and loads, something that's been particularly important on this project due to the length of the down stand beams (12 m) that are required to support the precast slab. Thanks to the width, strength, and easy vertical stacking feature of the towers, this solution has certainly helped to keep the overall project on schedule.

Everything about this project is massive, and the volume of formwork is no exception. Doka's optimised solution proved that 30,000 load-bearing tower frames and 100,000 running metres of Timber formwork beams H20 eco and H20 top were required in order to deliver the project on time, with the load-bearing towers being specifically designed to be oversized for material-saving use, meaning fewer frames were required to prop the structure at any given time.

Framed formwork and Timber-beam formwork systems were used for the walls and columns with the lightweight and easy-to-handle Frami Xlife used

for walls and Top 50 for the columns. Framax Xlife steel framed formwork was used for the forming of large areas that required a crane-lift.

As always, safety comes first when designing any formwork solution – for this project, stair towers enabled the site-crews to reach their workspaces quickly and approximately four kilometres of Edge protection system XP was used during the peak of labour. In addition, Doka Turkey provided Formwork Instructors who conducted on-site support and explained how to use the formwork effectively and safely.

Doka Turkey's solutions were used on the runways, terminals, multi-level car-parking facilities, hotels, and the wastewater treatment plant.

It is anticipated that the full project, which includes four phases, will be delivered in 2028 at which stage the airport will include six runways, 16 taxiways, 1,500,000 m² of indoor area, and parking for 70,000 cars. //

▼ 30,000 load-bearing tower frames complete the optimised solution.





▲ The Grand Egyptian Museum is scheduled to be partially opened in 2018.



The professional

"We chose Doka for this project thanks to its high level of technical assistance and detailed studies of the structural solution. Doka provided a very professional service, which greatly assisted the progress of the overall project."

George Kyrilos, Deputy Project Manager

▼ Complex calculations were required to design and supply material for the unique design.



Grand designs above ancient Egypt

Covering some of the world's rarest artefacts, we hear more about Doka's work at the Grand Egyptian Museum and the details behind its bespoke 3D-designed roof.

Located just two kilometres from the Giza pyramids, the Grand Egyptian Museum is part of a new master plan for the plateau that will soon be home to more than 50,000 artefacts, including the first exhibition of the full tomb collection of King Tutankhamun. Sympathetically designed to its environment, the building features a chamfered triangle plan, with the north and south walls lining up directly with the Great Pyramid of Khufu and the Pyramid of Menkaure respectively. Designed by Dublin-based architects Heneghan Peng, the project commenced construction in March 2012 under main contractors OCI/BESIX, with engineering support from Arup and Buro Happold and is on target to be partially opened in 2018.

As with many heritage buildings around the world, the Grand Egyptian Museum has been designed to be a work of art in its own right, and as such some of its intricate features have required a highly complex engineering solution.

Nominated by the main contractor JV in 2013, Doka's reputation for delivering complex designs meant it was the ideal partner to design and supply the material for the museum's 3D folding roof which consists of two areas; the conference centre and the museum, with each area being split into six further bands, covering a total area of 36,000 m².

Due to the unique design, Doka's engineers had to calculate all the necessary shop drawings for

each band, and for each building leading to a total of more than 12,000 hours of engineering before construction could commence. In addition to the design, the roof also required the right combination of material that was flexible to work with in all different areas, while being adaptable to any changes in design during the construction process.

In order to meet the flexibility required for the roof area as a whole, large area formwork Top 50, H20 and spindle struts were used. Pre-assembled panels were implemented for the folding lines and more than 10,350 m² of decking was used.

Speaking on behalf of Doka Middle East and Africa, Project Engineer, Mohammed Samaha said, "We were successful in winning this contract because we submitted the best technical solution with all the necessary details about the assembly and disassembly. Our team has dealt with the client in a very professional way, from negotiation to delivering the detailed study of the solution."

In order to recover time and to keep the project on target, Doka was later requested to supply an additional 50% of the original material, something that was only made possible thanks to the excellent organisation skills of Doka's logistics team.

Built at a cost of \$795 m, the Grand Egyptian Museum is expected to be partially open by May 2018. //

CONCREMOTE

Concrete Intelligence. Real-time.

Save time



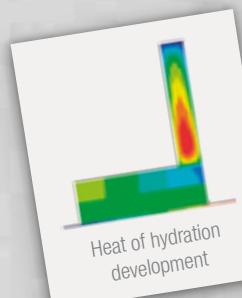
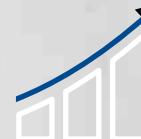
- Implement shorter cycle times with certainty by measuring early strength gain of the concrete, instead of having to rely on traditional approaches and incremental test cubes
- Switch concrete mix to optimise overall construction time
- Remote monitoring of temperature development and strength gain can be off-site
- Automatic notification in real-time when the concrete reaches the target value, enabling rapid initiation of critical path activities (stripping, pre-stressing, climbing, curing)
- Digital logging of the measured data reduces on- & off-site management

Increase safety



- Reliable quality data from the concrete structure makes for greater security in the decision making process
- Hard data for compliance confirming quality and strength thresholds
- Safe repositioning of the formwork in winter working conditions

Enhance concrete quality



- Required curing time is measured for quality assurance
- Mass concrete:
 - Heat of hydration is monitored continuously to minimise crack widths
 - Optional automatic control systems for the heating and cooling of concrete
- Support for achieving uniform fair-faced concrete colour tones when stripping formwork at a known level of concrete maturity

Reduce costs



- Plan cycle times in advance to cut material and labour costs
- Shorter cycles, delivering reduced commissioning of on-site quantities
- Validated concrete quality for reduced concrete finishing costs
- On builds with lengthy cycle times, optimising the concrete mix helps cut costs
- No requirement for traditional, incremental testing of cubes to establish early concrete strength

Concremote In Depth



As someone with almost twenty years of professional experience working with cement and cementitious materials, including seven years in advanced product development for Cemex, what were your initial thoughts about Concremote when you first heard about it?

Dr. Richard Fowler: I've used thermal maturity techniques since 2007 and there are various packages available now based on the principle, but the fundamental challenge out here is finding something that's sufficiently packaged for consultants and people who've not used this technology before, to try and understand and more importantly buy into it.

Having had the opportunity to use Concremote on site in the Middle East, most recently on the RAK Ports Saqr Port Terminal expansion, what was your experience with the device like and how did it perform?



Save time



Reduce costs

The Facts

Project stats: This project will be in service by March 2019

Value of project: AED300m

Functionality: Two deep-water berths, 18 metres draft, Designed to expand the capability of RAK Ports Saqr Port Terminal

▼ A sea of formwork material, pre-assembled by Doka's Ready-To-Use Service.

permitted peak temperature is going to be exceeded by a wide margin. If you take a high replacement mix, which is what we've used here, along with a low coefficient thermal expansion aggregate which we've also used here, it means we can let the ambient temperature rise much higher before we hit that peak temperature hydration. So we cast very early on the large blocks to ascertain exactly what this rate of rise to the peak temperature was. That clearly demonstrated, that for these larger blocks, high cement replacements were going to have to be a must. They also indicated that the control of the whole thermal process was also going to be critical and throughout the whole casting calendar. It could not be done as initial "approval" trial, which is usually the case because the ambient temperature was the largest variable.

At Doka, we believe Concremote has a wide range of benefits that cover safety, quality, time and cost. In your experience, what was the strongest benefit Concremote brought to the RAK Terminal project?



Save time

Dr. RF: Before we started this project we'd already cast the largest chunk, of the largest block we need to make, which incidentally is 1.8 m wide and 2 m high by 10 m long. This confirmed that the key challenge was going to be the control of the peak temperature. If you take an ambient temperature of greater than 30 degrees Celsius plus a low cement replacement mix you will be borderline with regards to the maximum permitted peak temperature. This means when the ambient temperatures rise higher than this like during summer, the maximum

Dr. RF: Confidence. We had to produce to hit the program requirements and it got to the point that we had cast so many blocks without any concrete or thermal problems that 25% of the project

had been produced before the whole process was signed off. At the end of the day I'd look at it differently, and suggest it's my opinion that counts. It had got to the point where I'm on a code two: I'm the one carrying risk; it's me that matters at the end of the day. I have to deliver the required production and when those blocks go down to the jetty, the contractor will inspect size wise, will check that they've met the strength and will inspect that the concrete was in specification. If those three parameters are met and it's past the minimum 14 days of age, it goes in the water. That's it.

From the consultant's point of view at the end of the day, he's not bothered, he just wants product in specification. From our point of view, it means that we're meeting contract, even though we started late. The next part of the development curve, when the weather drops off, we know we're going to have to increase the duration the blocks are in the mould. What the technology allows us to do, is that when the ambient temperature starts to drop, we'll rerun those tests to work out how long they need to be



► The largest concrete block is 1.8 m wide, 2 m high and 10 m long.

extended and at what temperature, so at all times we can maximise the turnaround time.

One of your duties includes overseeing the mix design of the concrete used on site. Could you tell us how Concremote helps to give a more detailed insight into hardening conditions when compared to traditional test cube strength results?



Enhance concrete quality



Increase safety

Dr. RF: There are several factors that come into that, particularly when you're running with high cement replacements. When you run with high cement replacements your reaction kinetics change considerably, your rate of exothermic heat driven from the mix design is greatly reduced, which is one of the reasons why we're running with high mix replacements in the first place. Consequently understanding the kinetic mass of the concrete you're working with becomes vitally important because if you cure cubes at a standard 20 degrees Celsius, it will have no relation to what's actually going on within that concrete mass at whatever temperature it so happens to be at. As a consequence of the temperature your rate of reaction is different and therefore your ultimate strength development will be very different.

Put that into number terms, using the mix design we have at present you'd expect to reach lifting strength at 20 degrees Celsius at around 90 hours, whereas the actual lifting strength in the blocks themselves particularly in the biggest ones, you are going through that in around 30 hours, purely due to the differences in temperature and the differences in the reaction kinetics which they're associated with.

Many acknowledge the construction industry has been slow to adapt new technologies over the past forty years – how much time before people catch up?

Dr. RF: It's an interesting question. One of the guys I used to work with very heavily using this technology from early on, worked extensively in this part of the world before he went back to the U.K. There does seem to be a pattern. If I look at the guys I first started working with at RMC, a lot of the good guys left whilst I was there and came to work out here. Several of them have now gone back to the U.K and formed the foundation of this new group of



You can read
the whole interview
with Dr. Richard Fowler
on our website
[www.doka-me.com/
news](http://www.doka-me.com/news)

people who are now pushing technology forward. In other words this part of the world is behaving like the building boom in the UK did in the Eighties and draws talent into the industry. Unless you've seen or been allowed to work in a different environment you don't realise that you can try out other ways of doing something. That doesn't mean to say there aren't controls out here, there are and there are some very good controls out here. ACI are out here and so there is in fact a pretty good situation where a lot of hands on training is being done, so there is a growing pool of good reason and good understanding. You've also got European (particularly German) concrete technologists out here as well, who again come from that mentality, which like to push new ideas and new schools of thought. This market does provide a scenario for quite a large peer group of people from many backgrounds who are at a high level, in terms of their understanding of what needs to be done and how to do it. As a consequence you get quite a good melting pot of ideas, ways to look at something, and push that technology forwards.

How would you summarise Doka's contribution been to the project?

Dr. RF: Very positive. If you look at all the people who've worked on this project, they all have the same fundamental mentality. It's a mentality that says, "let's look outside the box." – on several of these blocks we have to do an exposed aggregate finish to provide a surface for the capping beam to adhere to. There are various ways we can achieve that, we've tried three or four different ways that have given us the right result, it's not just looked at there's only one way of doing it. That to me is the key part, it's finding people who can look at the objective and then bring you the right solution, rather than trying to micromanage the process. //

Underwater concrete blocks

The blocks will be placed on top of each other at the sea bottom up to the water line. Afterwards a concrete capping beam will be casted on top of the blocks to bind them all together.



▲ Dr. Richard Fowler is a true expert in his field with more than twenty years of professional experience working with cement and cementitious materials.



▲ Doka's Lebanon team and SOS Children's Villages during their Open Day celebrations.



Supporting youth employability

The Umdasch Foundation and Doka Lebanon started a mentoring project with SOS Children's Villages in Lebanon. Four employees of Doka Lebanon accompany children from difficult situations on their journey towards independence. Regular meetings and shared activities provide support.

The young people aged between 16–19 years grew up with SOS Children's Villages, where they are prepared to stand on their own feet. Great emphasis is placed on their education, career advice and the search for a suitable job. The mentoring programme is still in its pilot phase; in future the project could be expanded and could help more young people. You will find more information and videos with these young people under www.150years.umdasch.com

▼ Mentor Andrea El Khoury is an engineer and has been a key driver in making this project a success.



Friends for Life

Somebody must help these young people! Andrea El Khoury, Lama Ayache, Alain Hantouche and Maher Merhi all agreed on that immediately last spring when they first heard about the opportunity by Umdasch Foundation (Umdasch Group is Doka's parent company) to support young people from SOS Children's Villages on their journey towards independence, but at that stage the four employees of Doka Lebanon had not yet planned on becoming actively involved as mentors.

"I didn't know what mentoring was, so I first had to Google it," remembers Andrea El-Khoury who took over the project on site. Nonetheless, the determined 27-year-old was full of enthusiasm and inspired her fellow colleagues with her eagerness. The first meeting was organised promptly and the four mentoring couples were set up. "You cannot imagine how much we all enjoy working with these young people. Our mentees always ask us when we are going to meet up again," continues Andrea. All the same, it was a completely new experience for both sides.

"At the beginning I was nervous; I didn't know what I should say about myself," says Hadia*, who has been meeting Andrea regularly since then. It seems hard to imagine that when you meet the lively eighteen-year-old schoolgirl. She looks relaxed and confident as she gazes into the camera. The words come out in a rush when Stephanie interviews her in a video. "Now I'm quite relaxed, it's as if I were meeting my sister. I have learnt

a lot from Andrea about life, not just about my education," she comments.

"The most important thing I try to give her is the message that when she suffers a setback she must pick herself up again and carry on," says Andrea. She has experienced directly that "life is not a bed of roses," as she puts it. At the age of 17 she moved alone from a little village to Beirut, a metropolis with over a million inhabitants, in order to study. It was a brave decision because everything was quite different from at home and her parents were far away. She had to take on casual jobs in order to finance her studies.

Next year Hadia will also leave her home in Abrah, a little mountain village, in order to study in Beirut. For the schoolgirl it will be an important first step towards standing on her own feet. She has been living in the SOS Children's Village for 12 years. Here she has found a new family and a home. Andrea will also be supporting her on her journey towards independence. "I am trying to prepare her



to face the challenges which she will encounter in Beirut as a girl living alone. She will find it is a completely new environment," she says. Together they have already found suitable study courses for Hadia. "I originally wanted to become a doctor. I was mainly thinking about the salary, and I wanted people to see me as being somebody important. I have learned from Andrea that I should choose the profession that interests me the most and that it is not important what other people think". Now she is wondering about studying the humanities, which appeals to her more.

Also Andrea's colleagues Alain, Lama and Maher provide their mentees with advice and practical help. During their meetings the main topic is the future and the education of the young people, but personal factors are also important. The four mentoring couples have been meeting for the past six months. It began as a small pilot project and today it is an important fixed point in the lives for all eight of them. Nonetheless, the mentoring programme is still in its early stages and will be expanded further, however, Andrea and Hadia have already decided that they will remain in contact because, as both of them point out, they have found in each other "friends for life".

Mentor Lama Ayache, Head of Finance

Lama Ayache, Doka Lebanon's Head of Finance was paired with 17-year-old Soha, a shy and engaging young woman who was excited to start the mentoring programme. "She's an excellent

listener and while she is still a little reserved to express her opinion, you can tell she has a lot to offer," remarked Lama. "She had a lot of potential to discover her strengths and so I spent a lot of time helping her to define her goals and shape how she can achieve them."

Soha was amongst the SOS mentees to visit Doka and while it was apparent that she wasn't interested in the construction industry, she was interested to understand the internal operations of the company and how we interact with one another. After further meetings, Lama discovered Soha was interested in Psychology, and would like to study it at university.

"During our time together, we discuss a variety of topics ranging from her studies, what she wants to achieve, and about life in general. From my point of view, I've thoroughly enjoyed the opportunity to get to know Soha and to provide her with various insights. I hope to have children of my own someday and I feel this has helped to prepare me for what that might be like."

Mentor Maher Mantouche, Head of Engineering

"We met once month on weekends, usually Saturday mornings," said Maher. "Typically we go for brunch or breakfast and discuss what he's doing at university. I enjoy reading and have found much solace in the thoughts and ideas of others, as such I lent him a copy of 'The seven habits of highly effective people,' by Stephen Covey, which we also discussed in great detail. Since meeting Rabih, I feel we've developed a good friendship and we are able to discuss things that I believe contribute towards his decision-making abilities as a young adult."

Mentor Alain Hantouche, Senior Engineer

Alain Hantouche was paired with Ellie, an ambitious 18-year-old studying business and economy and who had already found a part-time job as a personal trainer.

"Ellie has many interests, particularly in sports. He'd worked hard to achieve his role as a personal trainer and had made efforts to help some of his contemporaries to take a greater interest in health and fitness," said Alain.

"Upon our first meeting he was interested to understand the nature of Doka's business and in particular whether it was financially rewarding! I explained to him that finding a career with purpose and meaning to him personally would be far more rewarding than a bigger paycheck for a job you dislike."

*Name changed by the editorial team. //



▲ Mentor Lama Ayache is a role model and inspiration for her mentee.



▲ Mentor Maher Merhi has been a strong supporter of Sandro's development.



▲ Mentor Alain Hantouche shared his wealth of experience with his mentee.

You can
view interviews
with the SOS Youth and
Doka's Mentors here:
www.150years.umbasch.com/postingehandin-hand/

In brief

News, dates, media, awards

Doka Augmented Reality

The Doka Augmented Reality app gives you an immersive experience of defined Doka drawings. With this app you can build a bridge with 2D formwork visualization and interactive 3D models. The current version kicks off with models of Framax Xlife and Dokadek 30.



▲ Download the AR app via www.doka.com/en/home/apps/Doka_App_Store



Doka's Virtual Reality Experience

Customers can digitally immerse themselves in the Doka Info Center and Production Facility via Virtual Reality (VR) glasses. This new experience has already been delivered throughout many trade fairs across the globe.



▲ Doka Info Center and Production Plant visible via VR display.

Customer Oriented Solutions Caption

Peter Fischer, Managing Director of Doka in Oman and his team won the Dossier Construction Award for Best Formwork Solutions. The team continuously develops innovative formwork solutions for small and large scale projects. Congratulations on a well deserved award!



▲ Peter Fischer and representatives of Dossier Magazine during the awards ceremony.



▲ 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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