Mini excavators  
p28
SMOPYC  
p25
Engines  
p41
Tower cranes  
p34
More than half of the global population now live in cities, and by the end of the century another 3 billion will have followed, so high rise construction is an essential way to achieve sufficient population density in urban development and to avoid urban sprawl into the countryside.

Whereas the earliest skyscrapers were purely office towers, many of today’s high profile towers combine residential, commercial, leisure and even green space into a kind of vertical village. Another trend is for slender high rise luxury residential projects. These have an astonishing height-to-width ratio far beyond 9:1.

Climbing tower cranes working on inner city residential super tall projects often have to cope with limited set up space as a result of surrounding infrastructure, neighbouring buildings and the narrow core and lift shaft size of the building under construction.

In addition, the wide application of concrete requires fast load cycles. Strong competition among tower crane manufacturers drives provision of special slim tower systems under 2 x 2m for internal climbing.

For example, in 2009, Favelle Favco delivered a compact 223.19 type 1.9 x 1.9m tower for the London Pinnacle project in the UK. For an Australian apartment tower project, a step down to the even slimmer 1.6 x 1.6m type 223.16 tower system was made.

A transition tower section provides adaptation to the standard 2.017m slewing ring support of the upper crane. On the Favelle Favco M220DX luffing jib tower crane with 30m boom, a free standing height of 40.6m can still be achieved with the 223.16 tower system.

Access in narrow lift shafts is afforded by a vertical connection device, consisting of six bolts per angle in the pockets of the reinforced main chords of the mast. Nothing extra is needed for removing horizontal connection devices when de-rigging the internal climbing tower crane after topping out the core.

Adding to the compactness is the three beam internal climbing system. Space constraints can become a major issue when conventional climbing collars or systems using leaders, plus the formwork, force the use of a smaller crane than is possible using the three-beam lift shaft system.

The 22 tonne capacity Favelle Favco M220DX was rigged with a special transition tower section on the all-new 1.60 x 1.60m tower system, suitable for narrow lift shaft climbing.

Heinz Kessel reports Raising the core with a duet of Jaso J280PA towers at the Crocus City Manhattan project in Moscow, Russia. Both cranes have a special steep-jib parking system and 5 x 1.72m windsails.

Working principle of the Favelle Favco three beam climbing system.
climbing device. During the first climbing step of a three-beam system, the middle beam extends at both ends into core wall pockets while telescopic sections of the two other beams are retracted.

After jacking the crane by the amount corresponding to the length of the central hydraulic stroke, the two lateral beams are extracted from the core wall pockets leaving the whole crane supported on the next working level. Then the hydraulic cylinder with the central retracted beam follows up into the working position of the crane.

Three-beam climbing systems were originally widely used on Favelle Favco cranes. They are self-contained and minimise the preparation work needed before jumping a crane. They require, however, protrusions in the core at many short intervals as defined by the cylinder stroke of the climbing unit.

On Jaso J208PA and J280PA luffing jib cranes, the Spanish manufacturer developed a similar climbing device based on 1.7 x 1.7m towers to fit 2.09 x 2.09m lift shafts for its Australian representative.

Adjacent high rise buildings and other neighbouring obstacles demand a short out-of-service position in the initial phase of the construction project. To accommodate this, Jaso developed a folding structure acting as an additional boom stop which can be manually or automatically activated when the crane is parked in a steep out-of-service position.

The J280PA can be parked with a 30m jib at only 5.75m radius. To help the crane to weathervane, a large windsail banner was added at the jib end.

CROcus CITY

For the Crocus City Manhattan project in Moscow, Russia, two J280PAs were delivered climbing inside the building’s core. Both had the special Jaso jib park system so that the 40m booms could weathervane at 7.5m radius instead of the standard 16m.

On such cramped sites, Favelle Favco fits a storm parking system consisting of separate hydraulic buffers added to the A-frame, against which the boom is parked in a raised position.

Instead of using a common fixed windsail banner, Select is delivering its new Terex luffing jib cranes in London, UK, with a curtain-like windsail.

When the crane is working, the windsail will be folded and parked in a shelter on the tip jib section. For weathervaning, the crane driver activates an electric motor, pressing a button in the cabin to unfold the banner which is guided in a curtain track inside the jib.

In contrast to three-beam climbing, a typical climbing system from European manufacturers allows more flexibility as the crane can jump several levels in a single climb without needing core wall pockets arranged close together.
ITC is the essential education and networking event for tower crane professionals around the world.

SAVE THE DATE
10 and 11 May, 2017
London, UK
MILLENNIUM GLOUCESTER HOTEL, KENSINGTON, LONDON

Quotes from the 2015 ITC event

“ALMOST EVERYBODY INVOLVED IN TOWER CRANES THROUGHOUT THE WORLD IS HERE, IT’S A FANTASTIC NETWORKING OPPORTUNITY”
Dave Holder,
Director, HTC Wolffkran

“We may be at a time when this industry is changing - this event is perfectly positioned to provide the forum for this change”
Philippe Cohet,
Chairman, Arcomet

“This is a great chance for me to be here and meet with all the stakeholders in the industry”
Marco Gentilini,
Vice president,
Terex Cranes

www.khl.com/itc
In this case, the inner climbing crane is resting on a set of two climbing collars surrounding the crane tower which, in turn, are based on custom-designed sub-beams connected to the core wall.

By using the hydraulic ram in the base tower section climbing catch hook past, and then rest on, ladder rungs moving up the crane. The whole crane is held by a ladder fixed to the lower climbing collar during this process.

After the crane has climbed through the first collar, crane supports extended at the base tower section will rest on this collar while the ladder has to be moved to the second collar above. Before jumping the crane to the next level, a third upper collar must be installed, including sub-beams. It will guide the crane when leaving the lowest collar.

**SAVING SPACE**

Even using a slim tower system, the dimension of the climbing collars must also fit into the lift shaft. To save space and climbing time for the core construction, crane manufacturer Wolff developed a special version of its new KSH 23 inner climbing device.

Fitted with collars, the necessary floor opening is 3.54 x 3.19m for the 2.30 x 2.30m tower system. Without the collars, the modified ladder climbing system, called KSH E 23, can be installed in a 2.70 x 2.70m opening. Without collars a new guide system for the tower and a connection point for the ladders must be found. Two telescopic cross beams with extendable shoes replace the upper collar and sets of mast corner guides. To clamp the tower they must be fixed to the core wall.

During operation the whole crane is resting on a massive extendable support girder which is integrated in the lowest climbing tower element. When climbing, the support girder is retracted and catch hooks at the piston cross beam fall out and latch into the climbing ladders.

Regardless of whether a Wolff KSH 23 standard or a modified KSH E 23 internal climbing version is used, the 2.30 x 2.30m tower system with strong corner posts is very resistant to torsional distortion. Its characteristics allow the tower to be up to 36m above the clamping of the internal climber. It is suitable for internal or external climbing so it brings flexibility to the construction site.

Terex has an improved HD19 26.6 ladder climbing system. It was used for the first time installed on the two CTL430-24 core climbing cranes raising the 40 storey 100 Bishopsgate project in east London, UK. No climbing collars or sub-beams are used with this internal climbing device. Core wall pockets in the elevator shaft allow positioning of the climbing ladder support beams during climbing and crane supports during crane work.

During a climbing operation, specially shaped catch hooks flip by gravity into the lugs when passing the ladder. Two guiding fix frames connected to the base section and third tower section allow continuous climbing. By using transfer mast sections, CTL 180-CTL430 luffing jib tower cranes can be mounted on the slim 1.90 x 1.90m mast system.

The speed at which the core can be raised by slipforming is key to making good progress, to provide stability as the building takes shape. The tower cranes need to grow at the same speed to ensure that a light weight crane can be installed on top of the slipform with a fixed short tower length.

Alternatively, the crane following the rising core must be fast climbing to minimise its time out of service for climbing. A solution is to choose a rigid compact tower system allowing high free standing capacity above the last tie-in support to the building.

For larger cranes up to the 1,000 tonne-metre class, Liebherr developed its new 1.90 x 1.90m internal ladder climbing system in use at the 100 Bishopsgate project in the City of London.
The fifth International Tower Cranes Conference (ITC) will be held in London, UK, on 10 and 11 May, 2017, and the event will include presentations on tower crane innovations, rental trends, project reports and safety issues.

The Millennium Gloucester hotel in Kensington, London, UK, will be the venue for this year's event, starting with a networking reception on the evening of 10 May, and followed by a full-day conference on the 11 May.

A keynote speech on tower cranes in applications traditionally dominated by other types of lifting equipment will be given by Simon Marr of Marr Contracting, Australia.

Will Matthews, head of real estate insight at Deloitte will give a report on the London Office Crane Survey – prospects for the coming years. Then Aviv Carmel, general manager of Skyline Cranes & Technology, will speak on technical innovation and working with BIM (building information modelling) to improve efficiency in tower crane operations.

BIM will crop up again along with digital engineering and off-site manufacturing: the impact on tower cranes, addressed by Mark Herlihy, lifting solutions leader at Select Plant Hire.

There will be a round-table discussing on BIM, digital engineering and tower cranes with Carmel; Steve Bradby, technical and engineering leader at Lifting Solutions, Select Plant Hire; and Julian Norton, business development manager construction, Pix4D.

Marco Guariglia, managing director sales, Liebherr Tower Crane Division, will talk about well-trained staff: improving safety and performance on the job site. Tower crane access and French regulations: implications for rental companies, will be the topic for Pierrick Lourdain, commercial director of Matebat.

Among the other speakers, Heinz-Gert Kessel, project engineering manager at Franz Bracht, will discuss how to bring down a tower crane after topping out a building.