

# Formwork News

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## Safety first



Orion Building, Birmingham, UK

## Editorial

Dear Formwork News readers;

Exactly defined construction and forming workflows, high-quality formwork equipment, perfect safety features and wide-ranging site support – these are some of the key prerequisites for any site that is serious about getting optimum in-situ concreting results.

In practice, however, time and price constraints mean that quality and safety have to be achieved within a very tight framework. In this situation, it is a big advantage to be able to rely upon a formwork partner like Doka.

Held in great regard as a high-calibre formwork partner of construction companies the world over, Doka has a track record of winning formwork contracts for some of the world's most prestigious projects.

Like the "Development of King Abdul Aziz Endowment", an imposing hotel and residential complex in Makkah for which only Doka automatic climbing formwork is being used. Or the Burj Dubai, set to become the world's tallest building on completion, where the contracting joint venture of Samsung, Besix and Arabtec is also relying on Doka quality and know-how.

As well as on these two projects, we also report on several other major projects in this edition. Take a closer look for yourself!

Yours,  
The Formwork News editorial team.

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## A world record for Doka:

# Shaft core of earth's tallest building to be built with Doka

**Set to be the tallest building in the world, the Burj Dubai, in the United Arab Emirates, will present Doka with some highly demanding formwork challenges during the approx. two and a half years that it will take to construct its shell.**

**D**esigned by the American architecture firm of Skidmore, Owings & Merrill, this skyscraper will boast a 575 m tall reinforced concrete shaft core, followed by a steel construction whose exact height has yet to be finalised. It will, in any event, be ensured that the building clinches the height record upon final completion in 2008.

The complicated groundplan of the building is one of the key formwork-engineering challenges in the construction of the shaft core and walls of the three wings of the building. No fewer than 180 pouring and climbing steps will be required. For each of these sections, around 5000 m<sup>2</sup> of Doka wall formwork Top 50 will need to be raised hydraulically, by 227 automatic climbers. Based on a custom-tailored concept featuring new Doka solutions for the SKE 100 climbing system and the Top 50 wall formwork system, the typical storeys will rise in a streamlined 3-day cycle.

A total of 154 storeys are to be formed and poured in this way by the end of 2007 – a world record not only for the contracting joint venture but also for Doka. ■

**Contractors: Joint venture of Samsung, Besix and Arabtec.**

**Designed by the American architecture firm of Skidmore, Owings & Merrill, the Burj Dubai will boast a 575 m tall reinforced concrete shaft core, currently being constructed by the contracting joint venture of Samsung, Besix and Arabtec using Doka automatic climbing formwork.**





The Saudi Binladin Group uses a total of 450 Doka SKE 50 automatic climbers for constructing the cores of the giant towers. Around 90 automatic climbers SKE 50 in combination with framed formwork Frameco are in action on each tower.

## Development of King Abdul Aziz Endowment, Makkah:

# A fairy tale in concrete – built with Doka formwork systems

**Like a fairy-tale from The Arabian Nights – in concrete, and built with Doka Formwork systems: An edifice of truly gigantic proportions is currently rising in Makkah, Saudi Arabia. Directly opposite the Great Holy Mosque, an apartment and hotel complex is being built. The structure comprises 7 towers with heights of up to 475 m and an 80 m high podium. The works have been contracted to the Saudi Binladin Group.**

**W**ith more than 450 'SKE 50' automatic climbers in action here, this project is the biggest automatic climbing project Doka has ever carried out. By the end of the 5-year construction period, around 1,000,000 m<sup>3</sup> of concrete will have been poured – at times, up to 1000 m<sup>3</sup> per day. During peak periods, 31 cranes and as many as 20,000 workers are involved in carrying out this project. By the time construction work finishes in

late 2007, the useable floor-space in this complex of buildings will total around one and a half million m<sup>2</sup>.

The apartment and hotel towers, some of them more than 40 storeys tall, are rising from an 80 m high podium. To construct the large number of lift shafts required here, around 90 automatic climbers SKE 50 - with framed formwork Frameco - are in action on each tower, meaning more than 450 in

all. These structure cores climb between 2 and 4 storeys ahead of the rest of the building, most of whose floor-slabs are constructed using Dokaflex-tables. The podium will offer around 35,000 m<sup>2</sup> of useable floor-space in every storey.

"Thanks to the highly capable staff at Doka Saudi, and their fast response times, we shall be able to keep to the schedule on this project as well", is the justly confident assessment of the project management. Thus it is that from 2007, there will be no more obstacles in the way of the devout prayers of the hotel guests and apartment owners of this complex. ■

**Contractors:**  
Saudi Binladin Group.

# Efficient formwork systems keep project on target

Efficient formwork systems from Doka have been reducing labour, cutting crane usage and improving safety at this luxury high-rise residential development in Birmingham. Located on Navigation Street, close to New Street railway station and the Bullring shopping centre, The Orion Building includes more than 300 apartments, a triple-storey glass penthouse, 12,000 sqft of retail space on the ground floor, plus underground parking, interior styling by fashion designer John Rocha and around-the-clock concierge service.

Rising to 26 storeys, this prestigious development by Crosby Special Projects will be one of the tallest residential buildings in the city. The structure is based around two 40m-high cast in-situ concrete cores and an 85m core for the tower section. Doka has worked closely with main contractor Taylor Woodrow and their sub-contractor Thames Formwork to come up with a package of new and existing products which are helping to reduce labour requirements, minimise crane usage and improve safety.

## Safety first with GCS guided climbing system

The package includes the new guided climbing system (GCS). This uses suspension points along the completed section of the structure to guide the outside shaft formwork during lifting operations. As a result, the entire formwork unit can be repositioned quickly and safely with a single crane lift. Striking and re-adjustment operations require no additional support from the crane.

Since the formwork remains anchored to the structure at all times, GCS allows lifting operations to be carried out at wind speeds of up to 44 mph. The system is suitable for pouring heights of up to 4 m. With only one positioning anchor per pour, it reduces the amount of work required before and after each pouring operation. Platforms for manual finishing operations are secured to the system as required. Thames Formwork is using GCS on the

Crane usage is minimised and safety significantly improved with Doka's new guided climbing system.





**Wayne Rock, site head foreman for Thames Formwork.**

**The Dokaflex table is quick and easy to use, making it ideal for large-scale deck-slab jobs. A shifting trolley with attachable drive unit is available for shifting the forms horizontally.**

85m-high core and one of the 40m cores. The third core is being constructed in tandem with the floor slabs.

### **Stripping corners speed up striking**

The new Framax stripping corners, used on this project with a 3.0m high shutter, speed up the striking of formwork inside the core shafts by eliminating the need to dismantle the formwork between each pour. A spindle mechanism, operated from the top of each corner, draws the corner in on itself, leaving a gap of about 60mm between the formwork panels and the poured concrete. The entire shaft formwork, including the shaft support/access platform, is then lifted as a single unit.

Each core is formed in 2.85m steps with a maximum concrete pressure of 60kN/m<sup>2</sup>, and each pour level can be carried out in a weekly construction cycle.

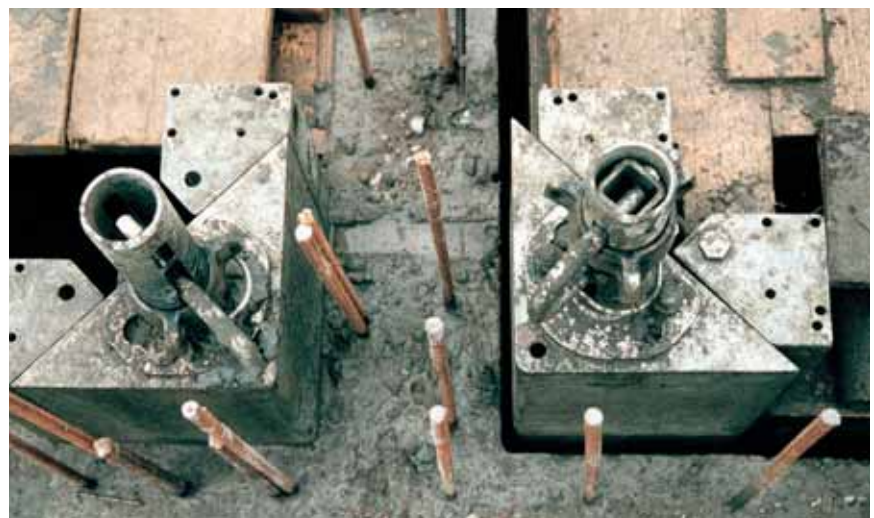
### **Quick and easy table-forms**

For the slab areas of the project, including the car park ramps,

Doka has provided a combination of 4.88m x 2.45m and 4.88m x 2.0m Dokaflex tables, plus Dokaflex 1-2-4 infill panels where necessary. The Dokaflex table is quick and easy to use, making it ideal for large-scale deck-slab jobs. A shifting trolley with attachable drive unit is available for shifting the forms horizontally. To make the handling of the tables even quicker, Thames Formwork is using a table hoist to transfer the assembled table

forms between levels without the need for a crane. Wayne Rock is site head foreman for Thames Formwork. He said: "The GCS system with the 2.0m high mesh screens has eliminated our safety fears over climbing cores and enabled us to achieve the required one-week cycle." ■

**Main-Contractor: Taylor Woodrow  
Sub-Contractor Thames Formwork**



**A spindle mechanism, operated from the top of each corner, draws the corner in on itself, leaving a gap of about 60 mm between the formwork panels and the poured concrete.**

# Drive unit blossoms on Cherrywood project

The first-ever application of a Doka shifting trolley with attachable drive unit in Ireland has saved time and money for Shannon Formwork Ltd. The company used the unit during the construction of the Dell Computer HQ in Cherrywood, County Dublin.

Completed in just six months, the development comprises two four-storey buildings, with a combined floor space of 28,000sqm plus 10,000sqm of basement car parking. The shifting trolley and drive unit enabled Shannon Formwork Ltd. to reduce labour and crane usage when repositioning 5500sqm of Dokaflex table formwork during the slab construction.

Designed to cut shifting times on large area slab projects and make Doka's already fast tableform even quicker, the trolley transforms the moving of fully-assembled tables on the same level into a one-man operation. Furthermore, with the drive unit fitted, it is safer than hand-operated units, especially when there are changes in room heights. In addition to the



**Shannon Formwork successfully used Dokaflex Tables during the construction of the Dell Computer HQ in Cherrywood, County Dublin.**

Dokaflex table system and shifting trolley, Doka Ireland also supplied the project with 450sqm of Top 50 for the 12 cores and 40 lin.m of Framax for the 11,000sqm of retaining walls. This was divided between the two buildings, which were built simultaneously.

By combining the Top 50 with Doka platforms K, Shannon Formwork Ltd. was able to eliminate the need for a scaffolding contractor. The pre-assembled, ready-to-use 1.8m-wide platforms provided a load-carrying capacity of 600 kg/m<sup>2</sup>

and work heights of 3 - 4m. Each core was completed floor by floor with a two-day turnaround.

Edward Kiernan, Construction Director for Shannon Formwork Ltd., said: "The Doka shifting trolley with the attachable drive unit has made a massive impact on executing slab construction on the Cherrywood site, saving my company money by means of labour reduction and accelerating the overall construction program. This is another Doka innovation which my company will buy." The project was completed timely at the end of October. ■

**The shifting trolley and drive unit enabled Shannon Formwork Ltd. to reduce labour and crane usage when repositioning 5500sqm of Dokaflex tableforms.**

**Sub-Contractor:  
Shannon Formwork Ltd**





Fourteen SKE 100 self-climbers are being used on the core, and six on the stairwell, to lift the formwork.

## Palms Casino & Hotel project, Las Vegas, USA

# Doka formwork at the core of Las Vegas hotel project

**Tough time schedules on the ambitious expansion program for a new 400 ft hotel tower on the prestigious Palms Casino & Hotel site in Las Vegas have led to main contractor Isaac Construction turning to Doka USA for the use of self climbing formwork systems.**

The Palms expansion project includes a new hotel tower, 32 stories high but standing 400 ft tall, significantly increasing the hotel's room capacity. Doka has had equipment on the site since work started on the substructure of the building in September 2004. Doka's Framax system was chosen for speed of assembly and versatility and used on the first section of the core. The Doka SKE automatic climbing system was then used in conjunction with Doka Top 50 formwork for the core projects.

"Using the Doka system means that we have only half the labour cost compared to using competitors' systems at this project. A competing brand requires ap-

**Doka's Framax system was chosen for speed of assembly and versatility and used on the first section of the core**

proximately 10 men full time, but I only need three full-time and three part-time workers with the Doka system," says Rex Taylor, Assistant Superintendent at Isaac Construction. Fourteen SKE 100 self-climbers are being used on the core, and six on the stairwell, to lift the formwork. Most of the steel superstructure frames for the gantry style self-climbing SKE

systems are out of sight, hidden within the elevator shafts. "Construction is on schedule," states Rex Taylor, adding, "Actually we are ahead with regard to the formwork but have to wait for the other elements to catch up."

"All the parts were here when they were supposed to, everything was according to the design and I am more than pleased with the cooperation with Doka," he confirms. ■

**Main-Contractor: Isaac Construction**



## Caesar's Palace II, Las Vegas, USA

### Doka helps speed completion



The 26-story Caesar's Palace II luxury hotel tower is being built to a schedule that is fast-track in the extreme, with just 11 months allowed for the entire superstructure of the tower from the formwork award date and 9 months of this pouring concrete. Doka was able to supply the entire customized self-climbing system in just six weeks to help meet Perini's demanding schedule.

See our web site [www.doka.com](http://www.doka.com) for more details.

Contractors: Perini Construction

## Elevated water tank in Luanda, Angola:

### Efficient formwork concept for water-tower

A highly efficient formwork concept permitted swift completion of a 35 m high water-tower for Agostinho Neto University in Luanda, Angola. Instead of conventional steel formwork, which in this case could only have been used once, South African contractors Grinaker opted for re-usable Doka large-area formwork Top 50. A platform

supported from the shaft served as a base on which to stand the load-bearing scaffold and formwork for the conical water reservoir itself. The working platform and the formwork were pre-assembled on the ground, raised in sections and then fitted together.

Contractors: Grinaker LTA, South Africa.



## Yang Luo Bridge, Wuhan, China

### Time-savings and high safety with Doka automatic climbers SKE 100

In the industrial city of Wuhan, a 1280 m long suspension bridge is under construction. The two twin-legged towers, one 166 m and the other 169 m tall, are being built using Doka automatic climbing formwork SKE 100. A total of 22 SKE 100 automatic climbers have been in service on this site for several months now, in conjunction with Doka large-area formwork Top50,

horizontal H20 formwork beams and vertical WU16 steel walings. These make up four 14.3 m high platforms, each with five work-deck levels. A complete cycle for one approx. 4 m high casting section takes an average of 3.5 days.

Contractors: China Harbour Engineering Group and China Zhongtie Major Bridge Engineering Group



## Lippitzbach Bridge, Austria

### Doka systems for balanced cantilever structure

445 m long, 11.35 m wide and 100 m tall – these are the key data of the new Lippitzbach Bridge, currently being built across Carinthia's River Drau just north of Bleiburg, Austria. A structure that makes tough demands of the structural designers, planners and contractors (Massivbau GmbH), as well as of formwork specialist Doka. In

conjunction with a WITO free-cantilevering form-traveller, Massivbau is using a set of Doka Top 50 superstructure formwork to form the superstructure deck, working out from either side of the hammerhead in identical cycles.

Contractors: Massivbau



## Major sewage treatment plant in Brussel's

### Complete Doka service package



Contractors De Nul benefited from the comprehensive formwork planning, on-site consultancy and "just in time" delivery services provided by Doka Belgium for the complex in-situ concreting works on a major sewage treatment plant in Brussels. Thanks to intensive on-site training, the site crews were entirely familiar with how to handle the formwork, enabling them to carry out this formwork assignment in a streamlined and cost-effective way.

Contractors: Jan De Nul

## Almannaskard tunnel in Iceland

### Streamlined Doka formwork assignment on the tunnel portals

Cast in 12 m sections, the 72 m long northern portal of the Almannaskard tunnel in Iceland was completed by November 2004. The Doka tunnel forming carriage was then dismantled into transportable units and taken to the southern portal. Work on the southern

portal also proceeded very swiftly, with the result that subcontractor G. Thorsteinsson was able to finish this 90 m long portal structure before the end of March 2005.

Sub-Contractor: G. Thorsteinsson





The new Framax Xlife wall formwork system from Doka has made an outstandingly successful US debut on three major wastewater treatment plant upgrades.

# Framax Xlife makes a smooth debut in the USA

The new Framax Xlife wall formwork system from Doka has made an outstandingly successful US debut on three major wastewater treatment plant upgrades. Framax Xlife has won acclaim for the exceptional quality of concrete finish it produces.

Contractor Pizzagalli Construction Company has been putting the clamp system through its paces on multi-million dollar expansion projects in North Carolina, Georgia and Virginia. “Framax Xlife is giving us the best finish I have ever seen,” says Pizzagalli superintendent Mike Patterson.

Framax Xlife’s plywood panels have a plastic coating on both sides, which ensures a smooth concrete finish. As the name implies, this coating also extends the plywood’s life. Less repair work is needed and the form’s smooth face outlasts any other plywood by at least three times, explains Doka USA Southern Regional Manager Daniel Payne. Pizzagalli’s three up-

grade projects will bring major increases in the water/waste water treatment capacity at Mason Farm in North Carolina, Linwood in Georgia and Broad Run in Virginia. The three projects have a combined value of over US\$150 million and all include multiple concrete structures with constantly changing wall pours. Demand for formwork has been especially high

at Broad Run, which has required 14,000 sq ft (1,299m<sup>2</sup>) of Framax Xlife. Teams on all three projects are finding that with Framax Xlife, the concrete looks good from the moment the forms are stripped. Doka USA rental customers will also increasingly get the chance to try Framax Xlife for themselves. “Every time we reface a form in the fleet we change it to the Xlife system,” says Payne. ■

**Contractors:**  
Pizzagalli Construction Company

**Framax Xlife’s birch plywood panels have a plastic coating on both sides, which ensures a smooth concrete finish.**



# Doka raises safety levels at Leeds' tallest tower

Advanced formwork equipment supplied by Doka UK is helping to maximise safety and minimise core construction times at what is set to become the tallest building in the city of Leeds in the north of England. Bridgewater Place is a 32-storey, mixed-use development located on a 6070sqm site. Measuring 110m high, it will dwarf Leeds' current tallest building by 30m.

Contractors Bovis Lend Lease are using Doka SKE 50 automatic climbing system and Framax formwork for the main residential tower core, plus the ground and basement floors. These measure a total of 105m high. For the two other cores in the lower building, Doka is supplying the new guided climbing system (GCS) MF400 and Framax stripping corners. With GCS the formwork and scaffold remain anchored to the structure even during the repositioning. This

means that each platform is repositioned safely and easily in a single lift. Furthermore, the system can operate safely in wind velocities of up to 70km/h, so there are fewer delays due to weather conditions.

The Framax stripping corners, also a new product, reduce the time it takes to construct concrete shafts by eliminating the need to dismantle the formwork between each pour. A spindle mechanism,



**With GCS the formwork and scaffold remain anchored to the structure even during the repositioning. This means that each platform is repositioned safely and easily in a single lift.**



operated from the top of each corner, draws the corner in on itself, leaving a gap of about 60mm between the formwork panels and the poured concrete. The entire shaft formwork, including the access platform, can then be lifted as a single unit.

Doka has also supplied trapezoid enclosure sheeting to provide a protected, safe working environment on the platforms for all three cores. The main core has a 40-week programme and the two smaller ones 20 weeks each. The £80m development is scheduled for completion in 2006. ■

**Contractors: Bovis Lend Lease**

**Doka self-climbing formwork is being used for the core of the main tower.**

*Doka SKE 50 automatic  
climbers permitted a  
two-day cycle, enabling  
casting operations  
for the pylon to  
progress in a highly  
streamlined manner.*



**Coherent formwork-concept ensured inauguration date was met:**

# Pylons of the Binh Bridge in Vietnam climbed in a two-day cycle

The new Binh Bridge across Vietnam's River Cam was opened to traffic on 13th May 2005, to mark the 50th anniversary of the liberation of Haiphong. Doka automatic climbing formwork SKE 50 made a major contribution towards catching up on time lost during the start-up phase of this project.

This cable-stayed bridge provides a 1347 m long river crossing with a main span of 250 m, and is 22.5 m wide. Designed with a steel-composite superstructure, it accommodates four lanes of traffic and two pedestrian walkways. The Japanese joint venture of contractors IHI, Shimizu and Sumitomo raised the 102 m tall A-shaped towers needed for the cable-stayed construction with the aid of Doka SKE 50 automatic climbers combined with Top 50 large-area formwork.

The slender 3.00 x 3.50 m pylon-cross-section left room for only a relatively narrow service shaft of 1.50 m diameter. This ruled

out placing form-ties through the formwork. For this reason, Doka conceived the pylon formwork as a column formwork for a solid cross-section. To sustain the high fresh-concrete pressure, the Formwork Experts substituted significantly thicker WU 22 steel walings for the WS 10 walings that come as standard with the Top 50 formwork. With 3.62 m high typical sections, the Doka SKE 50 automatic climbers permitted a two-day cycle, enabling casting operations to progress in a highly streamlined manner.

Doka also supplied a catwalk assembled from segmented steel framework, which also withstood



Two 102 m high pylons, constructed using Doka automatic climbing formwork, are the focal point of this 1347 m long cable-stayed bridge over the river Cam in Haiphong, Vietnam.

high wind speeds. This walkway bridge between the two halves of the pylon was raised by the Doka automatic climbers, and meant that there was no need for a second building-site hoist. As the distance between the two halves of the pylon decreased the higher they rose, the unneeded - projecting - segments of the walkway bridge could simply be removed.

The catwalk, and the efficient climbing technology as a whole, won great accolades from the clients. The comment of Siah Chee Seng, Pylon Manager of the ISS JV: "It was only in this way that the contracting JV was able to make up for the time that had been lost at the outset, and to save a great deal of time and money as well."

Contractors: Japanese joint venture of IHI Ishikawajima Harima Heavy Industries (steel-composite superstructure); Shimizu Corporation and Sumitomo Mitsui Construction (piers and pylons)



The walkway bridge between the two halves of the pylon was raised by the Doka automatic climbers, and meant that there was no need for a second building-site hoist



For slab construction throughout the Sector 6 contract, Al Shafar has opted for the proven Dokaflex table system.

## Jumeirah Beach Residence, Dubai

# Very short forming times for large areas of floor

In winning Sector 6 of the Jumeirah Beach Residence (JBR) project in Jumeirah, United Arab Emirates, main contractor Al Shafar General Contracting Co. has purpose-ordered Doka formwork systems for construction of the project's four high-rise towers, including Doka Top 50 climbing platforms and Dokaflex tables.

Jumeirah Beach includes a total of seven construction packages to provide 36 residential high-rise towers, four hotels and beach clubs to cater for a community of 25,000 people. Al Shafar's Sector 6 con-

tract features four high-rise towers with varying heights between 107 m – 172 m plus a 120 m high building linking two of the towers.

Al Shafar started work on Sector 6 in March 2004 with concrete pours for the raft foundation. Once the raft was complete, the contractor, using the Doka climbing formwork system, started work on the tower's core shafts, working two levels ahead of the slab on each tower. For slab construction throughout the Sector 6 contract, Al Shafar has opted for the proven Dokaflex table

system. As ready-assembled tables, the system can be shifted in one piece to the next position without being dismantled. With fewer separate parts, formwork erection and striking are greatly accelerated; ensuring the shortest possible forming times for large areas of floor.

Throughout construction, safety is of prime importance to Al Shafar with Doka providing climbing scaffolds and platforms to ensure that all formwork, steelwork, cleaning and casting is done in a protected and safe environment, allowing the labourers to work with enhanced productivity. The project, by completion, will feature two 44-storey towers, plus 43- and 29-storey towers linked by a 35-storey building. It will contain 770 apartments with a mix of 1, 2, 3 and 4 bedrooms with penthouses and loft houses on the upper floors. ■

The project, by completion, will feature two 44-storey towers, plus 43- and 29-storey towers linked by a 35-storey building.

Contractors:  
Al Shafar General Contracting Co



# Elm Park gets underway with Doka

Tricastle, Ireland's largest sub-contracting company and an exclusive user of Doka equipment, has started work on a 200 million euro mixed-use development in Dublin.

Located on a 7.28ha site on the south side of the city, Elm Park has a total of 400 one-, two- and three-bed apartments and 28,000sqm of office space spread over three eight-storey blocks. The development also includes a restaurant, leisure centre, a five-storey private hospital, underground parking for more than 800 vehicles, plus 5.88 ha of trees and meadowlands. Tricastle is using Doka Framax for the stair cores and walls on all the buildings, with pour heights of up to 5.4m.

MF240 Climbing Formwork allows the company to complete the stair cores ahead of the main building frames, and a combination of Dokaflex 1-2-4, Dokaflex Tables and Dokamatic Tables takes care of all slabs, including transfer slabs over the basement.

Slab thicknesses vary from 300mm to 800mm and heights are up to 6.8m. The versatility and easy integration of Dokaflex 1-2-4, Dokaflex tables and Dokamatic tables to varying slab heights and depths helps to minimise the amount of time spent on adjusting



The stair cores are being formed ahead of the main building frames, using Framax framed formwork and the MF 240 system. Dokaflex and Dokamatic tables are in use for the floor-slabs. Undertable support heights of up to 6.80 m are achieved by adding Dokamatic table frames.

formwork between pours. Tricastle also has two sets of 10m long Top 50 Wall Formwork for constructing over 1000 lin.m of fair-faced finish perimeter retaining walls, measuring up to 6m high. To ensure the right solution is chosen for each work element, represent-

atives from Doka Ireland and the site supervisors hold weekly site meetings. The first phase of the 60-month project is scheduled for completion early next year. ■

**Main-Contractor:**  
Michael McNamara Building Ltd.  
**Sub-Contractor:** Tricastle



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The new Doka heavy-duty supporting system SL-1 sustains the heavy loads and is compatible with all Doka systems.

## **Doka systems for the trickiest sections of the Lötschberg Tunnel:**

# **Conical tunnel tubes being formed in a one-day cycle**

**BLS Alp Transit AG, the client for the 35 km long Lötschberg base route in Switzerland, appointed the Swiss Alp Transit Consortium "SATCO" as the contractors to build the Lötschberg Base Tunnel North. In more complex sections of tunnel, such as the 4 ventilation tunnels and a funnel-shaped zone that broadens out over a length of 275 m, SATCO is using travelling tunnel-formwork units from Doka for forming the tunnel crowns.**

In the 275 m long "Adelrain Fork" section, the clear width of the tunnel cross-section decreases from 18.1 m at the beginning of the section to 7.6 m. Despite this substantial change in the cross-section, the tunnel crown can be formed with just one travelling tunnel-formwork unit. This keeps the costs for the site as low as possible. The new Doka heavy-duty supporting system SL-1 sustains the heavy loads and is compatible with all Doka systems. The system's high load-bearing capacity also means that the drive-through

access opening required for site traffic can be left clear without any problems.

Throughout the assignment, the site crew were always able to adapt the unit easily and quickly to the shape of the tunnel. Following an induction phase, the Doka solution enabled casting to take place in a one-day-cycle. The funnel-shaped rail-fork zone is now completely fitted out with its new concrete lining. For the 4 "jet-vent" tunnels, Doka designed one cylindrical tunnel-

formwork unit and one conical one, as each jet-vent tunnel consists of a cylindrical middle section with conical ends. With the special forming work now completed, contractors' supervisor Philipp Häfliger, head of in-house technical staff at Rothpletz, Lienhard + Cie AG, is very satisfied: "Using the travelling tunnel-formwork units from Doka, we have been able to overcome every difficulty. They are really easy to adapt to the tunnel cross-section, and we are right on schedule." ■

**Contractors:**  
Swiss Alp Transit Consortium "SATCO"

