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One of two Liebherr LTM 1750s working on Germany's largest ever cruise ship

Since our last look at the heavy lift market a year ago there have been some significant new cranes launched in the 500 to 750 tonne market sector. Yet in spite of improved safety features and performance, last month saw the worst crane disaster in living memory with more than 100 people losing their lives after a 1,350 tonne crawler crane overturned onto the Grand Mosque in Mecca, after being left in a vulnerable position in the face of a major storm with strong winds.

Incidents such as this further remind us of the dangers of not using the equipment as designed and recommended by the manufacturer. As we have seen several times before, wind is particularly hazardous to lifting operations, particularly when lifting bulky loads to a great height, such as installing wind turbines, not to mention how they are left when out of service.

Tadano enters the sector

Perhaps the most significant development was the launch of the eagerly anticipated 600 tonne, eight axle Tadano ATF 600G-8 All Terrain crane in June. Most notably, the crane features a triple main boom design - Tadano's alternative to the Sideways Superlift/Y-Guying cable suspended booms employed by competitors. The 56 metre boom is triple pinned and can take a 90 metre luffing jib. Load chart comparisons with similar sized cranes suggest that it can outperform or at least match capacities from cranes with cable supported booms, but the Tadano requires no installation and has a much tighter tailswing and working footprint.

The ATF 600G-8 and its new boom system is undoubtedly a strong crane lifting its maximum capacity at 3.5 metres. Although its maximum system length of 147 metres is good, its relatively short main boom could prove a limiting factor for some crane rental companies. It has a long chassis at just under 20.5 metres (almost two metres longer than a Terex AC700) but it has a good turning circle, large counterweight, competitive road speed and compact outrigger spread compared to other eight and nine axle cranes.

At just under 20.5 metres the Tadano has a long chassis but has a good turning circle, large counterweight, competitive road speed and compact outrigger spread

New 500 tonne Liebherr

Liebherr has added two large crawler cranes - the all-new LR 1500 - said to be a 500 tonne capacity crane with the dimensions and weight of a 400 tonner - and an updated version of its LR 1750. The LR 1500 is designed for easy transport, the carbody and superstructure frame weighs 55 tonnes. However the removable A frame allows this to be reduced to 45 tonnes and with a three metre overall width, enables it to be moved in all markets without restrictions. Overall working width is 7.6 metres and standard track pads are 1.5 metres - more than a 400 tonne class crawler crane - greatly reducing ground bearing pressure. The drive is taken from the LR 1600/2 and power is provided by a Stage IV/Tier 4f 350kW engine, again about the same as a 600 tonne class crane.

The new LR 1500 has an 84 metre main boom and an 84 metre luffing jib. The 250 tonne jib head on the luffing jib is also used for SL main boom operation. A 400 tonne head is standard for the S main boom for heavy jobs, being more lightweight than the optional 500 tonne head. The derrick boom is 30 metres and the 260 tonnes of derrick ballast can be adjusted from nine to 16 metre radius.

Liebherr says it has also developed a simpler lattice boom system reducing the number of parts - boom sections are six and 12 metres long. This makes the transport and erection simpler and therefore more economical. The guide frame for the derrick ballast has been completely omitted from the design and the ballast radius is adjusted simply using the derrick boom. The ballast is made up of 10 tonne slabs which are also used on the LR 1400/2 and LR 1600/2 machines keeping costs down for crane companies which have these in their fleet. The central ballast consists of a few concrete sections which can be set up quickly and easily and forms a safe catwalk for the undercarriage.

The Tadano ATF 600G-8 features a triple main boom design

Liebherr adds another

The new LR1750/2 has increased capacities and H-boom configuration similar to those already incorporated in the LR1600/2 which include strengthening the main boom and extending the derrick boom by

Wind is particularly hazardous to lifting operations not to mention how they are left when out of service. This overturn at the Grand Mosque in Mecca left more than 100 people dead

The all new LR 1500 is said to be a 500 tonne capacity crane with the dimensions and weight of a 400 tonner

Liebherr LR 1500

seven metres to 38.5 metres. The company claims that the changes have increased the crane's capacities by up to 30 percent. The suspended ballast trailer has also been modified to include a hydraulic drive system, while work at height safety features have been revised throughout the machine with additional platforms/access points added, as well as improved guardrails. All existing LR1750 components can also be used on the new LR1750/2.

First MLC650 on site

One of the most eagerly awaited new crawler cranes - the 650 tonne capacity Manitowoc MLC650 - has started shipping, with Bigge Crane and Rigging using the first unit to erect a large wind farm in Minnesota, USA. The crane was delivered with a main boom of 104 metres and optional VPC Max superlift system in June and started work in August. The MLC650, launched at Conexpo last year, features the innovative Variable Position Counterweight which adjusts automatically to keep the weight of the crane and load centred over the tracks to improve load distribution. As a result the crane requires less ground preparation than traditional crawler cranes and can safely pick andcarry heavier loads.

Bigge has rented the MLC650 to Colorado-based Renewable Energy Systems America, which is using the crane to erect 18 wind turbines at the Pleasant Valley Wind Farm near Austin, Minnesota on what will be a 200 MW-generating project when it's completed at the end of this year.

"We expect the wind turbine market to demand the MLC650 over the current offering of crawler cranes because the VPC saves time and money," says Bigge chief executive Weston Settlemier. "The crane's technology allows for reduced erection time, increased tracking speeds and lower transport costs. In addition, the VPC technology reduces the point loading of crawlers and cuts the ground

The VPC system automatically positions the MLC650's counterweight to suit each lift.

The new Liebherr LR1750/2 has increased capacities and a H-boom configuration

Tadano launched its 600 tonne, eight axle Tadano ATF 600G-8 All Terrain crane in June

preparation required by the wind turbine erection contractor."

On the site, the MLC650 is configured with 104 metres of main boom with a 7.6 metre jib and 296 tonnes of counterweight. The crane is lifting wind tower sections and nacelles weighing up to 107 tonnes. It is also installing blades weighing 11.3 tonnes at heights of up to 90 metres. The VPC system automatically positions the MLC650's counterweight to suit each lift. Another useful feature is that the MLC650 has a smaller, live mast making it easier to move around the job site, particularly when moving under power lines. Bigge says the MLC650 mast requires less disassembly to lower its height resulting in less down time.

John Krane, leasing manager at Bigge adds: "One of the MLC650's biggest selling points is its larger 32mm wire rope and good line pull. It can work with six rather than eight parts of line, allowing faster lift speeds, allowing us to complete the job in a shorter time frame. Also, it doesn't need an assist crane to raise its boom."

After the MLC650 completes this contract it will be moved to a similar project in Ardmore, Oklahoma. Bigge is using its second MLC650 on power plant projects.

Boom Booster for Superlift 3800

Terex has developed a version of its Boom Booster kit for its 650 tonne Superlift 3800 crawler crane, increasing capacities by up to 30 percent. The new attachment follows the launch of the concept on the CC 8800-1 crawler crane last year.

Available with all-new crane orders or as a retrofit, the Superlift 3800 Boom Booster consists of up to seven, 12 metre long by 3.5 metre wide, boom sections which offer boom lengths of between 24 and 84 metres. When equipped with the kit the Superlift 3800 offers a maximum hook height of 174 metres at which it can lift loads of up to 80 tonnes, making it well suited for erecting large wind turbines.

Walkways and fall protection systems are built into the boom sections as standard. Additional options include the company's Superlift Split Tray, which can be used to raise a long main boom and then uncoupled without an assist crane, allowing it to move with its standard Superlift counterweight.

A 3.5 metre derrick mast extension also allows an increased radius with full boom from 19 to 21 metres as well as enabling it to lift long boom systems from the ground without an assist crane. Finally, the Flex Frame system allows the Superlift counterweight radius to be adjusted from 13 to 21 metres with the full ballast on the tray.

The Boom Booster also allows the crane to travel with up to 94.5 metres, of boom/jib which Terex Cranes claims saves between four and five hours of disassembly/ assembly time.

Bigge Crane and Rigging is using the first Manitowoc ML650 to erect a large wind farm in Minnesota, USA

The Terex Boom Booster kit for the 650 tonne Superlift 3800 crawler crane is said to increase capacities by up to 30 percent

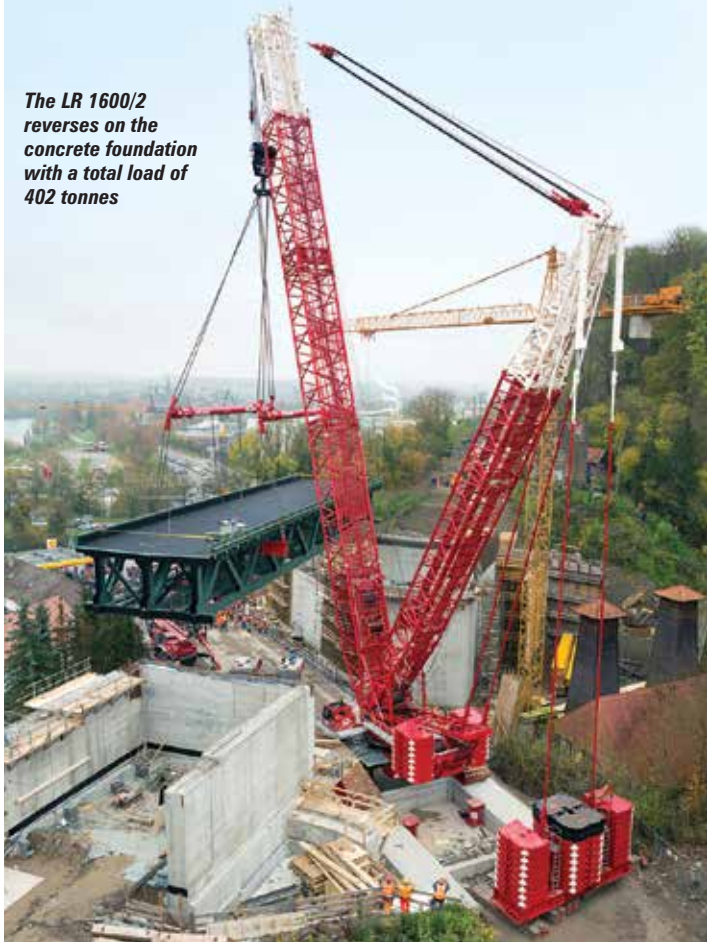
Clever bridge lift

Installing a heavy rail bridge in an extremely tight space on a difficult site presented a whole series of challenges for Uwe Langer of German heavy lift and haulage company Riga-Mainz. Expansion of the municipal railway around Heilbronn, Baden-Württemberg included a new 355 tonne bridge in Bad Wimpfen but there was very little space for a crane to lift the steel bridge into place. Proposals for a tandem lift were rejected for various reasons including lack of space.

Riga-Mainz decided to use a Liebherr LR 1600/2 crawler crane working from a purpose-built reinforced concrete foundation sitting on a dozen, 13 metre deep driven piles, designed to support bearing pressures of up to 507kN per square metre. The night before the lift, the 40 metre long bridge section was transported from the assembly site to the lift point on two side by side 10 axle Self Propelled Modular Transporters. Mainz then threaded two cross beams through the bridge section to service as lifting points. This was one of the main reasons Riga-Mainz was awarded the contract.

"Riga was the only supplier to offer a solution using just one crane," said Kathrin Gottschang from project management team at Deutsche Bahn Projektbau. "The concept suggested by Uwe Langer was also the only one that included threading the lifting cross beam through the underside of the new bridge deck. All the other companies would have lifted the bridge at the top of the structure. That would have meant that much of the work on the bridge could not have been carried out in advance of the lift."

The LR 1600/2 was rigged with 54 metres of main boom and a 36 metre derrick boom. With the cross beam, spreader beams and other equipment the LR 1600/2 had to lift a total load of 402 tonnes at 19 metres. The crawler crane was fitted with a total of 565 tonnes of counterweight - 65 tonnes central, 150 tonnes on the superstructure and 350 tonnes suspended at a radius of 18 metres. Once the bridge deck had been lifted from the SPMTs, the LR 1600 had to track backwards around 10 metres to position it on the new abutments. Two other Liebherr cranes - an LTM 1200-5.1 and an LTF 1045-4.1- were used for set-up and support work.



The LR 1600/2 reverses on the concrete foundation with a total load of 402 tonnes

One of the cross beams is threaded through the truss construction of the new bridge.

Pushing the boat out

Austrian crane and access company Prangl used a 500 tonne Terex AC 500 All Terrain crane to help lift a 71 tonne, 27 metre long pleasure cruiser from Ennsdorf harbour on the Danube, and then on its own to place it on Lake Hallstatt at Steeg.

To unload the craft Prangl reduced the main boom to 19.3 metres topped by a 30 metre luffing jib, with 180 tonnes of counterweight

"Ideally, you would want to lift this kind of load using a tandem lift, as we did when loading it on the trailer," said Prangl project manager Alexander Albert, "but that was out of the question when unloading, due to the lack of space - so the AC 500 was on its own."

The initial lift saw the crane with a 37.9 metre main boom and 140 tonnes of counterweight. Working in tandem with another crane at a radius of 14 metres, it lifted the hull from the water to a height of three metres and slewed it 180 degrees before placing it onto the low loader for the 430km road trip to Steeg.

To unload the craft Prangl reduced the main boom to 19.3 metres topped by a 30 metre luffing jib, with 180 tonnes of counterweight. This allowed the boat to be lifted at a radius of 24 metres to a height of four metres, slew through 180 degrees before placing it into the water. Working alone, this time the second lift proved to be the more difficult of the two, with weather, space and time presenting significant challenges which also involved the closure of the adjacent B166 autobahn for two hours.

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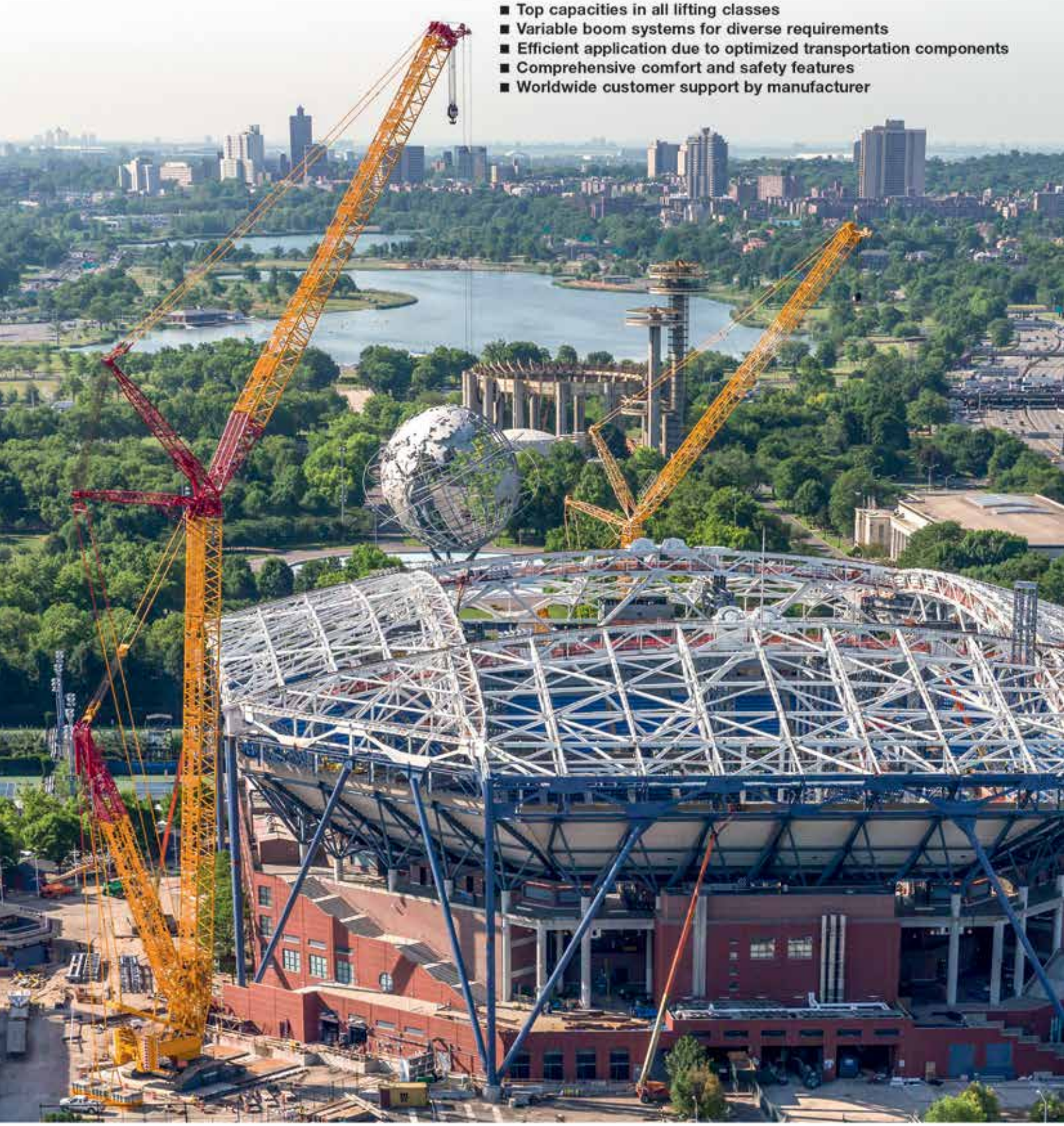

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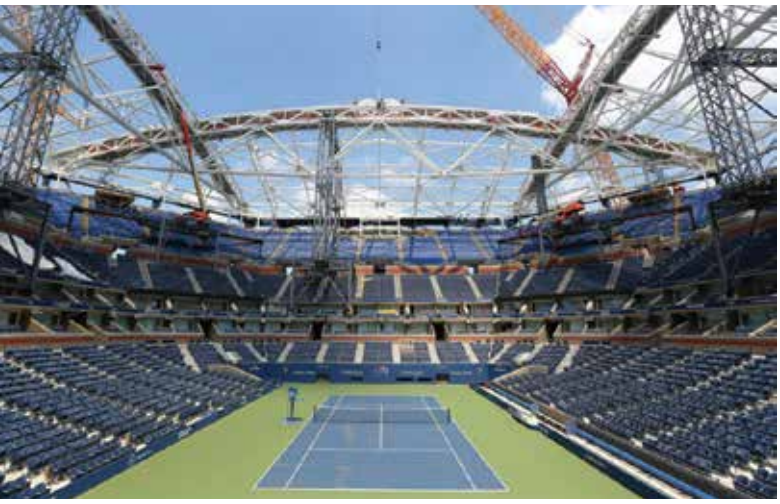
Advantage Buckner

The Arthur Ashe Stadium in New York - the largest tennis stadium in the world and the venue for the US Open - is getting a retractable roof to avoid match postponements due to rain. Over a period of 10 months, a 1,000 tonne Liebherr LR 11000 crawler crane and two 600 tonne LR 1600/2s operated by American crane contractor Buckner HeavyLift Cranes have been placing the steel structure for the roof.

The three cranes were on site from October 2014 to July this year, in order to complete the structure in time for this year's US Open last month. After the tournament, work restarted with a Liebherr LR 1600/2 from Buckner back on site for around four months, with the roof scheduled for completion in 2017.

One LR 11000 and two LR 1600/2 cranes erect the steel structure for the roof on the Arthur Ashe Stadium in New York



Buckner's cranes building the giant roof structure over the largest tennis stadium in the world.

"The site was logistically challenging and a great deal of planning was required just for the assembly and disassembly of the LR 11000 and LR 1600/2," said Kevin Long, Buckner's project manager. In addition two Liebherr LR 1200 cranes and an LTM 1220-5.2 from Bay Crane Service were on site as auxiliary cranes. The restricted space also caused difficulties for planning the various lifts but the compact design of the LR 11000 and its infinitely adjustable ballast tray with a minimum radius of 12 metres both helped."

"The maximum ground bearing pressure on site was our main concern," said Long. "But the Liebherrs offer far better ground bearing pressures than the other cranes we considered, and they also offered the lifting capacities and radii we needed. That meant that the cranes did not have to be moved so often which enabled us to save a good deal of time and money."

Crawler counterweight

Southern German crane company Helling used a Liebherr LTR 1220 telescopic crawler crane, already on site, as a ballast substitute for a 600 tonne LR 1600/2 crawler crane on a wind turbine job, resulting in significant time and cost savings.

The LR 1600/2 was being used to place the top steel tower sections, nacelles and rotors of 128 metre hub height wind turbines on a contract near Alzey, Rhine-Hesse. After assembling the rotor and completing the erection of the turbine on the previous day, the team from Helling started work at around midday to lower the crawler crane's lattice boom with 12 metre fixed jib - an overall length of 150 metres.

After removing the central ballast on the crane, the telescopic crawler crane then moved to the LR 1600s rear and was positioned for use as additional suspended ballast to allow the boom and jib to be fully lowered. It then took the crew around 45 minutes to free up the LTR 1220 so that it could help lift the 34 tonne boom sections. The two cranes then tracked 1,200 metres across a field to the next site. By 22:00 the LR 1600/2s boom was re-installed by the LTR 1220 and elevated ready for work the following day.

Managing director Markus Helling worked with Liebherr to develop the concept for using the LTR 1220 as auxiliary counterweight for raising long booms. "Firstly there is a massive reduction in set-up times because there is no need to add and remove the suspended ballast. Secondly, about eight fewer ballast transport units are required for the set-up process" said Helling.

After removing the central ballast, the telescopic crawler crane was positioned for use as additional suspended ballast to allow the boom and jib of the LR 1600 to be fully lowered

The LR 1600/2s boom being re-installed by the LTR 1220

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The Superlift 3800 was equipped with 165 tonnes of superstructure counterweight, 50 tonnes of central ballast and 325 tonnes on the superlift tray which can be extended from 11 to 19 metres.

Superlift raises the roof

Specialist heavy lift and transport company Sarens used its Terex Superlift 3800 crawler crane to place the roof frame on French football club Olympique Lyonnair's new Stade des Lumières in Décines-Charpieu a suburb to the east of Lyon.

The 59,500-seat stadium will replace the current Stade de Gerland at a cost of €250 million. Its first major national event will be six matches in the UEFA Euro 2016 finals scheduled for June 2016. With the major structural work and seating areas complete, work is now concentrating on the installation of the steel structure that supports the enclosed roof with a January 2016 completion deadline.

"This project needed a crane with a high capacity at short and extended working radii without reconfiguring the boom," said Sarens project manager Sam Voeten. The crane was transported 500 miles to site from Cherbourg in northern France using 46 trucks. "We needed a total of 540 tonnes of counterweight for the superstructure, central ballast and superlift tray to perform all the lifts," said Voeten.

"The access tunnels for truck deliveries at the stadium are only five metres high by four metres wide so the compact transport dimensions of the Superlift 3800 helped us get it inside the stadium, with rigging taking a crew of five four days."

For the project the Superlift 3800 required 60 metres of main boom, a 42 metre jib and 36 metre superlift/derrick mast. The crane's hydraulic pinning feature helped Sarens' rigging crew to quickly assemble the crane, while the quick connection system enabled the superstructure to be installed within 15 minutes. The Terex fall protection system provided additional safety when rigging the boom sections. It includes a vest harness equipped with a shock absorber and provided secured, tethered walking and working on the main boom. The stadium roof involves the installation of preassembled steel segments to form a supporting structure. Roof supports were placed around the entire circumference of the stadium but working space for the crane was very limited.

"Management of the free space inside the stadium was a challenge," said Voeten. "Terex helped us by studying the specific parking conditions for this project and corresponding maximum permissible wind speeds at the various working radii."

The Superlift 3800 was equipped with 165 tonnes of superstructure counterweight, 50 tonnes of central ballast and 325 tonnes on the superlift tray which can be extended from 11 to 19 metres. Working at a radius of 43 metres the crane quickly placed the 150 tonne inner segments at their drop-off height of 45 metres. It then worked at radii of up to 81metres - nearly the entire length of the football pitch - to position the smaller exterior flanges/assemblies which weighed 50 tonnes each. These were also positioned at a height of 45 metres for final assembly.

Sarens completed the supporting structure for final roof installation by mid-summer giving the stadium every chance of being completed ahead of schedule.

Zero-G lift for Riga

The service life of the 'Zero-G' parabolic Airbus A-300 aircraft came to an end in August when it was lifted over the fence of Cologne-Bonn Airport. The aircraft will now become a museum exhibit on show to the general public.

The A-300 performed about 13,000 'parabolic flights' over a 15 year period in the empty airspace between Scotland and Norway simulating 22 seconds of weightlessness each time for astronaut training and experiments for customers including the German Aerospace Centre (DLR). Heavy lift company Riga Mainz lifted the 82 tonne plane with a Liebherr LR 1600/2 crawler crane and a sophisticated combination of attachments.

The 600 tonne LR 1600 was rigged with a 66 metre main boom and 36 metre derrick mast. Central ballast was 65 tonnes, superstructure counterweight 150 tonnes and suspended ballast of 200 tonnes. The total load including hook and lifting attachments was 109 tonnes at a radius of 43.5 metres. The aircraft has only three attachment points with the required capacity - on the two main landing gear assemblies and an area at the front of the fuselage. The lifting gear included two cross beams and three spreader beams developed by Riga Mainz. A remote controlled chain hoist was also used to adjust the crane hook precisely over the centre of gravity. This made it possible to adjust the required angle of the aircraft to the horizontal to generate zero up-thrust in the event of a gust of wind from the front.

One hour was all that was needed for Zero-G's last 'flight'. With guy ropes secured to telescopic handlers on two sides, the seven-man team from Mainz turned the 54 metre long plane through 180 degrees.

Sophisticated hanging gear: the combination of cross and spreader beams was able to adjust the angle to the appropriate centre of gravity using an electric chain hoist.

Caution was required because a gust of wind at this point could have caused the rear of the plane to hit the crawler crane's main boom. The crane then tracked 20 metres to place the aircraft on a specially prepared gravel bed.

The attachment points for the main landing gear could only be accessed by opening the wings.

First live pylon lift

Specialist heavy lift and transport company Mammoet has completed the first ever lift of a 'live' high voltage pylon. The 380kV structure was raised in-situ by four metres, while maintaining the power supply on behalf of TenneT TSO for the Rijkswaterstaat (Department of Waterways and Public Works) in the Netherlands.

Mammoet was responsible for the complete project including civil works, fabrication of the new pylon section, the complete engineering package and lifting.

Using the 500 tonne JS500 jacking system, the pylon was raised with a margin of just five millimetres between each leg in order to maintain its structural integrity. Four JS500 jacking system towers - one at each corner - were used to raise the 35 tonne pylon, ensuring a very precise jacking manoeuvre. The system was operated remotely at a safe distance. The use of the jacking system avoided the need to construct a costly emergency power bypass.

Mammoet has completed the first ever lift of a 'live' high voltage pylon. The 380kV structure was raised in-situ by four metres, while maintaining the power supply.

Giant electricity pylons lowered

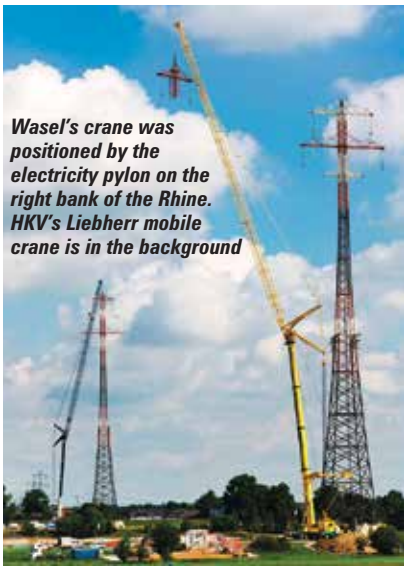
During the summer German logistics provider and crane operator Wasel reduced the height of two 138 metre high electricity pylons and rebuilt the masts on the Rhine near Dinslaken. Using two 500 tonne Liebherr LTM 1500-8.1 All Terrain cranes - one from Wasel another from Cologne-based HKV Schmitz + Partner - they worked simultaneously on both sides of the river.

When originally constructed in 1926, the pylons of the 'Rhine Overhead Transmission Line Crossing Voerde' were among the tallest in the world and spanned a distance of more than 500 metres. Contrary to its original plans, grid operator Amprion decided to redevelop the ageing crossing because a new power line was subject to severe delays.

The two LTM 1500-8.1s had to complete the first part of the work simultaneously. Before dismantling the upper cross-beams, the transmission lines were simultaneously detached from both masts and lowered to around 50 metres, before being temporarily suspended on the masts' framework structures. Shipping traffic on this part of the river was suspended for this phase of the work.

Industrial climbers and crane crews then worked for two days to dismantle the old mastheads and steelwork and erect the new mastheads at a height of almost 100 metres, pushing the two cranes to the limits of their lifting capacities. "The corner posts of the masts had significantly more mass than the calculations predicted," said Björn Kröger, project manager at Amprion. "Nevertheless, all lifts proceeded as planned, only the cutting of the original steel structure took more time than expected."

"On this section of the river the overhead transmission lines (now running lower) must always be at least 21 metres above the river's peak water level - the reason why the masts were originally built so high."



Wasel's crane was positioned by the electricity pylon on the right bank of the Rhine. HKV's Liebherr mobile crane is in the background