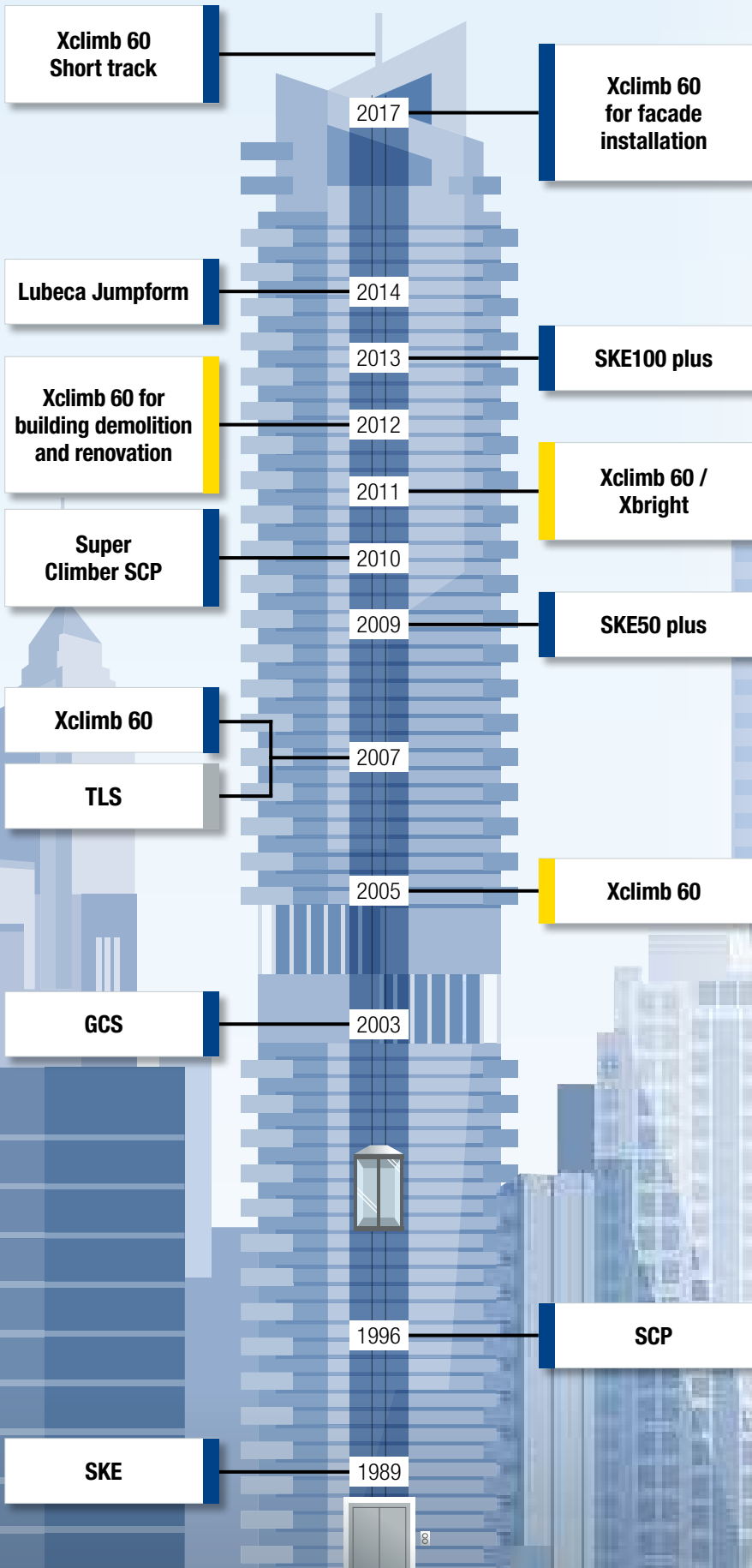


Doka's self-climbing technology

Milestones in high-rise construction



■ Self-climbing formwork
■ Protection screen
■ Shifting device



2017 Aurora Melbourne Central, Melbourne



2012 No. 1 Nine Elms, London



2010 2550 North Lakeview, Chicago



2011 European Central Bank HQ, Frankfurt



2007 Timelkam, Austria



2005 Burj Khalifa, Dubai



1989 Thai Wah Tower, Bangkok



1996 Zurich Toren, The Hague



Highrise construction takes on new dimensions

Doka offers a wide range of systems and services

Skyscrapers are inherently impressive and construction experts are invariably fascinated by their engineering, design and safety. Only a matter of years ago, a tower 200 metres tall would have ranked as a landmark build. Some projects nowadays surpass that figure by a factor of five. Doka has the right formwork solutions for every highrise project. The company also invests continuously in further development of products and services dovetailed to the individual requirements of customers.

Since the 1990s there has been an upsurge in highrise construction. After the Empire State Building (1931) and Sears Tower (1974, now Willis Tower) builds, their height records stood for decades. Since 1998 the cycle has been shortened to a matter of years. The "Year in Review: Tall Trends of 2017" study by the Council on Tall Buildings and Urban Habitat (CTBUH) reported that with 144 highrise structures (200 m or taller) built, a new record had been set. Most of these skyscrapers (53 %) are sited in China. At this time there are 1319 highrise buildings (200 m or taller) in the world. It is worth noting, too, that geographically 2017 was the most diverse year in history for tall-building construction. 69 cities in 23 countries completed new highrise builds, a huge increase of 54 cities and 18 countries compared to 2016.

The world's tallest building and structure at this time is the Burj Khalifa in Dubai. It stands 830 metres tall and has 163 usable storeys. From the engineering point of view, the maximum viable height is about 1.5 to 2 km. Although buildable, taller structures are impractical because they could support little more than their own weight. New man-made materials and new technologies could push this limit higher in the future, however.

Doka is fit for the future. For any set of requirements, the company offers custom formwork solutions for all CIP concrete components in highrise and super-highrise construction, from the foundations to the topmost storey. No matter how different, no matter how unique every individual highrise project might be, Doka always aims at the overall project solution to make construction optimised, fast and safe.

Broad range of applications for climbing systems

For a little more than 40 years now (since 1977, to be precise), Doka has used climbing formwork on highrise projects. Automatic climbing formwork has been available since 1989. An 'automatic climbing system' is a combination of wall formwork and scaffold (or working platform) that is able to climb by itself from one pouring section to the next. Whatever the set of requirements, Doka offers automatic climbing formwork for the building core and building facade.



In terms of method of operation/type, three different systems with hydraulic drive have established themselves on the market.

- Profile-guided climbing systems

Structure-guided by climbing profiles, these systems are climbed from storey to storey by a fully integral or mobile hydraulic system. Climbing is safe and fast, even in high-velocity wind conditions.

- Platform systems

Platform systems are formwork machines optimised specifically for the construction of highrise building cores. The main component is a pouring and reinforcement platform. It is climbed in a single lift by a small number of long-stroke hydraulic cylinders.

- Protection screen systems

Safety is immensely important when construction work has to be carried out at dizzy heights. In highrise construction, protection screen systems offer all-round protection for the topmost levels of the structure. They boost productivity, particularly when work has to be carried out close to the edge of the structure.

Optimising construction progress

From planning stage through to project completion, Doka experts provide help with professional consultation in case of any questions. Safe use of formwork systems is achieved not only by the system, but even more so by using the system components correctly. Factors such as cycle time, construction method, type of reinforcement, site equipment and concrete placement have to be taken into consideration in the planning phase so that the ideal formwork solution can be developed. The 3D planning of structures and structural members is an important contributor in this respect. Animations and photo-realistic images make complicated structures easier to understand and make project progress forecasts more transparent. The boundary conditions are brought together in a holistic model. A network of highrise specialists worldwide and the Global Expertise Center High Rise in Amstetten support consulting, planning and successful implementation.



At Doka, work on technical innovations and product developments is ongoing all the time. The overview below shows the milestones in automatic climbing formwork from 1989 to the present day.

SKE – the beginnings of automatic climbing formwork

1989 marks the start of self-climbing formwork with the SKE 30 system, which was used for the first time on the Thai Wah Tower build in Bangkok, Thailand.

SCP – self-climbing formwork and working platform for any highrise core

22 years ago, Platform SCP debuted on the Zurich Toren project in The Hague, Netherlands. Long-stroke hydraulic cylinders, rated at 40 metric tons, quickly climb the fully enclosed working platform to the next pouring section. In 2010 the Super Climber SCP was developed for the requirements of the North American market. That same year it was used on the 2550 North Lakeview project in Chicago, USA.

Burj Khalifa – currently the world's tallest building

In 2005 Doka formwork was used in Dubai, United Arab Emirates, to help construct the world's tallest building. Doka supplied the formwork solution for the entire structure core. The shape of the 830-metre tower meant that the formwork needed to be highly adaptable. In addition, the extremely tight construction schedule necessitated an ingenious utilisation plan for the SKE 100 climbers and the versatile Large-area formwork Top 50.

Protection screen Xclimb 60 – applied variety of design

Protection screen Xclimb 60, used for the very first time on the Burj Khalifa build, offers safety all the way up. Framed enclosure Xbright, first used in 2011 on the European Central Bank (ECB) project in Frankfurt, Germany, fully encloses the topmost levels on the build. Short assembly times are another advantage, because the enclosure panels are frame-based and the panel connectors simple and easy to use. Protection screen Xclimb 60 has also been used since 2012 for structure renovation and demolition. The protection screen climbs downward as demolition work progresses. This dispenses with the need for costly and time-consuming erection of a full-height, scaffold-mounted enclosure. On the No. 1 Nine Elms project in London, England, a protection screen was built to enclose 3.5 floors of the structure. A radically new feature was incorporated for the Aurora Melbourne Central build in 2017. A monorail system integrated into the protection screen enabled the facade panels to be installed quickly and in absolute safety.

From GCS to Automatic climbing formwork Xclimb 60

The product line started in 2003 with the Guided climbing formwork system GCS. Back then, the climbing platforms had to be crane-lifted into position. Automatic climbing formwork Xclimb 60 is the next generation of guided climbing formwork with the addition of a mobile hydraulic system. It was used for the first time on construction of the Timelkam combined-cycle power plant in Austria in 2007.



Table Lifting System TLS – the ideal shifting device for tableform projects

With the Table Lifting System TLS, tableforms and construction materials can be vertically shifted from one floor to the next with no need for a crane.

SKE plus – crane-independent climbing formwork for structures of any shape and height

An extensive modular system with integrated hydraulics for a very wide range of applications. The SKEplus 50 system variant is rated at 5 metric tons per lifting unit and is ideal for the majority of applications on the core and on the building facade. Even stronger and rating 10 metric tons per lifting unit, bigger brother SKEplus 100 is built for elevated requirements such as severe influencing conditions, additional working platforms or extra-heavy live loads.

Lubeca – Doka expands into new markets

By acquiring Lubeca Pty Ltd. in 2014, Doka strengthened its presence on the Australian market. The highrise specialists based in Australia deal with projects throughout the Pacific region. The merger also established the Lubeca Jumpform platform system as part of Doka's product portfolio. Rated at 20 metric tons per hydraulic cylinder, the system is used primarily in residential construction and for building concrete cores of office towers and tall multi-purpose structures.

Xclimb 60 Short track – for formed/poured in advance cores of low to medium-tall structures

A compact climbing system with a short, one-piece vertical profile (hence the "Short track" suffix) that has been in use since last year and was designed specifically for the markets in Asia and the Near and Middle East. This system is Doka's latest product innovation in the automatic climbing sector.



The following highrise projects now in progress demonstrate the versatility of automatic climbing formwork systems and protection screens from Doka.

Photos:

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Topping out at approximately 190 metres, the OMNITURM will be the sixth tallest building in Frankfurt and also Germany's first truly mixed-use highrise. It will offer office, residential and public spaces.

Photo: OMNITURM.jpg
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At 213 metres, the Swissotel will be one of the tallest structures in Istanbul, Turkey. The new hotel building will house luxury residences and its very own shopping centre.

Photo: Swissotell.jpg
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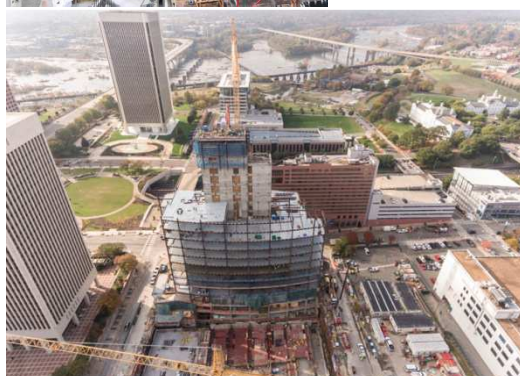
The design drafted by Zaha Hadid Architects for a 5.5 hectare site in Bratislava, Slovakia, will transform abandoned ground in a former industrial zone into a 20,000 m² park and mixed-use centre.

Photo: Sky Park.jpg
Copyright: Doka



Wood Wharf is adjacent to Canary Wharf and it was designed to create more than 3300 residential units in the centre of London, England. Building A2 stands 14 storeys high. Building A3 will have 44 CIP concrete floor slabs. In all, A2 and A3 will require 5600 metric tons of steel reinforcement, 31,000 m² of concrete and 65,200 m² of slab formwork.

Photo: Wood Wharf.jpg
Copyright: Doka



The 127-metre tall Dominion Workplace will be a proud addition to the skyline of Richmond, Virginia, USA. When completed in 2019, the highrise will accommodate the headquarters of the Dominion Energy power utility.

Photo: Dominion Workplace.jpg
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The Aurora Melbourne Central in La Trobe Street will be the tallest building in the city centre of Melbourne, Australia and it will also be the only residential complex to have its own direct access to the underground City Loop light urban railway. The residential highrise will have 92 storeys and soar more than 271 metres into the sky above Melbourne.

Photo: Aurora Melbourne Central.jpg
Copyright: Doka

About Doka:

Doka is a world leader in developing, manufacturing and distributing formwork technology for use in all fields of the construction sector. With more than 160 sales and logistics facilities in over 70 countries, the Doka has a high-performing distribution network which ensures that equipment and technical support are provided swiftly and professionally. An enterprise forming part of the Umdasch Group, the Doka employs a worldwide workforce of 6,700.

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