







# Dear Readers,

Once again, we were delighted to welcome many of you in person to the Bauma trade fair. Thank you very much for your visit and the superb conversations we had with you. This trade fair was without doubt the outstanding (and successful) highlight of spring.

And we are just as moved when we look at the newly developed LTM 1110-5.1 and LTM 1650-8.1 crane models. You have once again placed your trust in us and placed orders for lots of them. Once again, we would like to say thank you. You can read all about the concepts, strengths and innovations of these new machines starting on page 24.

Our challenge now is to validate the promised performance data by prototype testing and make the new models ready for the market. Deliveries will therefore not start for a few months yet and we would ask you to be patient for a little while longer. As with all new developments, we have to overcome the technical challenges – including some unexpected ones at times.

Unfortunately, we urge you to be patient with us, since the economy has seen a large expansion causing some of our lead times to be longer than expected and longer than what you, the customers, are used to when dealing with the Liebherr standard. We are deeply sorry for this. Some parts of our production is beyond our influence. Our manufacturing depth is the main reason of our dependency on the capacities of our suppliers. We will without a doubt increase our production volumes to meet this increasing quota set by our customers. Rest assured that our production will be sophisticated to overcome these challenges and further improve our processes. More on these challenges is available in an interview on page 70.

And finally something a little sweeter – Liebherr in Echingen is celebrating its 50th anniversary

this year. That actually means we are still rather young. But when we take a bird's eye view of our enormous factory site, which five decades ago was just green fields, the whole thing makes us extremely proud. Particularly since it was not easy to become established as a newcomer to the mobile crane industry. Thanks to our committed workforce, however, we overcame every crisis we faced from the very beginning, which means that today we can look back at some of our major orders and records. We feature some of the highlights starting on page 60. As a mark of respect and to show how much we value them, we are preparing a great anniversary party for our team of around 3500 colleagues here in Echingen. We will have photographs from the celebrations in the next edition of UpLoad.



Best wishes from Echingen

Dr. Hubert Hummel

Production Director of Liebherr-Werk Echingen GmbH



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Liebherr first unveiled the LTM 1650-8.1 at the Bauma trade fair in Munich in 2019.





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The intuitive user interface is the key to the Internet of Things.

**Now also online:**

UpLoad is also available at [liebherr.com](http://liebherr.com) to read, look at and download.



**Find out more:**  
[www.liebherr.com/upload](http://www.liebherr.com/upload)



# Moments

In action, in production or in review – in the following we have captured some extraordinary crane moments for you – and posterity.



## Snowstorm

Man and machine face up to any weather conditions at our testing and acceptance areas in Echingen.









**More starch**

An LG 1750 installs a falling film evaporator to increase production of wheat starch at a factory in Lower Austria.













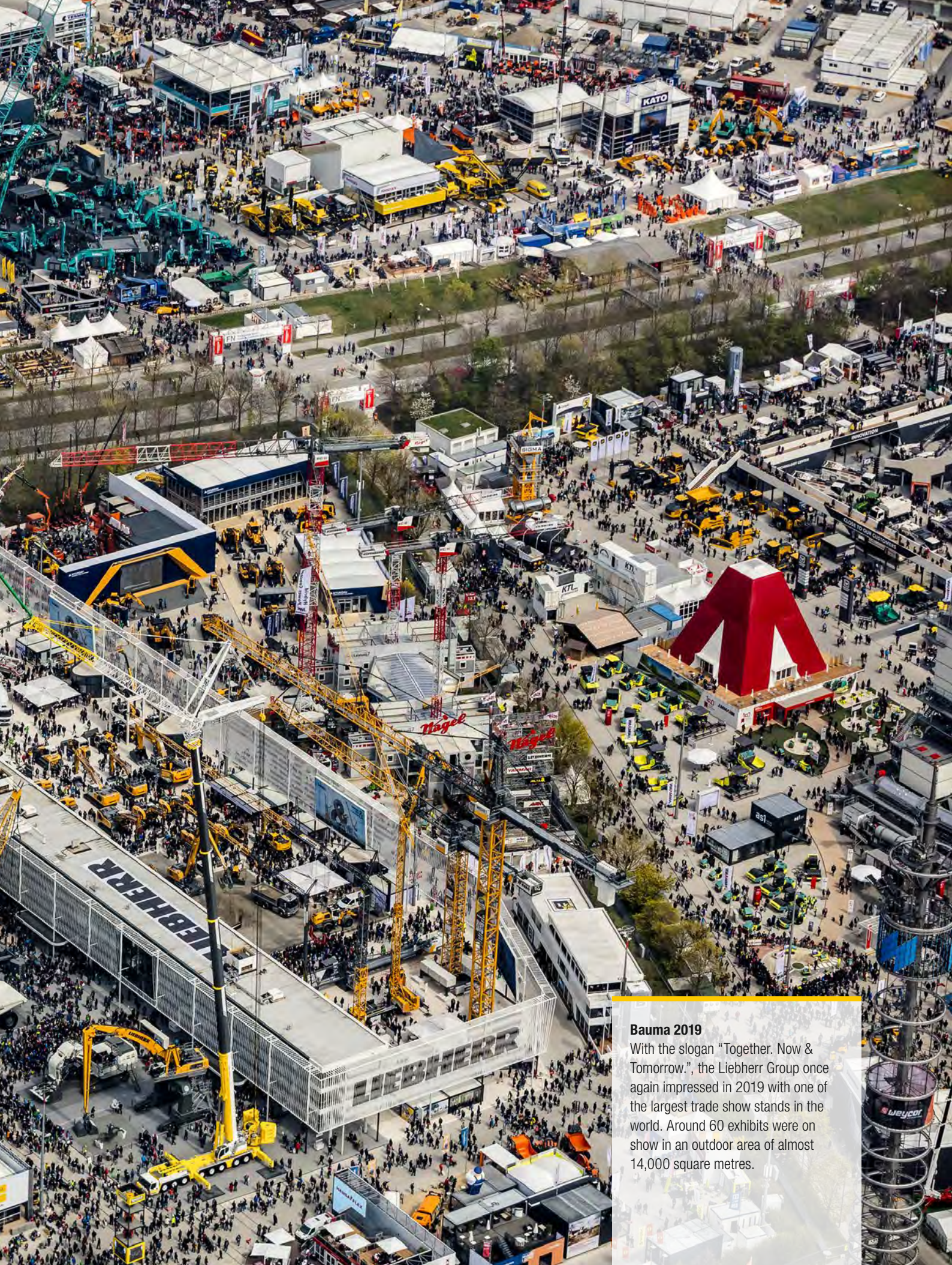
**Acetylene and oxygen**

Colourless gases with power – metal sheets up to 220 mm thick are shaped as required in a computer-controlled system.









### **Bauma 2019**

With the slogan "Together. Now & Tomorrow.", the Liebherr Group once again impressed in 2019 with one of the largest trade show stands in the world. Around 60 exhibits were on show in an outdoor area of almost 14,000 square metres.





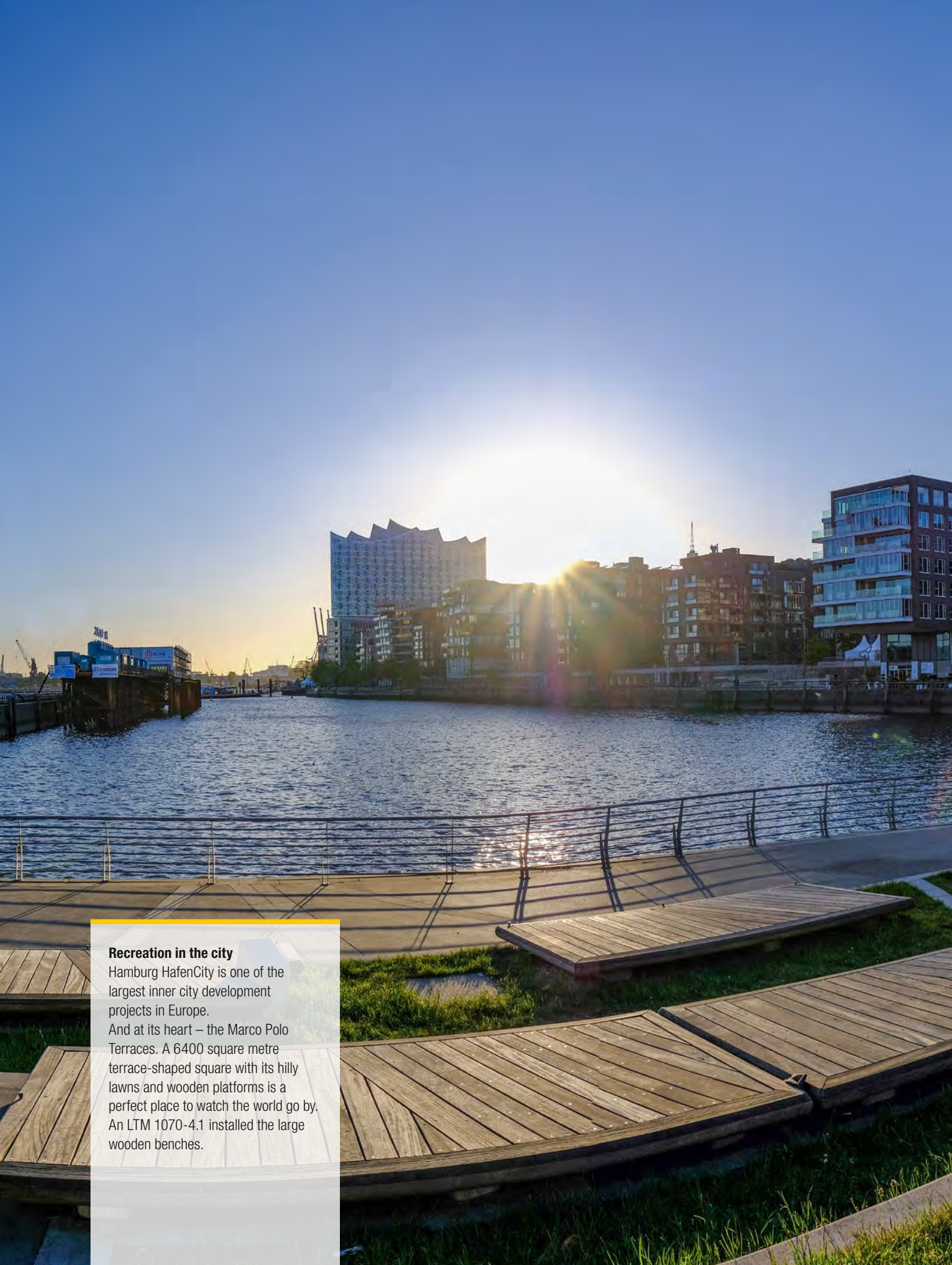




### **Memorial against war and destruction**

After a construction period of 17 years, the Frauenkirche in Dresden was completed in 1743 – it was then destroyed in just 2 days at the end of the 2nd World War. A small part remained as a ruin and memorial until reconstruction commenced in 1994. The new building was completed in 2005, financed mainly by support groups and donations from all over the world. An LG 1550 positioned the dome with its cupola cross in place to mark the end of the construction work.





### **Recreation in the city**

Hamburg HafenCity is one of the largest inner city development projects in Europe. And at its heart – the Marco Polo Terraces. A 6400 square metre terrace-shaped square with its hilly lawns and wooden platforms is a perfect place to watch the world go by. An LTM 1070-4.1 installed the large wooden benches.













### **Backdrop to a film**

The town of Carcassonne in the south of France has been used as a backdrop and shooting location for many films, mainly because of its historic fortress. The castle on the right bank of the River Aude has been a UNESCO World Heritage Site since 1997. A compact LTC 1045-3.1 had to be manoeuvred through all the narrow gates and alleys before it could complete a job at the site.



# Made with Liebherr

Imagine what the ancient builders of the Egyptian pyramids and the master builder of large medieval domed structures could have done with our modern Liebherr cranes. But now they are being used for renovation and reconstruction work involving some spectacular hoists and also some everyday challenges.



## Frauenkirche in Dresden

When the dome was put in position on the reconstructed Frauenkirche in Dresden on 22 June 2004, the Liebherr LG 1550 lattice boom crane used for the purpose probably set a very special record – around 60,000 people filled the streets, squares and bridges around the Frauenkirche in the centre of Dresden as the crane hoisted the 28 tonne dome with its gilded cupola cross into the air.

At a height of around 120 metres, the lattice boom mobile crane towered over the city's silhouette with its castle, cathedral and art academy. The heavy duty crane had been fitted by east German crane contractor MaxiKraft with a 49 metre main boom and a 70 metre luffing lattice jib as well as a 6 metre runner for this hoisting job. This fairly uncommon boom configuration was required since the dome measuring over 14 metres in height had to be placed on the stone cupola hanging from the yoke and four long steel ropes at a height of 80 metres and with a radius of 39 metres.



### Cité de Carcassonne

The mediaeval fortifications are unique in Europe to their size and well-maintained condition. The citadel still has residents and is surrounded by two walls. The main buildings inside these walls are a castle and a church. From time to time a mobile crane is needed here, for example to install an air conditioning system or an electricity distribution box. That is when the compact LTC 1045-3.1 from crane contractor Hugon gets to work. But it is far from a standard drive to a crane job inside the mediaeval fortifications – narrow gates in the fortified walls and long, narrow alleys as well as tight curves around the old walls. The mobile crane winds its way through historical Carcassonne on rough cobblestones, often just a hand's width between the crane and the centuries-old buildings.



**Find out more:**  
[www.liebherr.com/carcassonne](http://www.liebherr.com/carcassonne)



### Hamburg HafenCity

HafenCity is a district of Hamburg which is completely surrounded by river and canal banks. The plan for the area, which measures around 2.2 square kilometres, is to create residential units for up to 14,000 people, around 3000 hotel rooms and jobs for 45,000 people by the start of the 2030s.

A great deal of value was attached to the quality of free space design in the development of HafenCity. The interplay between land, water and tides has been skilfully used as a design element. The Marco Polo Terraces are an excellent example of this. They mirror this theme on three levels. A homely, restful atmosphere is created on the terraces by hilly lawns, wooden platforms suitable for sitting and lying and an array of trees.



Hamburg-based company Krandienst Schulz used an LTM 1070-4.1 to install

the large wooden benches. The heaviest bench sections weighed in at 700 kg

and were hoisted using radii of up to 38 metres.



# Mobile and crawler cranes









# Lightweight, long and powerful

“Prepared for every task!” is how Liebherr presented the new LTM 1110-5.1 at the Bauma trade fair. The aim for the design of the new 5-axle crane was to enable it to complete jobs all over the world economically and flexibly. But, of course, it had to be powerful as well.

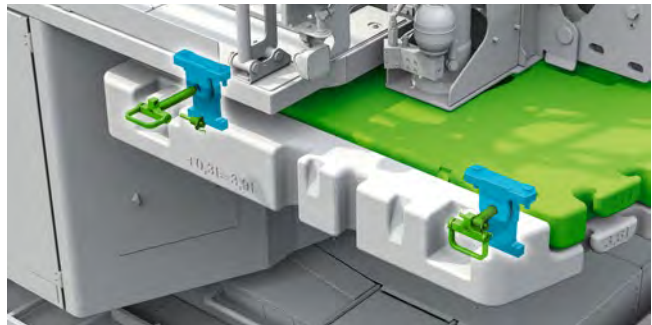






### Contradictory objectives

The demands of Liebherr's new 5-axle crane in the lower lifting capacity range were high and, in part, contradictory – it had to be lightweight so that it could be driven anywhere. But it also had to have a long telescopic boom, and of course it also had to be able to hoist heavy loads! Somehow our designers and structural engineers managed to do it – although the new LTM 1110-5.1 is such a lightweight construction that its gross weight is just 48 tonnes with axle loads of less than 10 tonnes, its 60 metre telescopic boom and maximum ballast of just 29 tonnes enable it to exceed the performance of its rivals on the market.

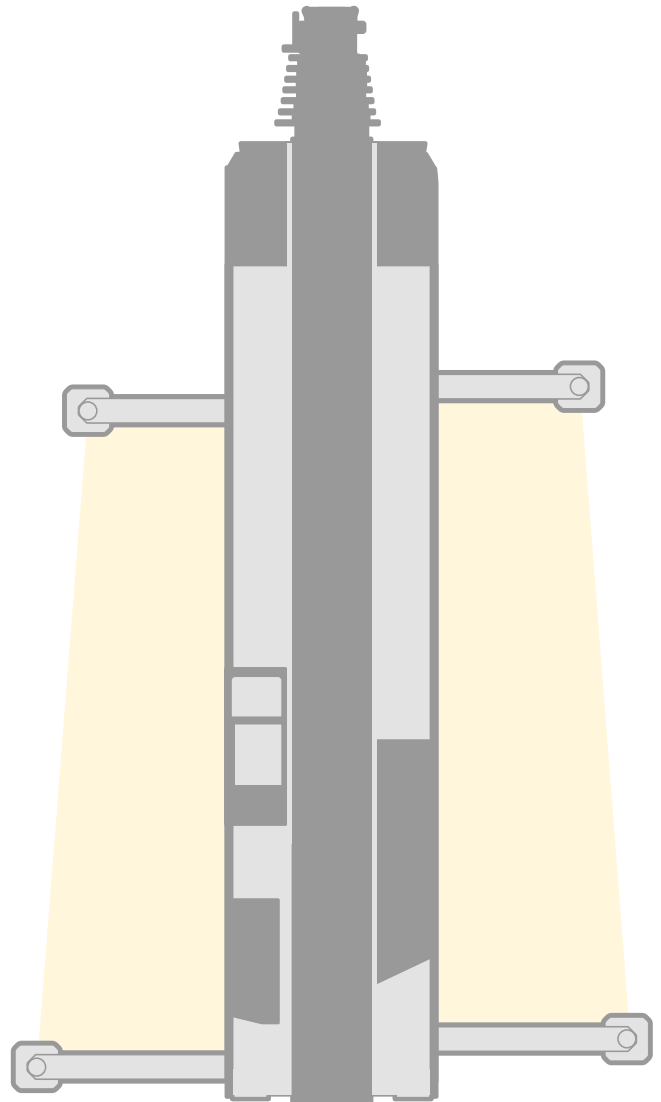
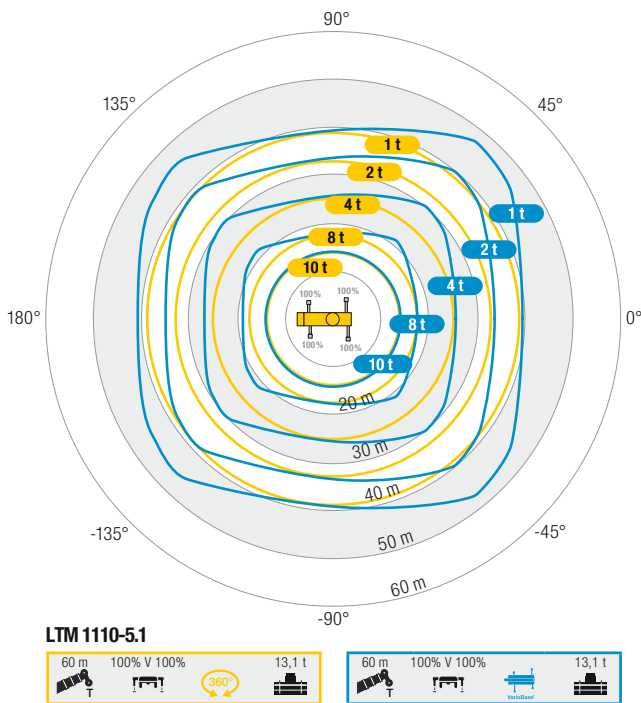
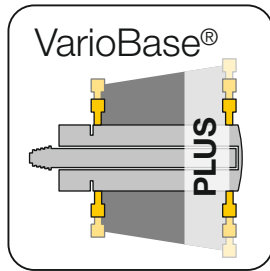


Quick-change ballast (option)

Mobile cranes can drive on the public roads in most countries with a 12 tonne axle load. That is one of the basic design objectives for any mobile crane. But the fact is that less is often more or better, for example when applying for permits and licences for specific routes. Bridges with weight limits, restricted driving in city centres and daytime-dependent regulations also cause hurdles. And in some countries the legislators actually demand a maximum axle load of 10 tonnes. And the new LTM 1110-5.1 can do it all. And it can do it particularly well because it can switch between different axle load versions quickly. Our solution is centred around "quick-change ballast". Ballast slabs are no longer screwed to the slewing platform, but instead are bolted in such a clever way that they can be fitted and removed in a matter of moments.

But sometimes we can use more – wherever higher axle loads are permitted and driving on site with lots of ballast. The new 110 tonne crane can do that well, too, because it delivers uniform axle load distribution in these situations with the telescopic boom lowered and therefore secured.





### Improved performance due to VarioBase® Plus

A powerful quick-erection crane carries lots of ballast with an axle load of just 12 tonnes. That enables it to tackle a large proportion of crane jobs without requiring additional ballast transport, making it particularly economical. For the new LTM 1110-5.1, that means up to 13.4 tonnes of counterweight – an outstanding value in the 5-axle class.

Familiar and time-tested – the VarioBase® variable support base generates higher lifting capacities in the areas above the outriggers. However, our engineers went a step further with the new 110-tonne crane – the rear outriggers have a double-stage design and achieve a support width of 8.3 metres. Although that is only 0.65 metres more than at the front on each side, the increase in performance over the rear outriggers is enormous, for example an increase of 29 per cent with a 12-tonne axle load configuration. We call the combination of the trapezoidal and variable support base VarioBase® Plus.



Find out more:  
[www.liebherr.com/lm1110](http://www.liebherr.com/lm1110)



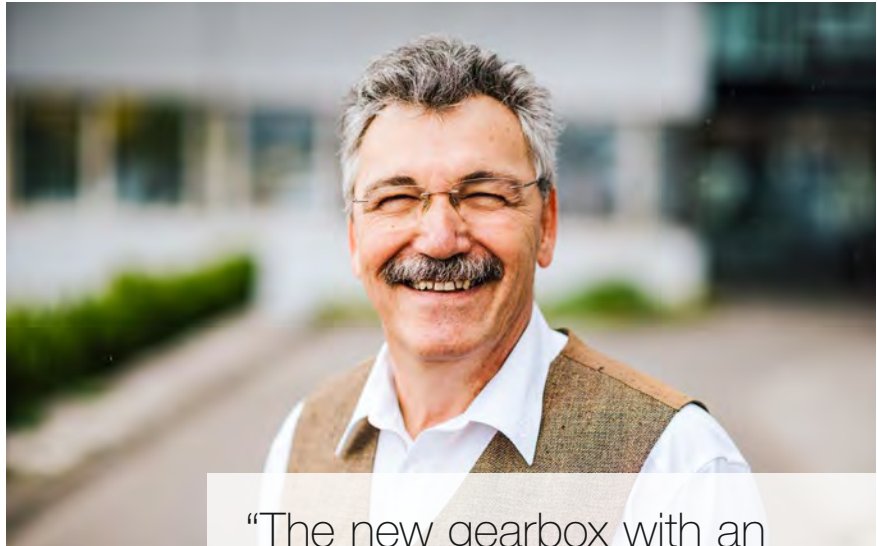


### TraXon DynamicPerform – manoeuvring made easy

The new ZF-TraXon gearbox is used to transfer the power to the crane's axles. As with its predecessor, the AS-Tronic, the 12 gears are changed automatically. ECOdrive is a new feature. The additional eco mode delivers enhanced drive properties which both save fuel and reduce noise. Meanwhile, Hillstart Aid makes starting on gradients easier.

The “DynamicPerform” version of the TraXon gearbox with an oil-cooled multi-disc clutch is used on the new LTM 1110-5.1, its first outing on a mobile crane. The new module prevents the clutch from overheating and therefore enables prolonged, wear-free manoeuvring, even if it creates high friction energy. The new gearbox enhances starting and manoeuvring actions to the same level of a gearbox with a torque converter.

“For our heavy crane vehicles with up to five axles, we believe that we will enjoy massive benefits from the fact that we supported ZF in the development of the TraXon DynamicPerform and its integration into mobile crane drivetrains. The new gearbox is pioneering”,



“The new gearbox with an oil-cooled multi-disc clutch is pioneering.”

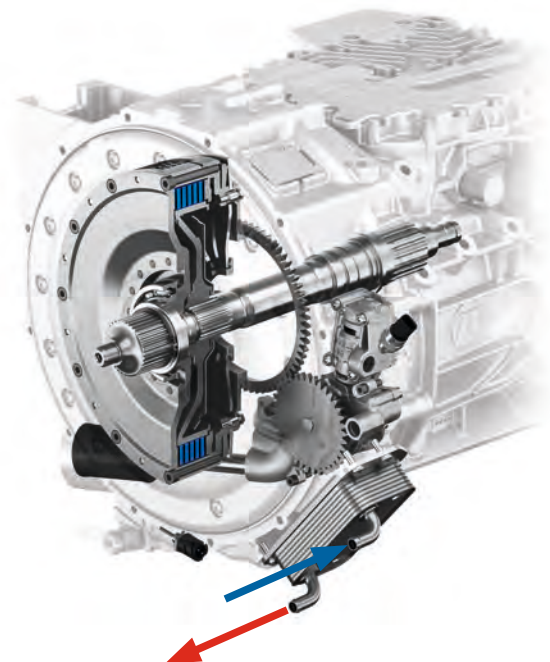
Mikica Rafailovic, Chassis Department Manager

says Mikica Rafailovic, Chassis Design Department Manager at Liebherr. He has been with Liebherr and involved in the development of technologies for the substructure of mobile cranes for 41 years and has played a leading role in several groundbreaking innovations

such as the hydro-pneumatic Niveauomatik suspension, active rear axle steering and the single-engine concept with a mechanical shaft for powering the superstructure.

# TRAXON

DynamicPerform



#### Benefits

- Wet discs guarantee long term, wear-free manoeuvring.
- Cooling oil circuit prevents overheating and downtimes.



# **Lake crossing to see the Fairytale King**











## A crane job between splendour and megalomania

It may surprise you to learn that there are alternatives to Neuschwanstein. If you want to find out a little more about King Ludwig II of Bavaria and his (credibly recorded) eccentricity, you could do worse than travel to an island in Chiemsee in Bavaria, where the crowds will be somewhat thinner. Visiting Herrenchiemsee New Palace, modelled on the Palais de Versailles in France, will leave you just as open-mouthed at the world of make-believe created by the Bavarian Fairytale King as travelling to Neuschwanstein Castle, the most famous of the four Royal palaces which Ludwig had built during his 22-year reign.



Every autumn, when the hordes of tourists at Herrenchiemsee New Palace start to lessen and the quieter time is used to get to grips with the dust on the windowsills and chandeliers, the palace park outside is made ready for winter. That does not just mean clearing thousands of plants. The annual ritual also includes protecting the three enormous and quite splendid fountains in the royal gardens. To protect these stone fountains adorned with numerous figures from snow and moisture, every autumn a scaffold hood is built over them, which is then covered with tarpaulins. And every autumn, before the first night frosts, in the early morning a small mobile crane can be seen on the north bank of the largest lake in

to the island. Once there, the romantic journey continued – past idyllic paddocks and proud outbuildings. Through swirling mist and through a large section of the enormous forest, which covers the majority of the island, featuring mighty Douglas fir trees. Then the crane reached its destination – the palace of King Ludwig II of Bavaria with its extensive parkland.

The scaffolders, with their last cups of breakfast coffee still in their hands, were waiting for “their” crane in front of the palace facade bathed in the blue

outside the enormous empty fountains. This meant that a significant radius of around 25 metres was required to hoist the loads, some of which weighed over two tonnes.

Dariusz Jagiello extended the boom on his Liebherr crane to a length of 45 metres so that the roller head could reach over the centre of the fountain. With the load on the hook, the experienced crane operator proceeded with extreme caution, precisely following the instructions of the scaffolders. Centimetre precision was required in

Just time for a snapshot of his crane with a royal backdrop...

...for Dariusz Jagiello, the BKL crane operator.



Bavaria, waiting for the ferry to take it to Herreninsel. To complete a crane job for the Fairytale King.

Last year, mobile and construction crane logistics contractor BKL, based in Forstinning near Munich sent one of its mobile cranes to the “Sea of Bavaria”, Chiemsee, around two hours drive away. As dawn broke, a Liebherr LTM 1060-3.1 mobile crane was transported over the lake on the small ferry

of morning. They had bolted together the protective hoods, each made up of three large pre-assembled parts, over the previous few days in the palace garden. These now had to be hoisted by the crane over the enormous ornate fountains, which measure up to thirteen metres in height. The protective hoods for the two largest of the fountains are each composed of three large pre-assembled parts. The crane could only be set up for the job

the manoeuvring to place the frames over the elements, which were already in position. They actually had to be connected to each other by the fitters whilst they were still floating in the air. As soon as a metal frame had been completed, the crane pulled long plastic tarpaulins to the apex of the scaffold dome. Covered like this to protect them from snow and rain, the palace fountains pass the winter snug and dry. Shortly before the visitor numbers to the palace and island start to increase again in spring, the winter covers are removed from the fountains (once again using a powerful crane) to unveil them in their full glory again for the annual 400,000 visitors.



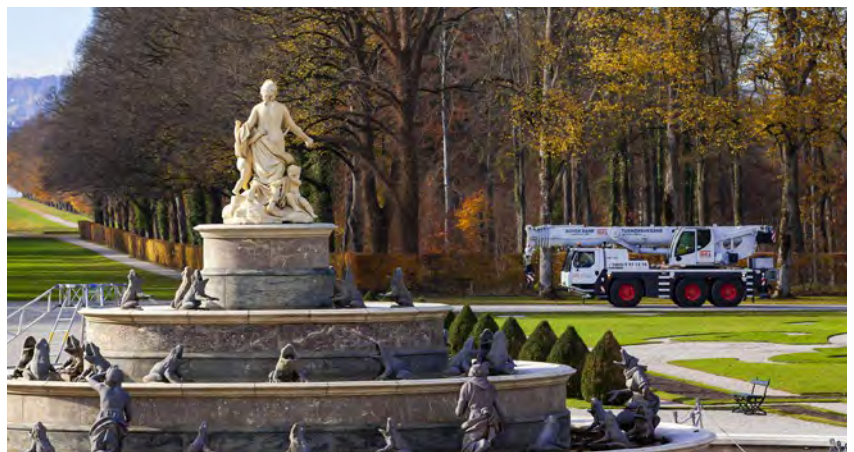




Although the fountains in the park are extremely impressive, the palace itself houses plenty of extravagant splendour, making it the focal point of any visit to Herrenchiemsee, including the imposing hall of mirrors, which is 98 metres long, the master bedroom crammed with gold and never used by Ludwig and the grand staircase, which is more than a match for the Pendant in Versailles. With so much pomp and glory, however, it should also be mentioned that although the exterior of the palace has been completed, the interior has remained unfinished. Twenty rooms in the building feature breathtaking decorations – the rest is a shell. And it has been like that for almost 140 years.

But because you, our readers, are interested in hoisting equipment, we must not forget to mention another highlight of Herrenchiemsee New Palace at this point – the so-called Magic Table. This curiosity is a dining table (gilded of course) for his Majesty which can be lowered into the room below. The unsociable monarch had this luxurious food elevator installed in his royal apartments to ensure that he could remain undisturbed whilst dining without even having to clap eyes on service personnel. Using a sophisticated hoisting mechanism, the royal table could be raised into the king's dining room after being readied in the cellar.

Sadly, however, crane operator Dariusz Jagiello had no time for all the beauty and splendour of the palace during his romantic trip into the Royal Bavarian past. The work to cover all the park fountains took the whole day. So instead of a tour around the halls and rooms of Herrenchiemsee New Palace, finding out more about the Fairytale King and his passion for grandeur, Jagiello had to make do with taking a snapshot of his Liebherr crane on his smartphone in front of the royal palace before the two of them were transported back to the mainland on the evening ferry. However, it is likely that not even His Royal Highness himself had enough time to enjoy the grandeur of the most expensive of all his palaces. In fact, Ludwig II only resided on the island for a total of ten days.









# Over mountains and through valleys in green and yellow









## Premiere with an Alpine

The era of one of the most successful crane models ever produced at the Liebherr plant in Ehingen is slowly but surely coming to an end. The thousandth LTM 1200-5.1 mobile crane recently rolled off the assembly line at the crane factory. The last of this model is scheduled to be built and delivered in just a few months' time. However, its successor has not just been waiting in the wings for some time, it is in fact also already conquering construction sites around the world – the Liebherr LTM 1230-5.1. The new crane celebrated its premiere in April in Switzerland.





“Curtain up!” was the call around a year ago when Liebherr unveiled the new mobile crane to its guests who had arrived in numbers at its customer days. And the new model equipped with more power and lots of modern features was immediately welcomed by the trade public. Angela Hess-Christen and her brother Adrian Christen from Switzerland were among those who had travelled to Ehingen in June last year to attend the event when the prototype finished in black was proudly unveiled. “As its 75 metre telescopic boom makes this mobile crane ideal for all the construction crane erection jobs we receive, we decided on the spot to place an order for this innovative machine,” says Hess-Christen, who holds the position of Chair of the Board of Directors of Christen Holding AG based in Küssnacht, Switzerland.



Everybody's happy – handover of the first series model of the LTM 1230-5.1 in Ehingen. From left: Marc Bollinger (Liebherr-Baumaschinen AG), Angela Hess-Christen (Christen Holding AG), Christian Betschart, Adrian Christen (Christen Logistik AG), Thomas Fanger (Liebherr-Baumaschinen AG).

So it made perfect sense that the first model in this new crane series was handed over to Christen in April with a small celebration. Adrian Christen, who holds the position of Chairman of the Logistics Division at the company came with his sister to Ehingen, together with Christian Betschart, the future crane

LTM 1200-5.1 that is only six years old. Although we normally do not replace our cranes until they are around ten years old, in this case the increase in performance and new technology made up our minds.” The VarioBase® variable support base, twenty percent higher lifting capacity and the fact that the telescopic boom is three metres longer are just some of the features of the new development. Furthermore, a 43 metre jib enables the LTM 1230-5.1 to reach a hook height of 111 metres – remarkable for a crane in its lifting capacity class.



“What's more, the crane is absolutely lovely to drive.”

Christian Betschart, crane operator of the new LTM 1230-5.1

operator, to take delivery of the LTM 1230-5.1 which had been painted in the company's green and yellow colours. As far as Adrian Christen was concerned, the decision to purchase the crane at the time was a quick one: “It is replacing an

But before the new green and yellow monster was able to show off its strengths on Swiss construction sites, the brand new mobile crane was driven past Lake Constance to Reiden in the Canton of Lucerne. This small town is where Liebherr has its sales and service outlet for Switzerland. For two whole days, Matthias Oberli, a Service Technician at Liebherr, provided the future crane operator with extensive training and familiarised him with his new tool in minute detail. Christian Betschart was also delighted by





A great show – the mobile crane placed the little Cessna in the water at the Swiss Museum of Transport in Lucerne in front of a whole host of guests.

the fact that the control elements in the crane had not undergone any massive change despite it having lots of new features. “That is really good for us drivers. I also appreciate the greater safety that the new crane delivers through VarioBase®, for example.”

Betschart and his crane underwent a baptism of fire around a week later. It was a small “Cessna 185” seaplane that the

team from Christen had to place on the hook – and at a gross weight of around two tonnes, it was hardly a challenge for the crane which had plenty of capacity in reserve. But the attractive location at the site of the Swiss Museum of Transport in Lucerne, the most popular museum in Switzerland, and a large number of spectators made the moment one to look forward to. Against a backdrop of aircraft, locomotives and other high quality exhibits, inserting the Cessna into a large basin



not only marked the opening of the “Switzerland in the Air” exhibition, but also provided a worthy occasion for the new crane to perform its first job.

The new member of the Christen fleet has now completed a number of other jobs. The erection of a construction crane on the day after its premiere at the museum was a more common event in the everyday life of an LTM 1230-5.1. After the first few weeks in his new machine, Betschart, who had been driving the Liebherr 200-tonne crane for the last few years, was delighted by the “lots of small details” which, he reported enthusiastically, make his working life significantly easier. “What’s more, the crane is absolutely lovely to drive.”, says Betschart with deep satisfaction.

To ensure that this satisfaction from its business partners continues in the future, Liebherr is renowned for attaching a great deal of value to customer support and service. Around 290 men and women at the service centre in Reiden and in Dailens, the outlet for the French-speaking part of the country, together with service technicians on sites, provide care and support for their Swiss crane and construction machinery customers. Liebherr Ehingen GmbH alone has around 150 companies with a total of 300 mobile and crawler cranes on

its customer list. And all of them want high quality after-sales care. Adrian Christen is in a good position to assess the quality of this support: “In general we are very satisfied with Liebherr and the staff at the service centre in Reiden. We are taken very seriously as customers and that is very much appreciated by our mechanics as well.”

Christen and Liebherr have had a close, fruitful partnership for decades. In 1952, three years after Swabian mechanical engineering pioneer and company founder Hans Liebherr had designed his first rail-mounted construction crane in Kirchdorf, Alois Christen-Reichmuth senior laid the foundation stone for the current group of companies based at the foot of Mount Rigi. Business relationships were established very early with the Swiss company also repeatedly buying excavators and construction cranes from Liebherr. Mobile cranes were then added to this list in the mid-seventies. Around 70 years later, sole trading company “Alois Christen, Baugeschäft” in Küsnacht on Lake Lucerne has now become a group of companies with four divisions and a workforce numbering almost 300. The Logistics Division, which is active in Switzerland and neighbouring countries, has a staff of 45 currently operating nine mobile cranes with lifting capacities of up to 400 tonnes.



Liebherr service centre in Reiden





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# Twin hoist





## From the road into the water

South German crane and transport contractor SCHOLPP obtained support from Kehl in the State of Baden-Württemberg for the first job for its brand new Liebherr LTM 1450-8.1 mobile crane. Together with an identical mobile crane operated by MSG Krandienst, enormous motors designed for power generation were loaded onto a freighter in tandem hoists.



The heavy load out quay at the Heilbronn industrial port facility was the first destination for the shiny new mobile crane operated by SCHOLPP Kran & Transport GmbH. It was driven straight to its first crane job from the Liebherr crane factory in Ehingen, which it was scheduled to complete together with another LTM 1450-8.1 crane. The new mobile crane, freshly painted in SCHOLPP's red livery, and the blue crane from MSG Krandienst GmbH hoisted the motors weighing around 165 tonnes into the hold of a barge.

Manufactured by mechanical engineering company MAN in Augsburg, the massive units had covered the route to Heilbronn over the course of three nights on country roads. The load then had to be transported to Mannheim by waterway from Heilbronn to its final destination due to a lack of over-land routes with sufficient load capacity.





“The thing is really good.”  
Denis Hedl, crane operator at SCHOLPP Kran & Transport GmbH

The first job for the new addition to its crane fleet arrived sooner than expected for SCHOLPP. That meant that the crane personnel training in Ehingen had to be stopped after two days and continued on the heavy load out quay in Heilbronn. No problem for the Liebherr after-sales service team – Service Engineer Tobias Hunger provided advice and support for the two crane operators, first during training at the factory site and then during their first job with the new machine. The two crane operators Aingeru Tejedor and Denis Hedl were able to rely on the service engineer from Liebherr during both the set-up process and the operation to load the massive motors.

SCHOLPP has stationed the new LTM 1450-8.1 at its Stuttgart site. In addition to all types of handling and crane work, the modern mobile crane, with its 85 metre telescopic boom, will also frequently be tasked with erecting construction cranes. Crane operator Denis Hedl was very impressed with the new mobile crane. “Not only is the 450-tonne crane very easy for the crane operators to use, moving around it is also very safe and really comfortable due to the platforms, steps and railings. The thing is really good.”



After-sales service is very important – Tobias Hunger from Liebherr (left) supports the crane personnel with the first set-up process.



Literally sparkling new – the gleaming hook block from the Ehingen crane factory has that freshly polished look.



**Max power**



SüdLeasing  
Ihr Finanzierungs





LIEBHERR

LTM 1650-8.1

LTM 110-6.1



# The ultimate machine on eight axles!

**Children with famous parents often have a hard life. They are under heavy pressure from birth and are expected to be successful. That is exactly the situation facing the new LTM 1650-8.1, which Liebherr unveiled at the Bauma trade fair. And it's all because it is the successor to the living legend that is the LTM 1500-8.1. With a volume of almost 600 units, it is already the best-selling large crane of all time.**



Of course, the LTM 1650-8.1 carries the same concept as its predecessor in its genes – maximum performance on eight axles. The result is impressive – it will be able to complete hoisting work in the 700-tonne class or even higher with ease. It therefore has a nominal lifting capacity of 700 tonnes. Depending on its equipment package, the new crane is between 15 and 50 percent more powerful than the old one. Technical progress has made this possible since, after all, a great deal of work has been done in this respect since the development of the LTM 1500-8.1 20 years ago.

The new crane has also inherited something else from the

LTM 1500-8.1 as it is also available with two telescopic boom lengths. 54 metres or 80 metres. Customers can also buy both lengths and interchange them easily by replacing telescope section 3 including the roller head with telescope sections 3 to 5. The concept has proved to be a successful one.

Our designers also used the time-tested technology from the LTM 1500-8.1 for the Y-guying on the new LTM 1650-8.1 – and although they upgraded the single-rope system to achieve better performance, the benefit of easy handling was retained. The experts from Ehingen focused on achieving an easy, fast and safe set-up process during the design process.



### Two 8-axle cranes with the very latest technical features

We now have two modern 8-axle cranes in our product portfolio. At the Bauma 2016 trade fair, we caused a stir with an 8-axle mobile crane designed to deliver maximum flexibility and fast set-up times – the LTM 1450-8.1 travels with its 85

“To minimise the set-up time, however, the rear outriggers are installed as complete support boxes in a single hoist and connected using quick-release couplings.”

Hans-Dieter Willim, Retired Design Manager



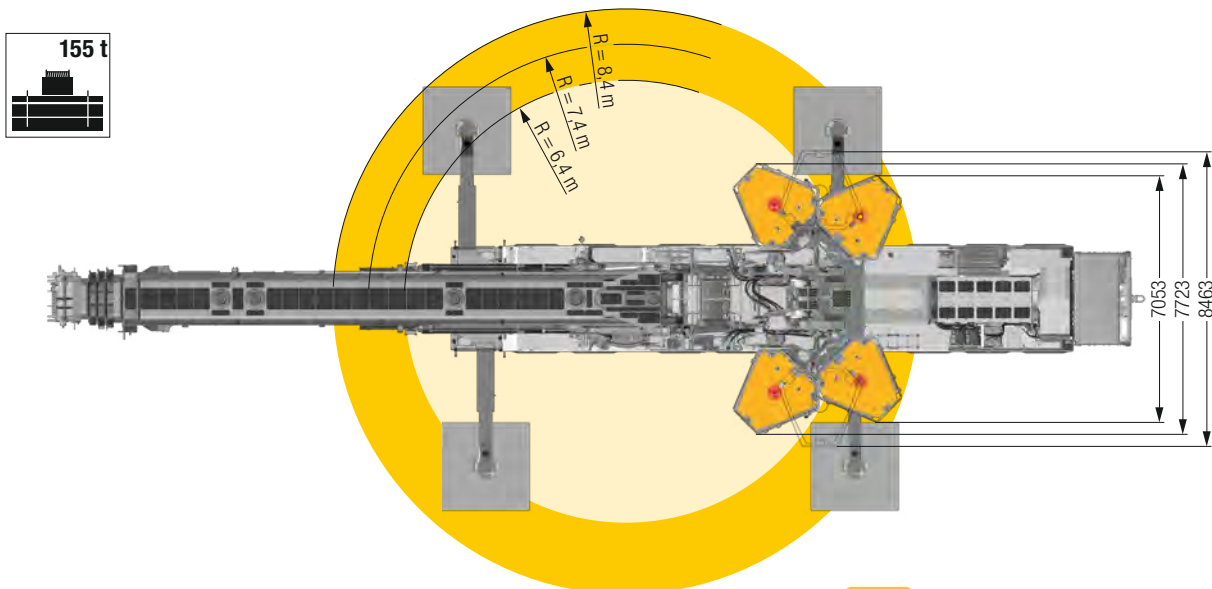
metre telescopic boom and all four supports on public roads with an axle load of just 12 tonnes. In designing its new 8-axle crane, we focused on achieving maximum load capacities. The LTM 1650-8.1 travels with an axle load of 12 tonnes complete with its 54-metre telescopic boom and the front outriggers. “To minimise the set-up time, however, the rear outriggers are installed as complete support box in a single hoist and connected using quick-release couplings, an idea we had some years ago”, says Hans-Dieter Willim, who helped design crane technology at Liebherr for four decades.

As with all new developments over the last few years, our engineers ensured that we can offer the LTM 1650-8.1 with a

very wide range of transport weights and axle load versions to ensure cost-effective global mobility for axle loads both above and below 12 tonnes.

#### Greater flexibility of use with VarioBallast®

High performance normally requires a large ballast radius. But often there is simply not enough space on building sites. This means the ballast radius must be as small as possible. We meet this challenge with our VarioBallast® innovation. The new LTM 1650-8.1 has adopted this time-tested system from the LTM 1450-8.1 – the ballast radius can be infinitely adjusted using a simple hydraulic slewing mechanism – between 6.4 and 8.4 metres on the LTM 1650-8.1.



Find out more:  
[www.liebherr.com/itm1650](http://www.liebherr.com/itm1650)





The laws of physics never change, but for decades cranes have been becoming more and more powerful.  
How is this possible?

**The LTM 1500-8.1 dominated the market for large telescopic cranes for two decades. Its successor, the new 8-axle LTM 1650-8.1, is significantly more powerful although it is based on the same crane concept and has approximately the same crane weight. That enables it to break into the lifting capacity range which was previously the domain of 9-axle cranes. We asked Bernd Boos, Telescopic Crane Design Manager, how this is possible.**

“Both cranes do indeed have around the same weight in terms of their crane structures. However, a good deal of technical work has been done in the twenty years between the design phase for the LTM 1500-8.1 and the one for the LTM 1650-8.1. For example, we now have fine-grain structural steel types which are much more efficient. In fact, the telescopic boom on the LTM 1500-8.1 is made of S 960 with a yield point of 960 N/mm<sup>2</sup>. On the LTM 1650-8.1, on the other hand, we use S 1300 steel with a yield point of 1300 N/mm<sup>2</sup>. That means that steel of the same weight has a 35 percent greater load capacity. Even better coordination of the boom profiles with the improved guying equipment has enabled us to increase lifting capacities even further.

Experience plays a major role in this development. We are always learning. For example, over the last few years we have collected a great deal of experience with thin-walled boom profiles and have managed to improve our calculation models using the finite element method.

Furthermore, we have new manufacturing methods available today. It is now possible to manufacture longer metal sheets for the boom profiles which means that fewer welds are required. That also means less warpage in the material.

Two innovative Liebherr developments have also made a significant difference – the single-engine concept and VarioBallast®. We also made a conscious decision to use the single-engine

concept for the LTM 1650-8.1 because the weight reduction caused by not having a superstructure engine can be used for the load-bearing components. VarioBallast® can improve performance since the increased ballast radius



results in an increase in the moment of the counterweight and also relieves the strain on the vehicle's chassis by reducing torsion. And the small ballast radius is perfect for constricted operating conditions.

These continuous improvements show that we are systematically working on pushing the bounds of physics.”







# Heavy handling







LIEBHERR

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BECKE

TSS1030





## The LR 11350 & LR 11000 working in tandem

The industrial port in Kehl in Baden-Württemberg, a small border town on the German side of the Rhine near Strasbourg, was opened in May 1900. It was the scene for an impressive event this year as well – two crawler cranes moved cargo weighing around 900 tonnes onto a barge in a spectacular tandem hoist. “Never before in almost 120 years of its history has such a heavy item been handled at our Rhine port using cranes”, explains





**Jürgen Preiss. And Preiss, a member of the port management team, knows exactly what he's talking about. The load that he is referring to was the core piece of a gigantic tunnel drilling machine, which was built by Herrenknecht based in Schwanau, Baden-Württemberg. Two powerful crawler cranes from the Liebherr Plant in Echingen were required to tackle this job.**





Mission accomplished – the tunnel drilling machine is stowed on the 110 metre barge. It will take it five days to transport its load to Rotterdam.

One LR 11350 crane and another from the LR 11000 series were on show in Kehl, representing the second and third-placed cranes in the current rankings of the most powerful Liebherr crawler cranes. Because it did not have a crane of its own in this class available, the German subsidiary of Dutch heavy load specialist Mammoet engaged for the job had to obtain the LR 11350 from crane rental company van Adrighem. The 1000-tonne crane was hired from Wiesbauer, a crane service provider based in southern Germany.

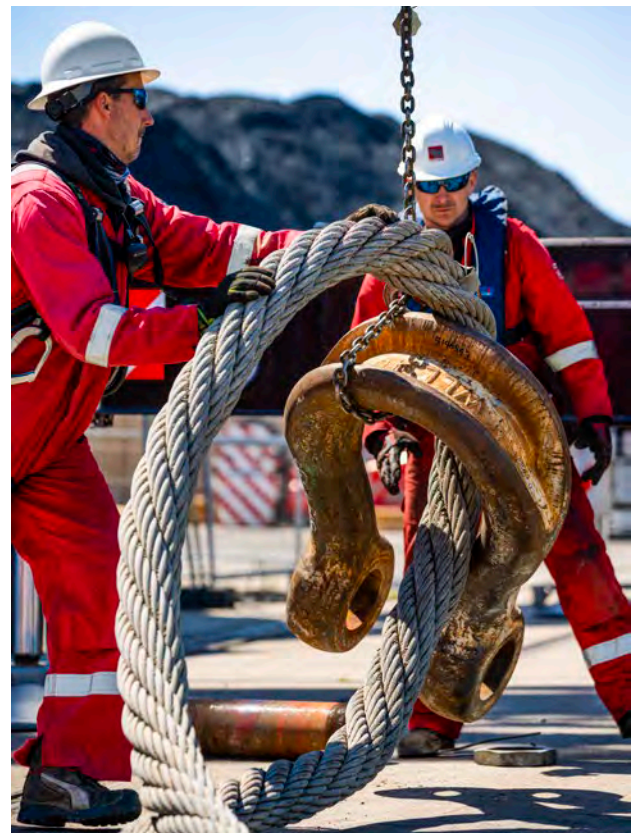
Overall, therefore, there were two cranes at the site with a total lifting capacity of 2350 tonnes or an impressive 37,919 tonne-metres of load moment – in other words a great deal of crane power in a small space. The two heavyweights had arrived on barges using the inland waterways. Whilst the components of Wiesbauer's crawler crane were put on board for the short trip from Mannheim, the LR 11350, still in the livery of its original owner, Scottish crane contractor Weldex, was loaded onto a barge in Rotterdam from where it was shipped to southern Germany.

### **A total of 1600 tonnes of ballast used**

When they arrived, however, the crawler cranes did not only have to be assembled and prepared. In addition, the various components of the nine-metre diameter tunnel drilling machine, which they had to load, had to be transported from the Herrenknecht factory in Schwanau 30 kilometres away and then assembled at the Rhine port of Kehl. The heavy-weight components included the core piece of a tunnel

drilling machine, consisting of the front blade area with all its components and installations such as the cutting wheel, drive and erector, a device for installing the tunnel shuttering. The handling and transport work required the installation of a so-called blade cradle underneath the earth drill.

This blade cradle also contained the fastening points for the attachment equipment on the two crawler cranes. This is where the extremely heavy steel ropes, as thick as a man's leg, were secured using massive shackles. The experienced team from Mammoet required several hours to hoist the machine onto the barge as placing a further 300 tonnes of steel onto the suspended ballast pallet of the LR 11350 during the slewing process proved to be an extremely time-consuming undertaking. A considerable number of counterweights was required since the load had to be lowered into the barge's hold with a radius of



High calibre – enormous shackles and gigantic steel ropes are required for handling the attachment equipment.



around 30 metres – during the final phase of the hoist, the two cranes had a total of 1600 tonnes of ballast.

### Structural challenge

This radius resulted from the large distance between the two cranes and to the barge and was based on the structural strength of the loading platform. As a result of the enormous ground pressure, the load capacity of the ground in this area had to be recalculated to find safe areas for the crawler cranes to be positioned. It was a masterful performance by the two heavy-weights to achieve this significant radius with an imposing gross load totalling around 950 tonnes on the hook.

The subsequent journey on the barge to the Dutch coast then took five days. When it arrived at the port of Rotterdam,

the large drilling machine was unloaded by a floating crane. In November it will then be shipped over the English Channel to cut a tunnel in Great Britain.

The two massive crawler cranes, with their lattice booms projecting around 60 metres into the sky, naturally attracted a whole host of “crane spotters” to the Rhine. For these fans of crane jobs and heavy haulage of all kinds and their cameras, a visually impressive tandem job like the one in the Rhine port of Kehl was a massive, yet rare highlight. “It’s like Christmas and Easter coming together,” said one young man from the crowd. And his friend continued: “A 11350 and a 11000 – I’ve never had so much power in front of my lens before. Never.”

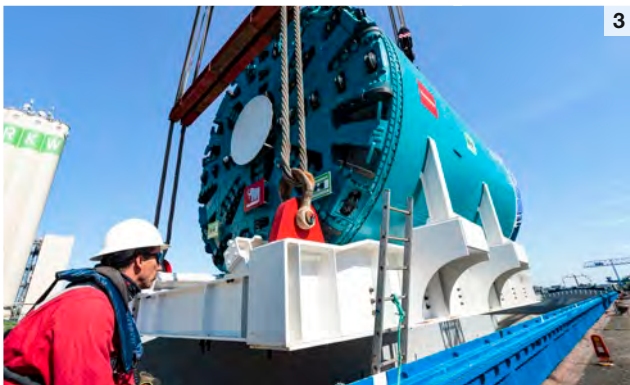
The structural strength of the ground had to be recalculated to ensure it could support the total of 1600 tonnes of ballast



1



2



3

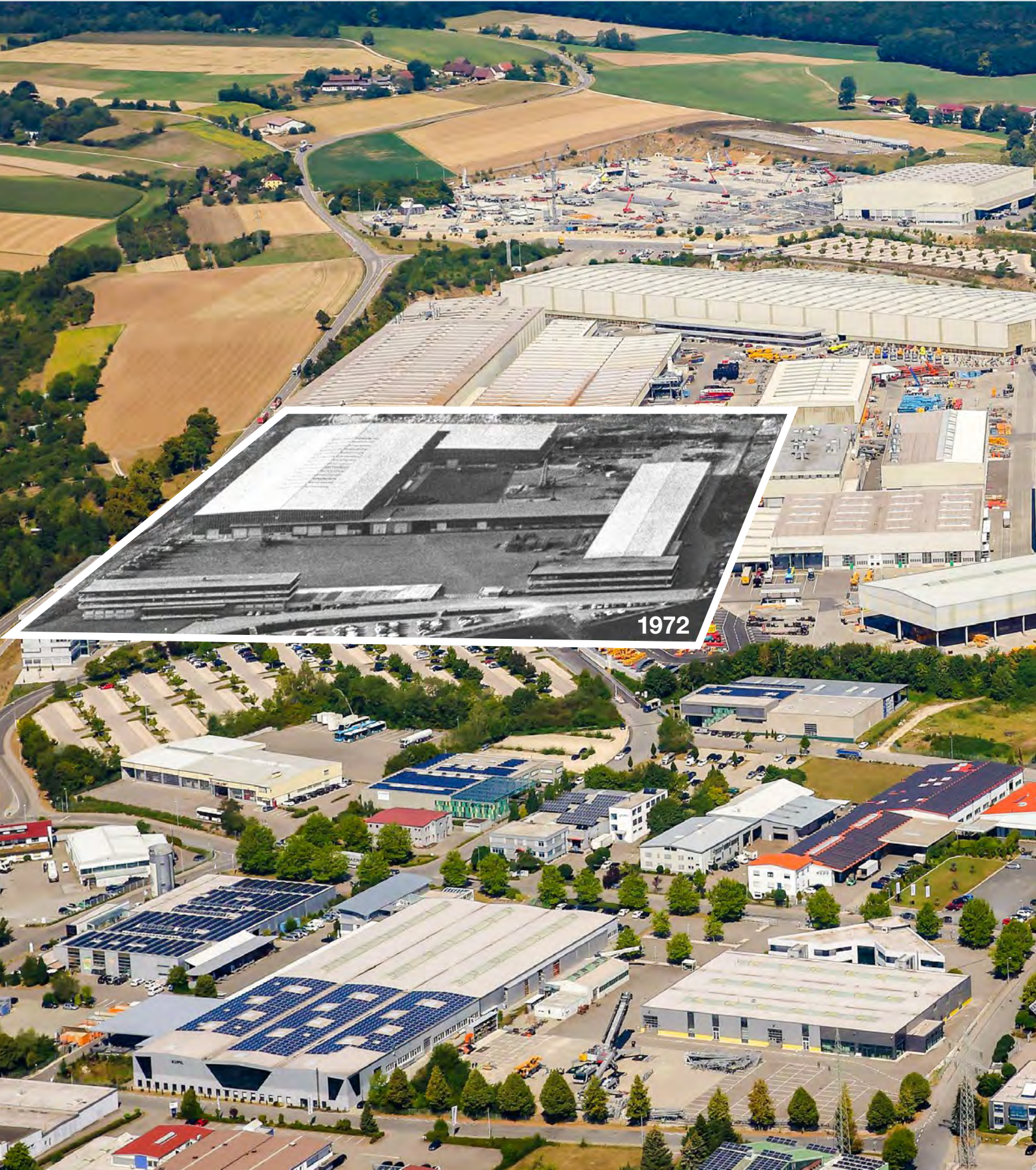
1 A welcome – the forks on the teleloader lend a hand for detaching the steel ropes which are as thick as a man’s leg. The double hook block on the LR 11000 actually weighs 14 tonnes.

2 Group photograph in front of the drilling machine – Dr.-Ing. Sören Müller, on the right, managed and planned the job in the Rhine port of Kehl for Mammoet Deutschland.

3 Precision and care – marshals send commands to their colleagues in the crane cabs by radio.



# In focus













# **A (not really very) small success story from Swabia**



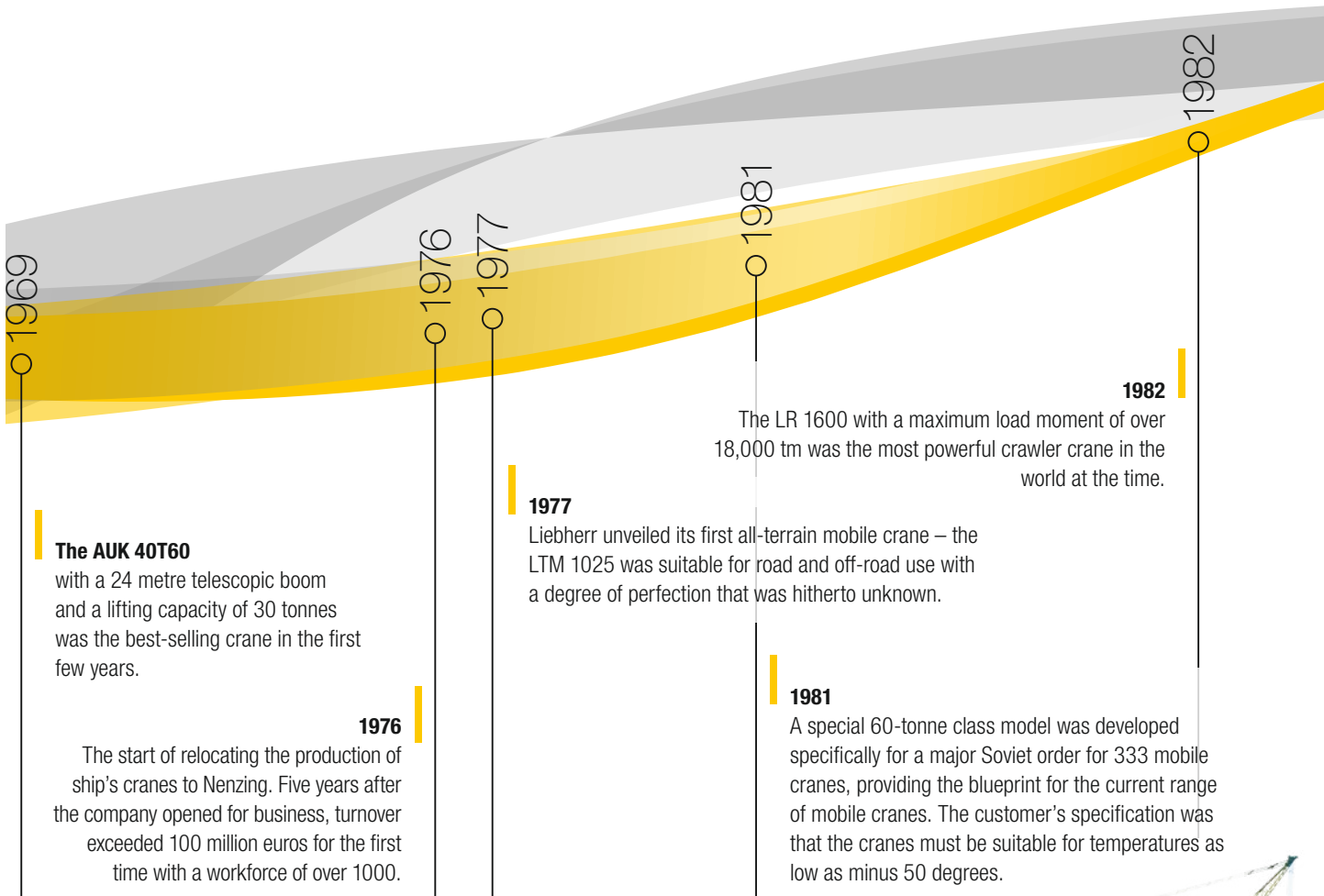


# Half a century of mobile cranes from Ehingen

Every second all-terrain mobile crane manufactured in the world comes from Swabia. To be more precise, they come from Ehingen, a town with a population of 20,000 on the Upper Danube, renowned for 1000 years of history and its pretty, rural surroundings. Those passing through will immediately be struck by the large number of massive crane booms which tower over the town.

This is where Hans Liebherr founded Liebherr-Werk Ehingen GmbH 50 years ago on 22 February 1969. Initially, the mobile crane market was still dominated by the names of other manufacturers. However, its innovative, high quality products, customer focus and reliability enabled Liebherr to become the global

market leader. Last year a 3500-strong workforce manufactured over 1800 cranes. The current portfolio consists of 40 different crane types with telescopic and lattice booms on mobile and crawler chassis. The following contains some of





the highlights from the company's history and statements from customers, partners and industry insiders.

1989

**Liebherr Computed Control**

In 1989 Liebherr developed its own crane control system – the most modern system on the market.

1996

**Liebherr created a pioneering innovation** in the form of the TELEMATIK single-cylinder telescoping system.

2000

**2000**

The largest factory expansion in the company's history with the workforce exceeding 2000 for the first time, manufacturing more than 1000 cranes.

**At the Bauma trade fair in 2007**

Liebherr not only unveiled the most powerful telescopic crane in the world, it also featured another superlative in the form of the longest telescopic boom on the market at 100 metres.

2007

**2010**

The new flagship LR 13000 with a maximum lifting capacity of 3000 t with a radius of 12 m saw conventional crawler cranes create a whole new set of dimensions. It is the highest free-standing crane in the world at 248 metres.

2010

**Record figures from 2018:**

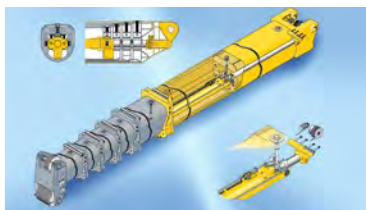
3500-strong workforce manufactured more than 1800 mobile and crawler cranes, recording a turnover of 1.94 billion euros.

2018

**2019**

Liebherr-Werk Ehingen GmbH celebrated its 50th anniversary

2019





"The Liebherr Plant in Ehingen has become part of our town's make-up and for many people the products, which can be seen for miles around, are an expression of a booming region with good jobs. Success and growth, supported by stamina and perseverance are the main features from the history of this company. To mark the 50th anniversary of Liebherr-Werk Ehingen GmbH, I would like to express my congratulations and the hope that it continues to have the foresight it requires and lots of the success."

Alexander Baumann, Mayor of the Town of Ehingen, Germany

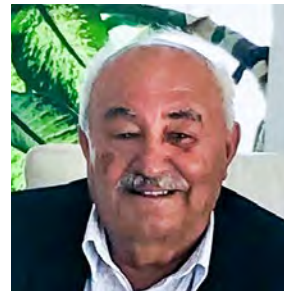


"There is no better model for global leadership and succession planning than the Liebherr Company. I have worked with members of the Liebherr team and family since 1986 and continue to be impressed with their commitment to their employees, their industries and their customers. It's an honor to work with such a world class organization and see that each generation has succeeded in continuing the innovation and growth that will lead them for the next 100 years. Congratulations to the Liebherr family and the entire team."

Frank G. Bardonaro, CEO Maxim Crane Works, USA

"First of all, we at the Sarilar Group would like to congratulate you on your 50th anniversary and wish you another 50 years of success. Our company has been in the market for almost 30 years together with the Liebherr brand. During our collaboration of almost 30 years we have felt and enjoyed the unique nature of the company and its quality. And every year its performance has grown with new machines and it has been a privilege for us to be involved. Thank you very much to the Liebherr family for the excellent collaboration."

Hanifi Gürbüz, Owner of Sarilar, Turkey

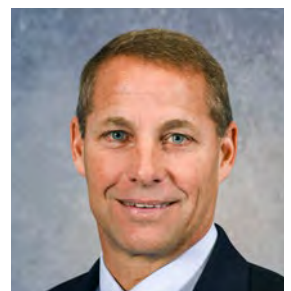


"Since our first Liebherr mobile crane purchase in 1998, an LTM 1080, we have continued to invest in Liebherr products purchasing over 80 Liebherr cranes over the last 21 years. We have complete confidence in both the product and the aftersales service and I firmly believe that the success of Whyte Crane Hire Ltd has been testament to the high quality of the cranes that come out of the Ehingen factory. Congratulations to LWVE on 50 years of leading the industry and enabling us to deliver first class products and service to the crane-hire industry."

Lawrence Whyte, Owner of Whyte Crane Hire Ltd., Scotland

"Congratulations on your 50th anniversary! During my career at Manitowoc, Liebherr was a respected competitor due to their solid business model and great culture. Liebherr contributed to the success of the entire heavy construction equipment industry and positively influenced us to continually innovate our product offerings and enhance our customer service. Our entire industry, and ultimately our customers, have benefited from the stability and longevity of Liebherr. Best wishes on the journey to another 50 years."

Glen Tellock, former CEO Manitowoc, USA





"We buy cranes from Liebherr because of the very high level of quality, after sales service and trust. This fits to our strategy to operate with a maximum focus on safety, efficiency and reliability to minimize the risk of incidents and accidents. Liebherr as a trustworthy partner with its closely-knit service network supports our leadership in the Scandinavian crane hiring market as well as our international activities."

Jens Engaard, CEO BMS Group, Denmark



"First of all, congratulations on Liebherr 50th anniversary. We use large mobile and crawler cranes from Liebherr since 2005 and I am impressed by their performance and technology. Therefore, Tokyo Juki would like to continue and even intensify the partnership with Liebherr."

Taku Tsuruoka, Managing Director of Tokyo Juki, Japan

"The Franz Bracht Group would like to voice its congratulations for 50 years of performance, strength of will and success. The massive competence in Ehingen continuously creates innovations and the company always has its eye on creating added value for customers. A special partnership, which connects the generations."

Dirk Bracht, Managing Director of Franz Bracht Kranvermietung GmbH, Germany



"What Liebherr-Werk Ehingen GmbH is today just shows what can be achieved in 50 years. It is not possible to describe the scale of that achievement in one sentence. My very best wishes to the Liebherr family, and by that I mean both the owners and the workforce."

Jose Manuel Garcia, President of the ROXU Group, Spain

"Liebherr Crawler Cranes are the strength of the Buckner HeavyLift Cranes fleet. The Liebherr product and performance is a key factor in our success. We look forward to the next 50 years together."

Doug Williams, CEO Buckner Companies, USA



"Liebherr has positively evolved the industry using technology, ingenuity and quality that reflects in their products combined with customer commitment. Adding to this recipe is hard work and growing community work force leading to a great success."

Hillary W. Pinto, Owner of Al Faris Equipment Rentals LLC, United Arab Emirates



# Technical progress and entrepreneurial continuity the recipe for success



**In the 50 years of the company's history, Liebherr in Ehingen has only had two Technical Directors. This is an example of entrepreneurial continuity – a feature to which Liebherr has always attached a great deal of value. It was a special honour for us to be able to talk to Rudolf Becker, who was responsible for design between 1971 and 1994, and his successor Dr Ulrich Hamme about the development of Liebherr mobile and crawler cranes.**

## **Mr Becker, what experience did you have in the mobile crane industry when you started at Liebherr in Ehingen in 1971?**

*Rudolf Becker:* I came from Demag in Düsseldorf, where I had been Senior Department Manager and Authorised Signatory for the Product Development Department for seven years. Prior to that I had worked for Gottwald for eight years as Group Manager in the Design Department. Both these companies started to develop and build cranes suitable for driving on public roads in around 1965. Demag also started designing crawler cranes with lifting capacities of up to 80 tonnes. If Dr Hans Liebherr had not employed me personally, I would not have come to Liebherr.

## **How did you assess the state of the art of Liebherr mobile cranes at the time?**

*Rudolf Becker:* In Ehingen we initially built mobile cranes with telescopic and lattice booms, which previously had been

manufactured by Liebherr in Biberach. The state of the art at the time, however, was still struggling from a lack of experience and market knowledge. Moreover, there was no acceptance of them on the market. However, there was enough courage and strength of will to catch up as quickly as possible with the personal support of Dr Hans Liebherr. The hard work and willingness of the Swabian workforce soon led to success. One shining example was that as early as 1971, a major order from Russia was completed for 50 telescopic cranes, which had to be operational in temperatures as low as -40°C.

## **What were the primary objectives for product development at the time? And how did you achieve them?**

*Rudolf Becker:* It quickly became clear that we have to create advantages over our competitors. At the time I often had in-depth exchanges with my fellow director Friedrich Bär, who was responsible for Sales, discussing what we had to do not



only to catch up but to get ahead. We also held these discussions with experienced crane customers, and with crane operators. They gave us some very useful ideas. We decided on the following objectives which we achieved through sheer determination.

The mobile cranes at the time were not licensed for motorway driving as they were unable to travel above 60 km/h. Since the rear axles had no suspension to help the crane's stability, their speed was restricted to 60 km/h. To counter this, we decided to build suspension systems with swing arm bearings which would enable our cranes to be licensed for motorway driving at 80 km/h. That gave us a massive lead over our competitors.

There was increasing demand for improved all-terrain features on construction sites. We therefore designed the LTM series cranes with the larger wheels and tyres with better grip. The hydro-pneumatic suspension also achieved significant improvements. The electromagnetic-hydrostatic control system delivered extremely sensitive control for the cranes'

“We talked to customers and to crane operators. Where else should we get the information?”

Rudolf Becker,  
former Technical Director at Liebherr-Werk Ehingen GmbH

drive systems, particularly for hoisting and slewing movements.

**Liebherr then became the market leader. What were the technical milestones in your opinion that made us the leading crane manufacturer?**

*Rudolf Becker:* In structural steel terms, the use of high tensile fine grained steel types with yield points of up to 960 N/mm<sup>2</sup> was required to achieve a significant weight reduction. However, these materials were not licensed. Therefore, as Chairman of the “Standards Department for Mobile Cranes at the VDMA”, I worked with the Technical University of Darmstadt to look at carrying out notch impact tests on welded steel types to obtain approval as a standard using the test results.

The development of the patented oval cross-section form of the telescopic boom tubes was another milestone as they made it possible to use the maximum stresses without exceeding the buckling limits. Since this meant that buckling plates were no longer required, we were able to make the internal telescope sections wider. The larger boom cross-section increased lifting capacity and also meant we could make telescopic booms longer.

For lattice boom cranes on crawlers or wheels, the counter jib, the derrick system with suspended ballast, was an early introduction. That resulted in significant increases in lifting capacity. Later, we managed the same thing on telescopic cranes by using guying systems for the boom.

**Did everything always go to plan?**

*Rudolf Becker:* Of course not. Everything is always easier in hindsight. I can remember the case of an LG 1180 for loading



transformers at a port in Iran. With a derrick system and 250 tonnes of suspended ballast, it was able to hoist 350 tonnes. The derrick was secured at the rear to the slewing platform. When we completed the first test hoists, the slewing platform bent significantly. That meant we had no choice but to reinforce the slewing platform.



**Dr Hamme, you arrived at Liebherr in Ehingen in mid-1994 as Technical Director and took over responsibility for the “Design and Development” Department after an induction period of just three months. Your professional background was in structural steel and statics and you also had experience as a managing engineer in plant construction.**

**How did you assess our technology and our position against our competitors at that time?**



“We can continue to meet the challenges through high technical flexibility and entrepreneurial continuity.”

Dr. Ulrich Hamme,  
Technical Director at Liebherr-Werk Ehingen GmbH

*Dr Ulrich Hamme:* I found that the company had a solid technical foundation and a committed, motivated workforce. We were in the middle of switching to computer-aided design (CAD), first in 2-D and then later in 3-D. But it was also a difficult time because the mobile crane market had collapsed. We even discussed reducing the workforce, but fortunately it never came to that. Things quickly improved again in Ehingen. Our market share in AT cranes was around 30 percent at the time. That meant that we had potential to improve our position on the market. We managed to do that gradually over the following years to find ourselves in our current situation.

**What was your focal point in terms of product development?**

*Dr Ulrich Hamme:* We built fantastic cranes in the past, but sometimes we only did so in very small volumes. So our focus had to be on serial production. That required more standardisation and a clear structuring of our product range. Improving the performance of products is always an objective for designers, but we were also interested in improving flexibility –

both for hoisting loads and for driving the machines on the road. Since our share of exports continued to grow, we also identified the need for universal cranes which could be used all over the world. That relates to almost every lifting capacity class and that trend continues today. And there is another very important point – safety has always been and continues to be our absolute priority.

**What other points were important for you in the development process?**

*Dr Ulrich Hamme:* As Rudolf Becker has already said, getting close to customers was an important key to our success at the time.

The same can be said of the current situation. Close communication with customers and markets by sales and product management staff, and also direct lines of communication with the design team, is essential.

Another important point is to ensure that a Liebherr crane is a good, safe place to work for the crane operator. He should feel at home in the cab. And even though it sounds like a marketing slogan, high quality, availability and value retention have always been important to me. And the green credentials complex must also be included in the design and production processes and, indeed, the whole of the crane’s service life.

**What do you think are the main technical milestones?**

*Dr Ulrich Hamme:* Rudolf Becker has already mentioned the development of the oval boom section. At the same time, the TELEMATIK single-cylinder system made it possible to produce longer multi-section booms. The combination of both these innovations in telescopic booms as from 1996 saw lifting capacity values increase enormously. In 1997 we launched data bus technology for the first time on the LTM 1030/2. This led to completely new way of controlling the crane, from the diesel engine to the hoist limit switch, through digitalisation. The diagnostic features were also extended.



Other milestones included crane models that set new records, of course. The first 100 metre telescopic boom on the LTM 11200-9.1. The most powerful conventional crawler crane in the world in the form of the LR 13000. Its hook height is a world record at 245 metres.

But even more important than records is what supports our customers in their everyday work. If we were to ask them about milestones, VarioBase® would be one of the most popular answers. I'm absolutely certain of it because it was a really pioneering development delivering greater safety, flexibility and even better performance.

I also believe that the main criterion behind our success is the continuous expansion of our product range to make us a complete supplier. Crawler cranes were always the second string to our bow and recently we have returned to become a member of the group of rough-terrain crane manufacturers.

**Mr Becker, have you kept up with developments in the mobile and crawler crane industry during your retirement?**

*Rudolf Becker:* Yes, the bug never leaves you. I have often driven around the factory site and looked at the new crane models. It is all very impressive.

**Dr Hamme, what challenges do you currently see facing us in the industry?**

*Dr Ulrich Hamme:* The world is becoming more heterogeneous, the requirements for mobile cranes and so on are drifting apart. Bringing them back together again will be a major challenge in the future. Automation, digitalisation, networking, autonomy, electrification, alternative drive types, climate change and environmental protection – these are the modern drivers and, of course, they are also important topics for us.

However, we must separate the essential things from the non-essential ones and continue to ask questions about whether things are sensible and feasible so that we don't spread ourselves too thin. The idea is to do the right thing at the right time! Of course, we have to stay on the ball with all these topics to enable us to steer the company in the right direction.

It is important that we never forget the basic functions of a mobile crane – mobility and lifting capacity. In other words we have to “do one thing and not forget the other”. As in the past, we will be able to meet the challenges of the future through high technical flexibility and entrepreneurial continuity.

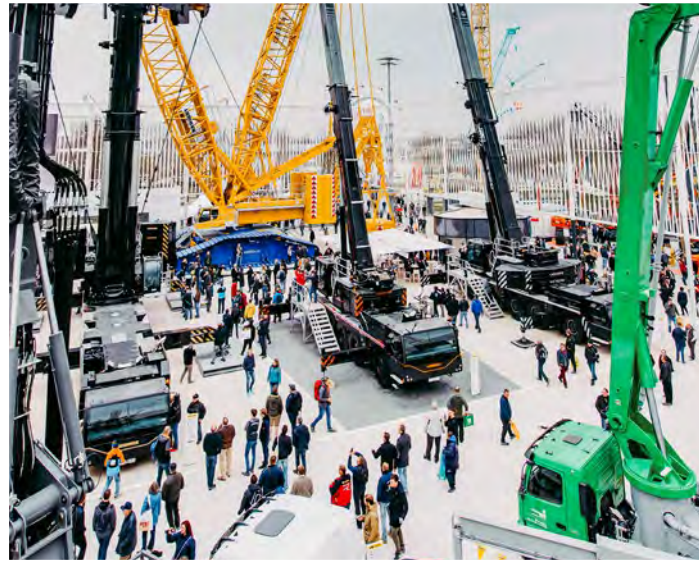


*Editor's note:* It was very refreshing to meet eminent crane authority, Rudolf Becker, who is now 90 years old, in a relaxed private atmosphere and to enjoy his humour and clarity of thought. And the plaited bread loaf with butter and jam provided by his wife Christel was delicious!



# Bauma 2019 – it was great

There's always a Bauma trade fair to look forward to. The truth behind this statement is demonstrated by Munich Exhibition Centre on its Bauma website [www.bauma.de](http://www.bauma.de). The homepage already states: "Let's meet again on 4-10 April 2022 – Save the date". So you can make a note in your diary right now. The Bauma is the trade fair of superlatives. This year once again it broke records: "Over 620,000 visitors, 3700 exhibitors from 63 countries, 614,000 m<sup>2</sup> of exhibition space, particularly high visitor growth from overseas, and good business for the





exhibitors” – that is how the final report from the Bauma trade fair reads. The Bauma trade fair was also very successful for Liebherr. With the slogan “Together. Now & Tomorrow”, we showed you some new products and technical innovations. But the best thing for us was meeting you again! And we are already looking forward to the next Bauma trade fair. Here are some impressions of mobile and crawler cranes at the Bauma 2019.





# Production at record levels

**In 2018, the Liebherr Plant Ehingen set new records in terms of turnover and sales – we have never manufactured as many cranes as we did last year! In total we supplied 1831 new cranes to customers in more than 80 countries. That was a mammoth task for our staff in Ehingen and in our worldwide sales and service organisation. And this year we are going even further. What does that mean for production, material flow in the factory and purchasing?**

**We talked to Production Director Dr Hubert Hummel, plant Manager Andreas Niesl and Purchasing Manager Stefan Dambacher for UpLoad.**





### What was your reaction to the massive uplift in demand?

*Dr Hubert Hummel:* Of course we were very pleased about it. It makes us feel good and also proud. But growth is not our primary objective, it is just a sign that we are managing our business well and working hard to meet the wishes of our customers. That is important to us. At the same time, this development secures the future of our company and jobs. It confirms investments that we have made in the past and those that are planned for the next few years.

*Stefan Dambacher:* I was excited about the challenges that rising demand makes on the purchasing process and I thought: 'Let's see how we are going to manage it.' We had to ask the question how quickly we could increase our purchasing volumes.

*Andreas Niesl:* The main priority for me was to ensure that we work through the requirements in production professionally whilst at the same time maintaining the quality our customers expect.

### What were the challenges for production?

*Andreas Niesl:* Capacity is finite. It quickly became clear that this increase in production could not be matched with our existing workforce. So we decided to do two things to increase capacity. Firstly, for the last year we have been using a 2-shift operation, and we would like to express our sincere gratitude to our colleagues for their untiring commitment.

Secondly, we are actively looking for new employees, which is a particular challenge in itself. When there is a lack of skilled workers, we are limited in our search for new blood. Furthermore, all new workers have to have adequate qualifications and be integrated into our production teams. To enable us to guarantee uniformly high standards for our customers, we have taken additional quality assurance measures such as digital quality checklists and improved feedback lines from the person who identifies an error to the person who caused it.

### What does the increased demand mean for other processes in the company?

*Dr Hubert Hummel:* The aim is to maintain a balance between feasible increases, reliable deliveries from our suppliers and high quality. As a result of the high numbers, we have very little reserve to enable us to react to problems. Even if we continue to attempt to push the boundaries of what is possible



Dr. Hubert Hummel

upwards, additional increases in production will have to be brought in line with our high quality demands.

Another challenge posed by the strong growth is to improve our processes and structures. We are engaged with this task now and our work will continue in the future to enable us to overcome the demands we are currently facing.

### How are suppliers dealing with the significant increases in purchase volumes?

*Stefan Dambacher:* They are facing the same challenges as we and some of them have reached the limits of their capacities. It is now becoming more difficult for us to obtain adequate volumes of material whilst also preventing missing parts.



The aim now in purchasing is to stabilise our supplier base, from raw materials and processors to the actual components. In view of the fact that our production depth in Ehingen is rather low, we are focusing on maintaining material supplies and not jeopardising production capacity due to a lack of availability of parts.

*Dr Hubert Hummel:* There is also the fact that the good economic situation means that other companies also need higher volumes from our suppliers. So we are also competing with them.

**What does it all mean for the material flow at the factory?**

*Andreas Niesl:* Previously we built five or six cranes per day, now it is eight or nine. Every additional crane means fifteen to twenty thousand additional parts have to be moved. We need increasingly sophisticated material flow systems and additional space for them. We also have a significantly increased amount of traffic at the plant – the number of incoming and outgoing shipments has noticeably increased.



Stefan Dambacher

**What have been the main requirements to ensure that the production increases can be achieved?**

*Dr Hubert Hummel:* The whole thing is only possible if all the departments work closely together. We have managed that together. We are on track! We coordinate with Sales and achieve increases within the bounds of what is feasible. We will continue to do so in the future to meet the needs of our our customers.

*Andreas Niesl:* One helpful thing is that our colleagues in Sales are clarifying orders early with our customers. That means that our production processes can run without any interruptions. We must all continue to pull in the same direction to keep that going.

*Stefan Dambacher:* Stable planning is also important to our suppliers. It is hard work and sometimes it is far from easy – but working together in a good partnership we manage it.



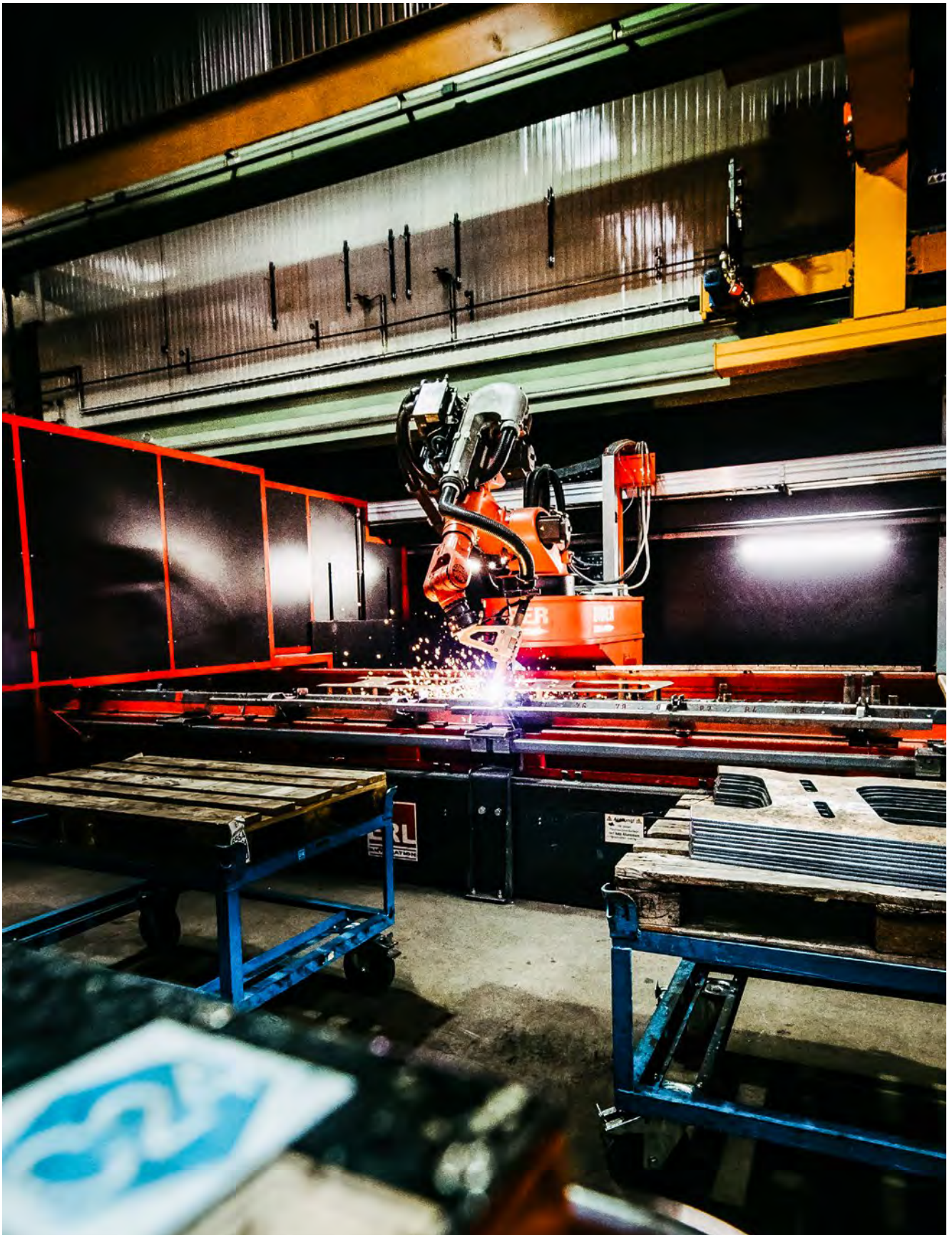
Andreas Niesl

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**Some production data**

- 8 cranes are produced every day
- 325 km of lattice tubing, 650 km of hydraulic hose and 325 km of hydraulic pipework are used every year
- Deliveries by 140 to 160 trucks every day
- 160,000 different parts for serial production and spare parts
- 210,000 t of material assembled every year







# Less is more!



**Achieving more with less – Uwe Laitenberger explains how this is possible. The certified baker has been passing on his crane expertise as a Technical Trainer at the training centre in Echingen for the last eleven years. He has 22 years of experience as an equipment inspector in the crane acceptance procedure.**

“Planning crane jobs not just safely but also efficiently and economically is one of the challenges of the everyday crane business. The safety level required for crane work can be achieved by the interaction of your well-trained crane operators

and our LICCON control system. But how can ballast transport, for example, be reduced whilst still achieving the same or even higher performance?”

“The LICCON job planner enables you to plan low cost crane jobs efficiently.”

Uwe Laitenberger, Technical Trainer



The increase in economy is often a question of good planning – and it is here that we want to provide support.

This is where our unique VarioBase® system comes to the fore – its smart software calculates lifting capacities in real-time and displays them on the crane’s monitor. That means that much higher lifting capacities can be achieved in the areas above the outriggers, significantly improving efficiency. However, it also leads to so many different lifting capacity states that they can no longer be shown on paper in the form of lifting capacity charts.

This is where the LICCON work planner comes in – a system for planning, simulating and documenting crane jobs on a PC and in a crane cab. We supply the latest software version with every machine together with the original crane data sets so that you are always up to date and you can plan your crane jobs using this planning tool very efficiently and safely.

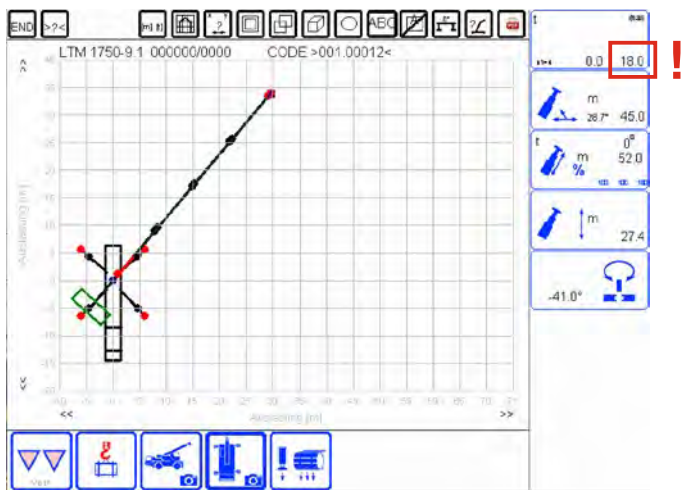


**Find out more:**  
[www.liebherr.com/variobase](http://www.liebherr.com/variobase)

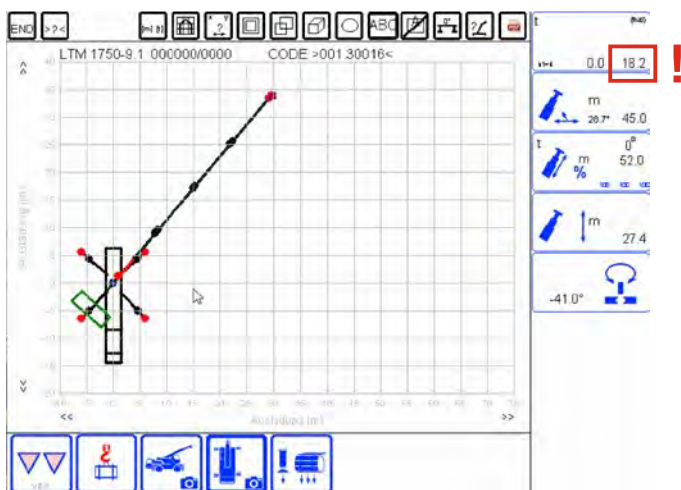




An example of this:



The LTM 1750-9.1 delivers a lifting capacity of 18 tonnes with 94 tonnes of ballast with the standard 360° table and a radius of 45 metres.



With VarioBase® it achieves a lifting capacity of 18.2 tonnes over the outriggers with just 54 tonnes of ballast with a radius of 45 metres.

This has enabled us to make less into more: 40 tonnes less ballast that has to be transported to the site, and an increase of 200 kilograms in lifting capacity. This enables you to save resources and work more economically.

As an aside, you can do that in the LICCON job planner with just five clicks! Try it.

Integrated in Liebherr mobile cranes, the tool enables your crane operator to simulate the job you have planned on site before completing the actual hoist. This is a good idea if a four-eyes principle is required or if the conditions have changed

between when the job was planned and when it is due to be completed. It means that the worst case scenario of an impossible hoist can be avoided on the site.

After completing your plans, the job planner can produce complete documentation of all the details in the form of a PDF file. After all, only if your driver knows how you have planned a job and with what criteria, will he be able to carry out that job on site.

If you would like some training for the job planner, please contact your sales partner.”



# The world with Liebherr









# MyLiebherr – your personal customer portal for Liebherr online services

**“The MyLiebherr online portal is your access point to the Liebherr service world.” That is the description of the new customer portal on the company’s website. Extensive service and a wide range of additional offerings for construction machines, mining, mobile and crawler cranes, handling technology as well as maritime cranes are now available to customers using this platform. Manuela Kovacic and Oskar Thanner, who work in the Customer Service Department at Liebherr in Ehingen, explain what MyLiebherr is and what you will be missing if you do not use it.**

## What exactly is MyLiebherr?

*Manuela Kovacic:* MyLiebherr is an online customer portal which is available to Liebherr customers at any time and in any place. After operators have registered their Liebherr machines in the system using the factory number, they can find any spare parts they need very easily and order them in the portal.

*Oskar Thanner:* Another helpful function is the facility to download all the documentation included in the package with all our machines in digital form using MyLiebherr. There are also other useful applications, such as exchanging large volumes of data between Liebherr and the user. Even the LICCON work planner has been included in the online portal.

## When was MyLiebherr launched?

*Manuela Kovacic:* The new portal went live on 1 July 2017.

## Why was MyLiebherr developed in the first place?

*Oskar Thanner:* MyLiebherr was developed to replace the previous portal P@rts24 and provide our customers with even better online service and additional applications.

It was an attempt to meet the needs of our customers for an online ordering portal to enable them to order spare parts on the basis of the current spare parts catalogue together with relevant information such as prices and availabilities. The previous system had restricted functions and, I must admit, was a little awkward to use.

## Since when have mobile and crawler crane operators been able to use MyLiebherr?

*Manuela Kovacic:* Our mobile and crawler crane customers have been able to use MyLiebherr from the very beginning, in



other words since the portal went live on 1 July 2017. Every operator who had registered in P@rts24 by the end of June 2017 was automatically transferred by Liebherr to the new portal – including all their machine data.

## What benefits does the portal deliver for crane operators?

*Oskar Thanner:* It is particularly important for users to have access to the latest spare parts documentation for the machines online at all times using machine-specific parts lists. If the machine equipment has been changed, for example by a modification or retrofit, the documentation be updated automatically in the system. That means that all prices and availability information are always up to date.

*Manuela Kovacic:* MyLiebherr is a portal for all Liebherr product segments. Naturally, that is a major benefit to those customers, who operate mobile cranes, tower cranes and perhaps also

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### MyLiebherr in figures:

For all product segments worldwide:

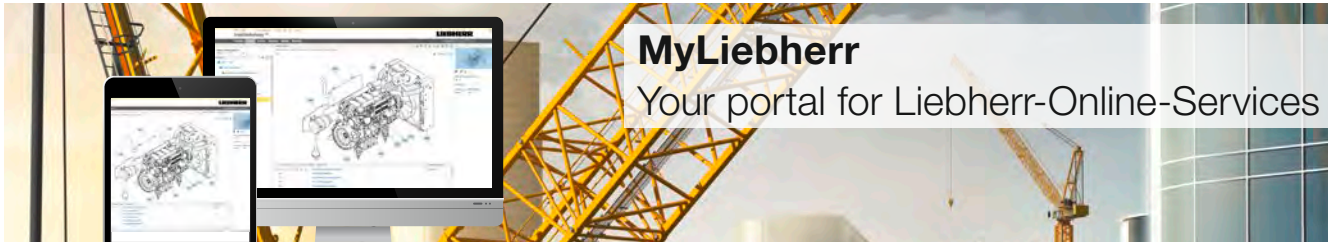
- 21,000 registered companies
- 41,000 active users
- 30,000 registered machines

Crawler & mobile crane product segment:

- 1,500 registered companies
- 5,000 active users
- 8,000 registered cranes



# LIEBHERR



earthmoving machines. The fact that all the different applications can be opened from the same interface makes the whole thing extremely practical.

The “Connected Companies” function has been specially created for companies with multiple sites. This gives authorised personnel in the system access to the machine data at all the company’s sites. A complete self-administration system enables customers to issue the required authorisations to the appropriate personnel.



*Oskar Thanner:* Export and import functions in the spare parts catalogue and in the shop enables our customers to transfer the data to their own systems, for example to process a shopping cart in their own ERP system. Some users manage parts using Excel tables and can then import these into the shopping cart within MyLiebherr. That eliminates the need for inputting data multiple times and automates the processes.

I would also like to mention the central benefits of the digital spare parts catalogue for individual machines – the search

function is extremely user-friendly and frequently required parts can be saved as favourites. Notes and attachments such as images or documents can be filed for each machine, module or part. In addition, there is a precise zoom function for parts with drawings to ensure that every detail can be identified – right down to the smallest screw. The export function is another plus point, as it can be used to provide drawings and parts lists from other systems in a wide variety of formats.

### How do you get access to the system?

*Manuela Kovacic:* After registering on [www.myliebherr.com](http://www.myliebherr.com), our IT department will carry out a check which will take between one and two working days. After this, the customer must request a business relationship from a service partner online, register their machines and will then have full access to the portal. The service partner is his existing contact – generally the local Liebherr company or dealer.

### What are the costs for MyLiebherr?

*Manuela Kovacic:* MyLiebherr is free of charge to our customers. Inside the portal, however, various optional applications are available for which our customers can purchase licences, for example the Crane Planner or Crane Finder. These functions are currently still under development.

### Where can users find help if they experience problems with the system?

*Oskar Thanner:* Generally from their long term service partner. And if they cannot help, the experts at Liebherr in Ehingen will get involved.

### To sum up: What are customers missing if they are not yet using MyLiebherr?

*Oskar Thanner:* A great deal! MyLiebherr users benefit from enormous time savings in their daily processes relating to their machines and can place their orders and request quotations anywhere and at any time, even outside of business hours.



Find out more:  
<https://www.myliebherr.com>





## Second hand, but first class

**The 10,000th used crane left our factory at the start of this year. The LTM 1350-6.1 was supplied to Australian crane contractor MCG Cranes after being repaired and repainted and furnished with a warranty. Liebherr is a reliable partner in the used crane business for customers all over the world.**

As well as manufacturing new cranes, Liebherr is also one of the largest used crane dealers in the world. “In this segment, we benefit massively from our technical expertise and decades of experience”, says Bernd Rechtsteiner, Sales Manager Used Cranes at Liebherr-Werk Ehingen GmbH. “Our aim is to be able to offer our customers the best solution at all times – whether that is a relatively new, large crawler crane or an older, small mobile crane”, adds Rechtsteiner.

We have been repairing and marketing used cranes since the mid-70s. In 1983 a repair centre for used cranes with an area of 2500 m<sup>2</sup> was built on our site. Since demand for continue to rise, the Repair Department moved to a completely new building in 2001 with an area of 5800 m<sup>2</sup>.

Used cranes are a low cost alternative to new machines. Lots of well-known crane rental companies also occasionally decide to purchase used cranes. For example, at the start of the year French crane rental company Mediaco bought an eight-year-old Liebherr LR 1600/2 crawler crane and a nine-year-old Liebherr LG 1750 mobile crane. “Purchasing used cranes delivers a whole range of benefits. The lead times are shorter and the investment is lower. Liebherr cranes are renowned for retaining their value. Buying used cranes direct from the manufacturer gives us security”, explains Managing Director Alexandre-Jaques Vernazza.

Our crane experts inspect every machine before it is sold to ensure maximum safety and also check for bespoke designs of used cranes. Because we are the crane manufacturer, we can also guarantee a specific crane configuration tailored to



French rental company Mediaco's used Liebherr LR 1600/2 crawler crane was used for a bridge construction job in Blois.

the customer's needs. Flexible finance packages are another aspect which play a major role in the used crane business. “We have found that used crane customers who order a machine from us can obtain finance more easily as banks and leasing companies also appreciate the security that we can offer as the manufacturer”, says Bernd Rechtsteiner.

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### The Liebherr world of used cranes in figures

- 10,000 used crane delivered
- 230 to 260 used cranes per year
- 65 large cranes sold since 2014 (9-axle telescopic cranes, lattice boom cranes with a lifting capacity of 350 tonnes or more)
- 4 repair sites: Ehingen, Oberhausen near Essen, Alt-Bork near Berlin and Melnik in the Czech Republic
- 75,000 hours for repairs, accident repairs, painting and retrofitting work in 2018



We currently have an extensive range of used cranes in the most diverse size classes. Our product portfolio currently includes various telescopic and lattice boom cranes (with lifting capacities of over 500 tonnes) as a result of low activity levels in the European wind power industry. In most cases, these machines are in fact designed for the low cost erection of wind turbines, but otherwise can easily be retrofitted by us.

A word of caution – a number of outsiders are also currently attempting to benefit from the good name of the Liebherr Group in this industry. “Our good reputation is being abused by unknown third parties attempting to purchase or resell cranes. Our company name appears in the email addresses of these people to make recipients believe that they are actually dealing with Liebherr. For example, they may involve a bargain with a low upfront payment. But actually, the crane does not exist and the upfront payment disappears,” warns



Bernd Rechtsteiner, Sales Manager Used Cranes

Bernd Rechtsteiner. “We are doing everything in our power to bring these people to justice quickly as possible”, he adds.



The team from the repair centre in Echingen with the 10,000th used crane.





## At an icy altitude

**Four tower cranes were in permanent use building the highest building in Europe, the Lakhta Tower. A Liebherr service technician from Tower Crane Customer Service ensured at a dizzy height that everything ran smoothly even in extreme weather conditions. A reflection.**

### **When service becomes a high-wire act**

430 metres above ground. Secured only by climbing gear and a carabiner. Surrounded by dense fog. With an icy wind blowing through the metal rods of the tower crane. Ivan Dikun is lying on his stomach on a narrow strip of metal, checking a tower crane sensor. "Up here, the permanent wind and the low temperatures in winter are the biggest challenges to me", says the service technician, who must keep a cool head even when things turn a little dicey. The crane he is currently on is not operating today as it is scheduled for routine maintenance. If things turn serious, service work must be carried out as quickly as possible so as not to jeopardise the progress of the construction work. The crux of the matter is that the work on the

new landmark of Saint Petersburg can only continue once the maintenance work has been completed on the tower crane.

At 462 metres, the Lakhta Tower is the tallest building in Europe. The high-rise building is around ten kilometres outside the city centre right on the Gulf of Finland. Contractor Renaissance Construction used three Liebherr 710 HC-L 32/64 Litronic cranes and an 357 HC-L 12/24 Litronic machine for building the skyscraper. Their hydraulic systems enable the cranes to climb up the external facade and inside the tower. That meant that they were always one step ahead of the skyscraper.





“We have to keep an eye on our own safety and that of the other workers on the site at all times – regardless of what altitude we are at”.

Ivan Dikun

#### In extreme conditions

And service technician Ivan Dikun was responsible for the whole thing. At an altitude of over 400 metres, even standard tasks, like checking limit switches and sensors, become a high-wire act. For example, when the service technician walks along the tower crane's jib having to hook himself onto the guide rope every few metres to protect himself from falling in an emergency. “We have to keep an eye on our own safety and that of the other workers on the site at all times – regardless of what altitude we are at”, explains Dikun. A dropped tool could be just as fatal as a fall.

The actual challenge on the Lakhta Tower is not its record-breaking height, however, but the weather. “We are right on the sea and only around 1000 kilometres from the polar circle. The temperature can drop here to minus 32 degrees, and we have to deal with wind speeds of over 130 km/h”, says Dikun. That means that the workers have to wear the right clothing for the weather. The tower cranes are designed for operating in these extreme conditions. Maintenance work, on the other hand, can only be carried out in wind speeds of up to 72 kilometres per hour.

Therefore, the service technicians have to react flexibly to the weather conditions on site. And, of course, a steady hand is essential as well as a good head for heights. “It takes a certain amount of skill not to spill anything whilst changing the oil”, grins the technician. In addition to routine maintenance, he and his colleagues from Tower Crane Customer Service also support dealers and customers on request with challenging installations and with dismantling tower cranes.

#### 87 storeys in record time

Work on building the Lakhta Tower was started in 2015. The work on the exterior of the high-rise block was completed in 2018 and the interior works were then started – after a construction period of just three years. That is a very tight schedule for a project of this size. There is also the fact that in addition to the





high-rise block, a multi-purpose building with office rooms and sport and leisure facilities was being built at the same time. Another six Liebherr tower cranes were used for this project.

“One of our specific requirements was therefore obtaining technical support from Liebherr during every phase of our project”, says Rustam Doshchanov, Project Manager at



Renaissance Construction. The construction company worked closely with Liebherr’s internal Tower Crane Solutions Project Department a year before the construction work was started. This department is responsible for planning particularly challenging crane jobs. “The earlier we are included, the better we are able to adjust the crane concept individually to the site and our customers”, explains Benedikt Bärtele, Project Manager at Tower Crane Solutions.

The planning process particularly focused on the height of the building and the extreme weather conditions. Particularly high performance tower cranes had to be used to ensure rapid construction progress of the Lakhta Tower. The final choice was for three 710 HC-L 32/64 Litronic Tower cranes with maximum

lifting capacities of up to 64 tonnes and hoist speeds of up to 176 metres per minute. But it is not just the height of the building that was challenging, its shape is also unusual. The high-rise block looks like a gas flame which narrows towards the top. The design of the tower is unique and differs from storey to storey. That meant that a standard solution was impossible. The climbing process for the cranes was adjusted individually to the facade concept and the progress of the construction work.

That meant that every section of the construction required precise planning. But it is not just precise planning that is required for massive projects of this type, because not everything can be planned. “We have to react quickly to what we find on the site and check whether alternative methods could be better. For example, when we have to hoist components which are heavier than originally planned”, says Bärtele.

The engineers from Biberach worked closely with Renaissance Construction and the service technicians on site to enable them to react flexibly and quickly. “Fast response times are very important to us because any delay in crane operation would have meant a delay in the construction work”, adds Doshchanov.

Ivan Dikun completes the maintenance work after around two hours. “Dispatcher, come in please. The inspection has been completed, the crane can be restarted”, says Dikun into his crackling radio before starting the long descent. Whilst he climbs down the last few metres inside the tower crane, the crane itself is already restarting its work on the tallest building in Europe.

“The biggest challenge was the extreme height of the building. 462 metres meant that we needed very powerful tower cranes.”

Benedikt Bärtele



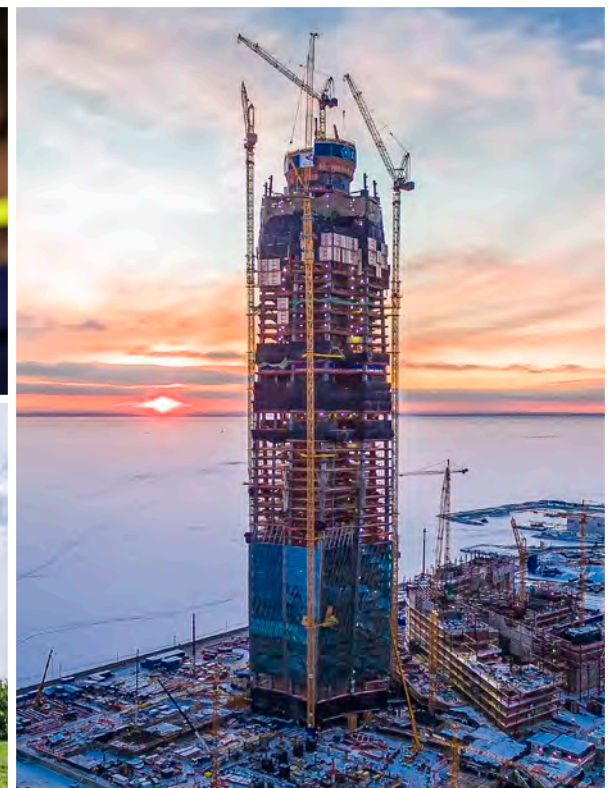
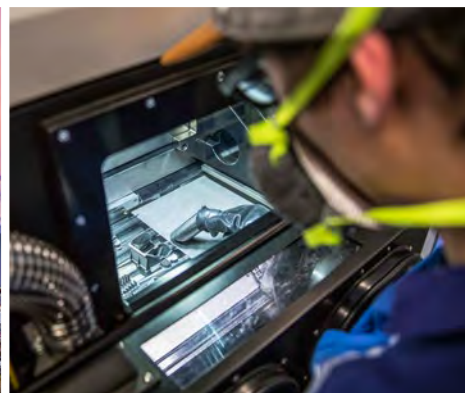




Find out more:  
[www.liebherr.com/  
lakhta-tower](http://www.liebherr.com/lakhta-tower)







# The Liebherr Group

**The Liebherr Group exceeded the mark of ten billion euros for the first time in its history when it recorded a turnover of €10,551 million in 2018.**

This was due to the extremely pleasing development of the general economy and demand in several sales regions. Business not only developed very well in North, Central and South America as well as in Asia and Oceania, but turnover was once again increased in the European Union, as well, the most important region for Liebherr.

This was due, among other factors, to renewed growth in Germany, the largest market for Liebherr, as well as positive development in France and Great Britain. As a result of negative development in Russia, turnover in non-EU countries

fell below the level achieved in the previous year. Slight falls were also recorded in Africa and in the Near and Middle East.

The workforce increased significantly in the 2018 financial year. Around the world the Liebherr Group employed 46,169 people. This corresponds to a rise of 2,300 personnel or 5.2 % compared to the previous year. Workforce numbers at Liebherr companies are set to increase again in the current financial year.





Regular investments in production plants and the global sales and service network have always been very important for the Group. During the past year, the Group invested €829 million, which corresponds to an increase of €51 million. This was countered by depreciations of €513 million. The Group will continue to invest heavily in its global production plants and its sales and service network. The Group also spent €586 million on research and development projects to enable the creation of new products and support technological progress in the industries which are relevant to Liebherr.

According to current forecasts, the global economy will continue to shrink in the current year. As a result of its full order books, the Group is nevertheless expecting turnover to increase again in 2019. The Earthmoving, Mining and Household Appliances Divisions, in particular, are expecting significant growth.



Find out more:  
[www.liebherr.com](http://www.liebherr.com)





Concrete technology

# Concrete for one of the largest cable car projects in Europe

**A Liebherr concrete mixing plant was installed in October 2018 for a Swiss cable car project, one of the largest in Europe just where around the corner from where the ibexes, chamois and mountaineers enjoy the high alpine peaks. The plant is at an altitude of 2340 metres on the Eiger Glacier in the Bernese Highlands.**

JungfrauBahn AG and the Männlichenbahn in Grindelwald are building two cable cars which will run in two different directions from their joint terminal in Grindelwald-Grund – a three-cable circular cableway to the Eiger Glacier and a gondola lift for ten people to the Männlichen. They are scheduled to open for the 2019/2020 winter season.

Liebherr supplied the perfect plant for the project in the form of its Compactmix 1.0 A-R/ RIM-M. The company was

sent special transport dimensions to ensure that the plant could be transported by cable car to the site. The plant has a ring-pan mixer with agitator for perfect mixing results. The plant features a winter-proof housing to enable it to produce concrete at low temperatures. The aggregate and cement are supplied to the mixing plant by cable car from where they are sent immediately to the inline silo.





Earthmoving

# INTUSI – progress through intuition

As part of the process of digitalisation, the construction site is changing more and more to become a networked, logistical ecosystem in which people exchange information with a wide variety of machines. At the same time, a change is taking place to replace simple machine operation with communication between the operator and machine. Operator assistance systems and functionalities from the networked world of the Construction Site 4.0 are also increasingly gaining importance.

Liebherr regards these factors as the main drivers in the INTUSI development process and has started a new age of machine communication with this control concept. The INTuitive USer Interface, or INTUSI for short, is the key to the Internet of Things (IoT) for Liebherr construction and material handling machines and combines a smart control logic system with sophisticated machine intelligence. In the future, this control concept will be used in all Liebherr earthmoving and material handling machines.



## Bauma Innovation Award in the Design category

A total of 138 applicants entered the competition for the Bauma Innovation Award on 5 September 2018. 47 innovations passed the initial selection process, and the expert jury, comprised of representatives from science and industry, then selected three products for the award in each of the five categories Machine, Components/Digital Systems, Structure/Construction Method/Construction Processes, Science/Research and Design, with the INTUSI control concept developed by Liebherr in collaboration with the Technical University of Dresden finally winning the main award in the Design category.



The Bauma Innovation Prize was awarded at a ceremony held in the Allerheiligen-Hofkirche in Munich.



# Liebherr Shop



Visit us at: [www.liebherr.com/liebherrshop](http://www.liebherr.com/liebherrshop)

Email: [liebherr-shop@liebherr.com](mailto:liebherr-shop@liebherr.com)



**I 1 | T-shirt.** White T-shirt with black pictogram print of our construction machines. The shirt has a comfort fit and has a round neck and short sleeves. Material: 100% cotton. Sizes: S - 3XL.

**Size/Part No.:** S/12765501 M/12765502 L/12765503 XL/12765504 XXL/12765505 3XL/12765506 **Price: € 22.50**

**I 2 | Ladies polo shirt.** White ladies polo shirt with grey stripes. Slightly tapered shape. Very comfortable to wear and a perfect fit. Material: 100% cotton. Sizes: XS - XXL.

**Size/Part No.:** XS/12765470 S/12765471 M/12765472 L/12765473 XL/12765474 XXL/12765475 **Price: € 29.90**

**I 3 | LTM mobile crane key fob.** Solid metal key fob in the shape of an mobile crane. With keyring and metal plate. Packed individually. Size: around 69 x 22 mm.

**Part No.:** 12217250 **Price: € 4.90**

**I 4 | Liebherr LTM 1090-4.2 mobile crane.** Detailed scale model of the 4-axle mobile crane with a maximum lifting capacity of 90 t. Scale 1:50. Zinc die-cast model from WSI. Length: around 30 cm. **Part No.:** 12229275 **Price: € 167.00**

**I 5 | Liebherr LTM 1450-8.1 mobile crane** Miniature scale model of the 8-axle 450 t class mobile crane on a scale of 1:87 (H0). Zinc die-cast model from IMC. Length: around 20 cm. **Part No.:** 12225890 **Price: € 59.00**



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