

# The future of confined space lifting?

The world's first Artic Raptor 84 articulated tower crane is currently working on its first contract in Kilburn, North London and could be the answer to everyone's confined space lifting prayers. Mark Darwin saw the crane in action with Bob Jones of UK agent and hire company City Lifting.

With a minimum out of service radius of just four metres, the new Artic Raptor 84 looks set to revolutionise lifting on tight sites. Until its introduction, the minimum radius of a similar sized luffing tower crane was generally between nine and 12 metres. Placing the crane in the most efficient position - usually outside the building to minimise reinstatement costs - is often impossible particularly on small City infill contracts and where laws restrict oversailing such as the UK and Singapore.

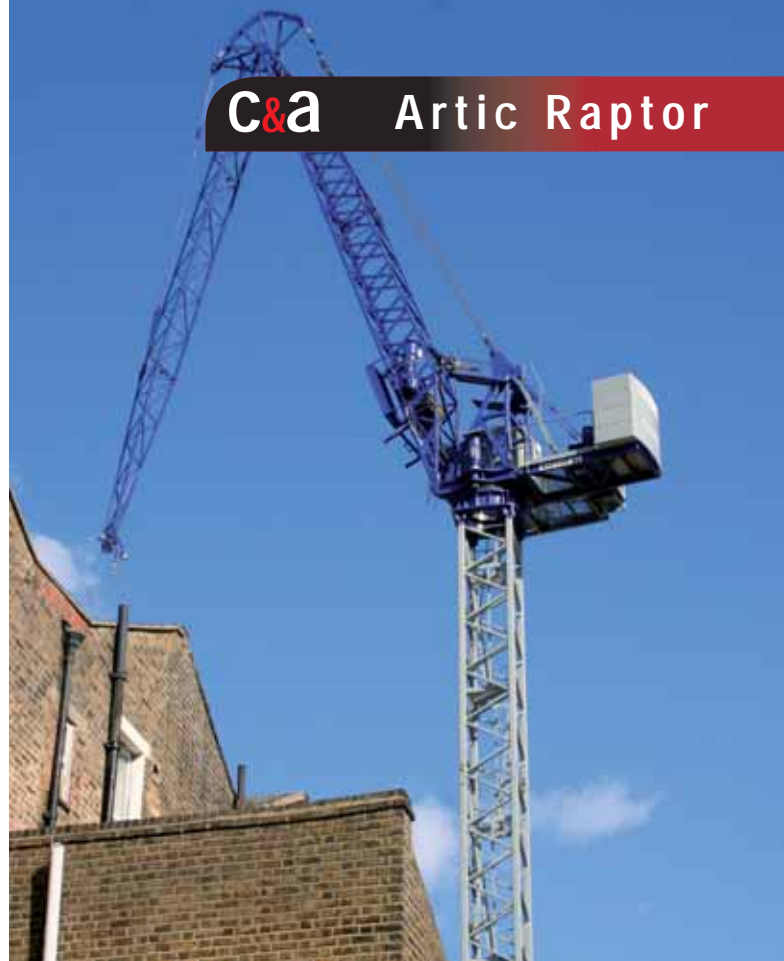
It was an ancient principle of English law that the rights over your land

stretched from the centre of the earth all the way to the stars. This together with a few legal test cases means that if a contractor does not have the right to oversail an adjacent property or is unable to obtain an Oversail Licence then a complete rethink may be needed in the design, method of work and type of crane or other lifting equipment which usually means huge additional costs.

The Raptor 84's (84 tonne metres) first job on Willesden Lane, Kilburn shows off its capabilities perfectly. Principal contractor Bouygues Construction needed a tower crane for its six storey, 13 apartment, precast concrete frame development for the London Borough of Brent. Unable to gain permission to oversail any adjacent buildings, the logical position for the tower crane was in a courtyard in the corner of the small site. The close proximity of the adjacent buildings (four metres) however meant that a conventional luffing jib crane would have had oversailing problems. The only option would be to place the crane in the centre of the site - still very close to the site boundary - and straight through the heart of the building.

The Raptor on the other hand was able to sit in the courtyard area just four metres from two site boundaries.

"We did look at other luffing jib cranes but their out of service radii were between 10 and 12 metres and we also had the problem of the ballast blocks and counter jibs trespassing into the adjacent airspace," said City Lifting's Bob Jones. "If we didn't have the Raptor, the only option for the contractor would have been to put the crane



right in the centre of the site going through the building. With no lift (or lift shaft) it meant the crane would have gone through every apartment adding considerably to construction and reinstatement costs."

The crane is being hired to reinforced frame contractor Duffy Construction with the possibility that Bouygues will take over the hire later in the contract to complete brickwork and roof construction.

The 28 week contract - which started mid February - uses a ring beam and pile foundation and needed the crane as early as possible to unload materials from a side street on the far side of the site, a maximum of 28 metres

from the crane.

"All materials used - mainly precast concrete columns, beams and rebar - are less than two tonnes, well within the lifting capacity of the Raptor which can lift four tonnes to 21 metres and two tonnes to 32 metres," says Jones. "This type of crane is ideal for high speed, accurate lifting. Its other main advantage is that it can work very close to its tower, unlike a luffer which has a 3.5 to six metre minimum working radius. Often tower cranes are positioned in a lift shaft but a luffer cannot be used to construct the shaft because the minimum radius is too big. Some contractors forget this fact and it can cause a big problem."



The experienced crane operator - provided by Duffy - had driven a variety of tower cranes including the older Tornborgs Magni S46 articulated cranes but still had to go through a thorough and full induction process to familiarise himself with the crane controls including the new touch screen computer - although it was the electric seat, air conditioning and generally spacious cab that immediately impressed.

"We have jointly developed the Raptor with Artic Cranes over the past three years and have the option on the first four units that it produces. Artic has decided to build two cranes at a time so the second Raptor 84 should be ready for the UK in a few months. Maximum free standing height is 32 metres under the hook on a 1.2 metre square tower. If you use either a 1.6 metre



The new touch screen computer.

square tower or a 1.6 metre reducing down to a 1.2 metre tower it can go much higher of course. The jib articulation in the middle means that the end of the jib remains level and at the same height whatever the radius."

"The front jib arrives on site folded with hook block already rigged and only needs reeving for luffing motion," said Jones. "Using a pinned tower (the old Magni's used bolts) the crane can comfortably be put up in three hours using an 80 tonne mobile although we used our 100 tonne Terex 100/4."

"I have been amazed at the number of serious enquiries we have already had primarily from contractors in London and the South East working in the City because of the reduced airspace and good lifting duties. We originally identified the need for such a crane when the contractor's 10 year crane rule was introduced. We had upgraded our four Magni S46s but their age meant that they fell foul of the rule. This is the next generation and future of confined space cranes. It gives us a modern crane which also has a much greater lifting capacity than the S46 the last of which were built in the early 1980's."

"The first Raptor was still being built when we heard about this contract and while the contractor did not want to be used as a guinea pig, we had the crane erected in our yard and put through its paces



The Raptor has a spacious cab

every day for three weeks prior to being erected on site just in case and it has performed faultlessly."

All drives are controlled by PLCs (Programmable Logic Controllers) and frequency inverters and all load and angle sensors are connected in a redundant control circuit for safety. The cab has been well thought out and includes tempered heat reducing glass, a fully adjustable seat and display screen system that provides the operator with all the necessary information at a glance. The crane has also been fitted out with spotlights right at the end of the jib which helps working during winter site hours.

"The Artic is the ultimate confined space crane which has no modern competitor. Even compact luffers

such as the Jost JTL68.4 has either a nine or 10 metre out of service minimum radius (although in special circumstances it can be reduced to five metres) while the Jost 108.6 is 10.9 metres and the Jost 158.6 is 12 metres," says Jones. "For this job, even positioning a luffer in the middle of the site may have caused over sailing problems."

## Articulated tower cranes



Two Magni S46

Possibly the most successful articulated or 'jackknife' tower crane as it was known, was the Magni S46 built by Tornborgs Maskinfabrik AB in Sweden in 1961. Tornborgs was an old Swedish company founded in 1871 in Lindås, a small village in the south east of Sweden. The company currently produces rack and pinion hoists which have been sold into the US market since the early 1970s under the Pecco brand.

The 46 tonne/metre Magni S46 - with a maximum capacity of 2.2 tonnes to 22 metres and 1.25 tonnes to 30 metres - continued in production until the early 1980s. Using a concrete counterweight its minimum radius is 5.1 metres although this can be reduced by 0.5 metre using a steel counterweight.

There are still many Magni's working in the UK, the largest fleet being run by Leighton Buzzard-based Vertical Transportation. The main advantage of the articulated jib crane design is that the jib stows in a folded position at minimum radius which is a real benefit on cramped sites.

Other benefits include fast slewing operation, particularly when the jib is retracted as well as its high-speed extension or reduction of the working radius in comparison to single jib luffers. One possible disadvantage is that the end of jib height is constant compared with a single luffing boom jib.