

An aerial photograph showing a large white wind turbine blade being lifted by a blue and yellow Liebherr crawler crane. The crane is positioned on a dirt and gravel area, and the blade is suspended in the air. The background shows a forested area with green trees and a small building. The title 'UpLoad' is overlaid in large white letters, flanked by two horizontal white bars.

UpLoad

The magazine for customers and friends of mobile
and crawler cranes

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Publisher:
Liebherr-Werk Ehingen GmbH
Postfach 1361
89582 Ehingen, Germany
Email: upload@liebherr.com
www.liebherr.com

Editorial team:
Wolfgang Beringer, Tobias Ilg, Berenike Nordmann , Annika Strahl (Liebherr-Werk Ehingen GmbH)
Oliver Bachmann (TT-Communications, Budenheim)
Willi Wilhelm (Willi Wilhelm Industriefotografie, Badenweiler)

Photographs:
Christina Schmuker (Liebherr-Werk Ehingen GmbH)
Willi Wilhelm (Willi Wilhelm Industriefotografie, Badenweiler)
Boris Golz (Boris Golz Fotografie GmbH, Arnsberg)
Oliver Bachmann (TT-Communications, Budenheim)
Sebastian Grenzing (Grenzing Fotografie, München)

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We use male pronouns simply to make our articles easier to read.
However, the content of the articles applies to all genders.



Dear Readers,

Welcome to 2024!

A special year for us and our employees in Eching. After a forced break in 2021, we are now able to invite you to our Customer Days in Eching again. A marvellous opportunity for mutual exchange, exciting discussions – but also for interesting insights into our production and our service. A lot has happened and changed at our plant since the last Customer Days in 2018, and a major expansion is also imminent. We are therefore all the more pleased to be able to present and give further details of this expansion to you in person in June under the motto: Consistently innovative.

2024 is something special for the entire Liebherr world: Together we will celebrate the 75th anniversary of the company. This milestone birthday for the Group will accompany us in many places around the world in the coming months – including in Eching during our Customer Days and on the Family Day for our employees that will follow. You can see for yourself today that the history of our Group has many exciting stories to tell by looking at a crane transfer from 1975 on page 58.

At the end of 2023, we were able to set some further important milestones: The first all-terrain cranes with the new LICCON3 crane control system were delivered in autumn. Find out how they prove themselves in the field in a mission report from Norway (page 24). The first LTC 1050-3.1E hybrid cranes have also been delivered and are now in CO₂ emission-free operation (page 46). We also

launched the new LTR 1150, a telescopic crawler crane that complements our product segment and offers unique transport and performance data – discover more on page 34. And just before Christmas, for me personally the best crane moment in 2023: For the first time, we delivered the 2,000th new crane from Eching within a year and handed it over to a satisfied customer. A great performance from our whole team!

We expect developments to continue unabated in 2024: Climate change, infrastructure renewal, skills shortages and digitalisation. On pages 40 and 52 you can read how work is being done on all continents to modernise the infrastructure. Renewable energies and heating networks are important aspects of the energy transition. We see this in Delft in the Netherlands on page 78 and in Australia (page 10). And on pages 74 and 92, you can read how the crane industry is combating the shortage of skilled labour in new ways.

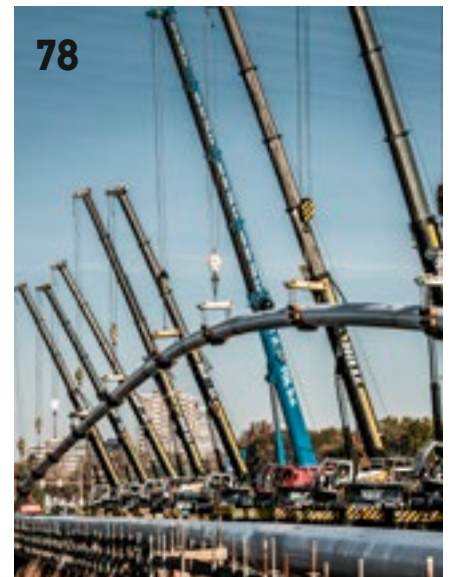
I wish you a successful and healthy 2024 and look forward to welcoming many of you here in person in June.

Daniel Pitzer,
Managing Director Finance
Liebherr-Werk Eching GmbH

The subjects of our articles.

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www.liebherr.com/upload



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Moments

2,000 in 2023

Milestone shortly before the end of the year in Ehingen: The 2,000th crane is delivered within a year.

This – almost magical – 2,000 mark was exceeded for the first time in 2023 and the special LTM 1070-4.2 was handed over to MaxiMum GmbH, a company of the MAXIkraft Group. The crane was bid farewell from the Ehingen plant at the works meeting in December.

A great achievement and many thanks, Team Liebherr!





Building bridges in Antioquia

In the Colombian region of Antioquia, Movitram Gruas was commissioned to carry out the bridge lifting work for a new road link. An LTM 1160-5.2 and an LTM 1220-5.2 from the crane operator, which was founded in 2012, were used together. Infrastructure development is of great importance for the region in order to accelerate the transport of numerous mineral resources, increasing industrial products and growing coffee production.





Tandem lift for green energy

Down Under, work on the energy transition is also in full swing. In the Australian state of Victoria, for example, two LTM 1750-9.1 cranes from crane rental company Johnson & Youn Cranes are working together to assemble the blades of a new wind turbine.



Hard labour for renewables

Spain's north is working hard to expand offshore wind power. In the port of Avilés, the third largest city in the province of Asturias, an LR 1600/2 from Gruas Roxu is being used to handle tower segments with individual weights of up to 320 tonnes for the Baltic Eagle wind farm.





Globe for the 2006 Football World Cup

As part of the cultural programme for the 2006 Football World Cup in Germany, the work of art was on display at all twelve venues from September 2003 until the start of the World Cup in June 2006. The football globe was invented by artist André Heller, assembled using a Liebherr mobile crane, of course.





83 metres down

the waters of the Montmorency plunge over a rock face into the St Lawrence stream. Located north-east of Quebec in Canada, Montmorency Falls is 30 metres higher than the famous Niagara Falls. In April 2013, a second attraction was temporarily added on site: an LTM 11200-9.1!







Curious resting place

Aircraft carrier and aeroplane – go together! A decommissioned aircraft carrier that serves as a museum in New York together with one of the last models of the famous Concorde? This is something of a rarity. And when the Concorde is lifted to its final resting place by two Liebherr mobile cranes – it's definitely worth a look!



Made with Liebherr

They are weightlifters, bridge builders, enablers, saviours and sometimes creators of art. They replace the old with the new and without them the energy revolution would not be possible. Liebherr cranes shoulder the everyday and the extraordinary.



Photograph: Marc-André Leclerc

Bridge renewal against a spectacular backdrop

Montmorency Falls is located around 15 kilometres north-east of Quebec on Canada's east coast. Tens of thousands of litres of water plunge 83 metres per second from the Montmorency River into the St. Lawrence River and then flow somewhat more calmly into the Atlantic. Directly after the waterfall, they flow under a bridge – which was the scene of another magnificent spectacle in April 2013. An LTM 11200-9.1 was used to renew the bridge over the mouth of the Montmorency into the St Lawrence River. The

old bridge was clearly getting on in years – an infrastructure measure made for the largest all-terrain crane in the Liebherr range. The Canadian crane rental company Guay, headquartered in Quebec, was commissioned to disassemble the old reinforced concrete girders and lift the new bridge girders into place. The individual components weighed up to 88 tonnes – and some were around 55 metres long.

Historic crane operation

The Concorde is probably one of the most famous aeroplanes in aviation history. Only 20 models of the French passenger aircraft were built, including the prototypes. Used primarily by the airlines Air France and British Airways for almost 30 years, the supersonic aircraft was able to complete the route from Paris to New York in 3–3.5 hours – around half the usual flight time today. The top speed: 2,405 km/h or Mach 2.23. The flight altitude was up to 18,000 metres. But the records came to an abrupt end when a Concorde crashed shortly after take-off at Charles de Gaulle Airport in Paris in July 2000. The licence was then withdrawn – although it was granted again around a year later, the Concorde never really got to fly again. The last Concorde flight took place in November 2003.



One of the two models that are still in the USA today was placed next to the decommissioned US Navy aircraft carrier, the USS Intrepid, right in the heart of the metropolis of New York – and can still be viewed there today. The USS Intrepid is home to a whole collection of decommissioned military aircraft and helicopters, as well as the space shuttle and many other exciting technological milestones on the flight deck and in its belly. Two Liebherr cranes were used to lift the record-breaking aeroplane into its resting position against the spectacular backdrop of Manhattan. An LTM 1500-8.1 and an LTM 1250-1, in the service of Bay Crane based in New York, jointly lifted the Concorde from the cargo ship to its final position on the quay wall.

Football and gate go hand in hand

The footballing globe began its tour of all twelve venues of the 2006 FIFA World Cup on 12 September 2003 in Berlin in front of the Brandenburg Gate and ended back there on 9 July 2006 after the final. Italy beat France 5:3 on penalties. The “summer fairytale” saw the German national team finish in third place.

In May 2006, an LTM 1200-5.1 from Poppe & Wittrock installed the round work of art on Paris Square: first the steel structure and then the individual covers of the football. The 200-tonne mobile crane had to put up to five tonnes in position with centimetre precision. Under the cover of darkness, the outlines of the continents of our globe were lit up on the outer shell of the giant globe. Football-themed events were held inside.



Mobile and crawler cranes

Night shift in Joyo

In Kyoto Province, Japan, an LR 11350 from heavy haulage expert Hirano is in night-time operation. Over a period of six months, prefabricated parts for a new road bridge were lifted into place – with individual weights of over 200 tonnes per component.



Cool design





First LICCON3 crane goes into series production: the LTM 1110-5.2 undergoing field testing

With our new Liebherr LTM 1110-5.2 mobile crane, we are opening a new chapter in Ehingen's history of crane technology. The third generation of the LICCON control system, plus a modern crane design and a bundle of innovations. These are the visual and technical highlights of the pioneering machine. And there is something else new about the LTM 1110-5.2: For the first time, the ten machines in the pre-series of this crane type are being monitored daily by our test department using telemetry. This helps us to respond quickly and purposefully in the event of any problems. Enormous heat and icy cold are also parameters that we have to take into account when designing and configuring our high-tech cranes. Extreme temperatures can otherwise lead to difficulties or even erroneous error messages. That is why we are monitoring an LTM 1110-5.2 in Sicily, where it works in summer at temperatures of over 40 degrees Celsius. Its counterpart has been rolling through the fjord landscapes of Norway to its construction sites since November. We watched our "cool unit" at work in November as winter set in. On site as well as from our plant in Ehingen.

Daniel Rössner and his team receive the data packets from the field test machines every night. The test engineer is responsible for this field test with the LTM 1110-5.2. Via UMTS routers, these ten cranes distributed throughout Europe send everything that their internal data loggers have recorded throughout the day: load cases, crane configurations, error messages. "A field test like this is

nothing new for us, as we have already successfully completed it for an engine project. The challenge in this case is the entire vehicle with all its subcomponents," explains Rössner, who regularly analyses the automatically generated reports with the relevant colleagues from the control and design departments.

Long distances

The LTM 1110-5.2 travels long distances through breathtaking fjord landscapes on its way to its assignments.





On-road driving with 8.2 tonnes axle load

And Rössner also receives all the information about the work of the LTM 1110-5.2, which our business partner Sunnmøre Kranservice AS, based in Volda in the Vestlandet region of Norway, has received. One of the first jobs takes our "cool unit" past seemingly endless fjords and on the deck of car ferries to one of the many islands in the west of the country. The pier of a shipyard in Larsnes is to be extended and large prefabricated concrete parts have to be installed. "This is the perfect crane for this construction site," explains crane driver Harald Klepp, "because I don't have much space in some places and will have to move it a lot here." Harald had already set up his machine on the shipyard grounds the day before. "To do this, we not only had to ballast, but also install the four beams of the crane outriggers beforehand. We transported them separately because there are strict weight limits on the

route here, which we would have exceeded with the supports installed despite the crane's low axle load of less than ten tonnes."

"The ability to drive without support beams – and therefore with a total weight of less than 41 tonnes – is crucial for us," agrees Mads Indresøvd. Mads is the Managing Director of Sunnmøre Kranservice AS. "Because here in western Norway we have countless bridges and small roads with weight or axle load restrictions. This crane now makes it much easier for us to reach our customers. With larger cranes, such as our LTM 1250-5.1, we often have to remove the telescopic boom so that we are allowed to use certain routes. That's a huge effort every time, which we no longer have to do with the 110-tonne crane and its powerful, 60-metre-long boom."

Lightweight

If required for on-road driving, the support beams of the LTM 1110-5.2 can be removed. As a result, the mobile crane achieves an axle load of less than 8.2 tonnes.





Idyllic workplace

The heaviest components that have to be installed on the LTM 1110-5.2 for the port expansion on the shipyard grounds weigh 16 tonnes.

“It’s finally here”

“When we got our first look at the new machine and the modern control system a few years ago, we immediately decided to order the LTM 1110-5.2 for ourselves and to be the first in Norway with a LICCON3 crane. It took some time, but it’s finally here. A really beautiful crane with a great design,” says Mads, praising it. “Especially in our colour and with our beautiful logo,” he adds with a wink. He makes two trips to the shipyard to discuss the new machine with crane driver Harald on site. Also because errors occurred a few times in the new crane control system. “But we are always able to sort it out with the support from Ehingen. They usually update online from there and the problems are resolved, which means we are quickly up and running again.”

“This is exactly what we had in mind,” explains Daniel Rössner. “We have designed the architecture of the field test telemetry so that we can create error diagnostics from here. In particular, if we notice that identical messages are appearing on several of the monitored cranes, major serial damage can be avoided in a targeted and effective manner. For example, we were able to identify a problem with a new type of sensor. Based on the feedback from the field test, we then began replacing this component at an early stage. This test is the ‘dress rehearsal’ before series production, so to speak. This ensures that our business partners’ cranes are stable and reliable and that our service is not affected by serial damage wherever possible.”

Three-year test duration

“Normally,” says Rössner, “we test our new cranes for around a year before they are delivered. We put the LTM 1110-5.2 through its paces for a full three years due to the LICCON3 control system that was used for the first time. However, we will never be able to simulate all applications on our test site as they will occur in real-life use. And this field test helps us enormously.”

But back to the coast of Norway and our “cool unit” at the shipyard. Work is in full swing here and one of the great strengths of the 5-axle mobile crane is that it can move from one location to another incredibly fast. Harald,



Optimally illuminated

For crane driver Harald Klepp, the new lighting concept of the LTM 1110-5.2 is a big plus, especially in the dark winter months – also in terms of work safety. When setting up the crane and during repositioning or lifting.

our crane driver, only needs a few minutes to reposition the crane. “The crane really can be moved unbelievably quickly,” he shouts from his cab. He has a large concrete slab hanging from the hook and no time for a chat at the moment. His crane is positioned between stored components and scaffolding elements. The variable VarioBase® support system enables him to place the supports here or close to unpaved areas. Later, during a short break, we hear a little more from him: “The new LICCON3 system works very well for me. Of course there are a few teething troubles, but they are manageable. Otherwise, many of the crane’s features are very user-friendly: the display in the superstructure, the light on the boom that follows the hook block, the well-lit working area around the crane and the heaters in the superstructure and chassis. Engine pre-heating is also part of our crane’s winter equipment.”

Service technicians also by aeroplane

Since the job at the shipyard, Sunnmøre Kranservice has used its LTM 1110-5.2 many times. “The crane has done a lot of work in the shipping industry in particular. It was also used for the construction of a huge new bridge and modular houses. We are happy with the machine.” Managing Director Mads is more than satisfied with his new acquisition. Incidentally, with Liebherr in general too: “If there are any problems with our cranes, Thomas Bohlin and his company Ing.Hans P. Øen AS are available around the clock as Liebherr service partners for Norway. If it has to be done quickly, a service technician even comes by plane so that we have as little downtime as possible.”

Crane driver Harald would not want to do without his new Liebherr mobile crane either: “Everything in the driver’s



cab in the chassis has been redesigned and improved. You almost feel like you’re in a modern truck. And with its three driven axles, the crane makes good progress. He climbs up mountains or over passes.”



Site visit

Mads Indresøvdde, Managing Director of Sunnmøre Kranservice AS, visits his new LTM 1110-5.2 at the shipyard. The company’s fleet of Liebherr cranes also includes a 250-tonne mobile crane and a brand new LTM 1060-3.1.



Part of the Liebherr field test team:

(f.l.t.r.) Frank Münt, Christian Sauter, Daniel Rössner, Jürgen Bosler, Alexander Kisselbach, Armin Geiss

Service 24 / 7







“We are focussing strongly on the green transformation.”

In this issue, we report that we manufactured over 2,000 mobile and crawler cranes at our plant in Ehingen last year. An achievement that we are – admittedly – quite proud of. But our work is not done when we deliver the cranes to our partners and customers. Maintenance and, if necessary, repairs for all the Liebherr cranes in use around the world are of course also included. So far, there are around 44,000 of them, most of which are still in daily service. Globally, over 1,000 men and women are responsible for servicing our products alone. This includes warehouse and workshop personnel, operations managers and, of course, our service technicians. They all ensure that our cranes are running and that downtimes are kept to a minimum. In most countries, we provide mobile crane services through our own branches. In some markets – including Belgium, Sweden and Norway – we work with long-standing sales and service partners who are responsible for both sales and customer service. In Norway, Ing. Hans P. Øen AS carries out these tasks for us. We meet the company’s Managing Director, Thomas Bohlin, for a chat in Fosnavåg, Norway.

Thomas Bohlin, you visited the first Liebherr mobile crane with LICCON3 control delivered in Norway on a construction site here: the LTM 1110-5.2 from our partner Sunnmøre Kranservice AS. How do you personally like the new crane?

Thomas Bohlin: I think the new LICCON3 crane is a fantastic machine. Many improvements have been implemented in it. Convenience and operation are at a completely new level. But I particularly like the new chassis design. Good ergonomics, good lighting.

What special advantages and possibilities does this new crane model offer specifically for your customers in Norway?

An important feature of the new mobile crane is that it can drive on the road with an axle load of less than 8.2 tonnes. In Norway, great importance is attached to the axle load of the vehicles, because we have many narrow and unfortunately also bad roads. The LTM 1110-5.2, like the LTM 1090-4.1, has the potential to become one of the main machines in our market. We have modified the new crane from Sunnmøre Kranservice in our workshop so that the outriggers can be removed if necessary. Even the boom can be removed. This means that it can easily drive on narrow roads and over small bridges here in western Norway.

This vehicle is part of a large-scale field test with ten LTM 1110-5.2 machines.

We were lucky enough to get this LICCON3 crane from the pre-series here. Among other things, it is tested for operation in cold conditions and should be able to work at temperatures as low as minus 40 degrees. The machine is connected to the plant in Ehingen via a modem. This means that any errors can be read out there and solutions found should problems occur.

Mads Indresøvd, Managing Director of Sunnmøre Kranservice AS, was very pleased with the new crane. And about the service that your company offers Liebherr customers here in the Norway. Can you briefly outline your work?

Ing Hans P. Øen AS has been looking after the needs of Ehingen Liebherr customers in Norway for 45 years. Engineer Hans P. Øen founded the company in 1979. I've been running the business since the turn of the millennium. Products from the Liebherr plants in Biberach and Nenzing have since been added. However, the plant in Ehingen is by far our main supplier. Around 90 percent of the machines we sell in Norway come from there. But we also have MK mobile construction cranes from Biberach and hydraulic cable excavators as well as LR crawler cranes from our colleagues in Nenzing in our portfolio.

As mentioned earlier, you're not only Liebherr's sales partner in Norway, but are also responsible for service in Norway.

Yes, that's true. At Ing. Hans P. Øen AS, 14 employees take care of our customers' concerns. Six service technicians are available on site or at the customer's premises in the event of technical problems with the machines. A 24-hour service, 365 days a year. When we receive a call from a customer, we often have a long distance to travel. Norway is a very long country – around 2,500 kilometres from north to south. Our branch is located in Honefoss,



about 40 kilometres from Oslo. We have stationed a fully equipped service vehicle in Harstad so that we can be ready for action as quickly as possible in the north of the country if necessary. We fly there and then drive to our customers in northern Norway.

A major issue in your country is the transformation towards renewable energies. Your country is driving this change forward with great vigour.

Indeed. We are focussing very strongly on the green transformation here. The city of Oslo, for example, has decided to only allow access to emission-free vehicles in large parts of the city centre from 2025. Property developers, the city of Oslo and government clients are increasingly demanding low-noise and low-emission machines. Our customers have recognised this and seeking the right machine. We delivered our first LTC 1050-3.1E to Skoveng in Lillestrøm near Oslo in the autumn. This is a crane that can be operated entirely with electricity on the construction site (report page 46).

What is the response to this LTC 1050-3.1E compact crane? Have you already received feedback from the customer?

Yes, it is consistently positive. As expected, the machine works almost silently and without emissions. We will be seeing this crane model more often on construction sites in the capital in the future. We have already sold a total of ten of these cranes in Norway. All to customers operating in the Oslo area.

Right: Soon to be a relic from bygone days?

Decorative imitation petrol station on Europastrasse E16. Norway is taking a bold approach to restructuring its energy policy.



**Compact and strong,
transport in one**





A new addition to the telescopic crawler crane range: the LTR 1150

Crawler tracks plough through wet mud, stones creak, tough clods of earth fall out of the base plates – the crawler crane moves slowly but continuously over the soaked ground. Cameramen in wellies and thick jackets stand in position. Deep in concentration, they defy the adverse conditions and record impressive film sequences of the brand new telescopic crawler crane. The weather doesn't bode well with us. Continuous autumn rain makes for difficult film and photo shoots. Nevertheless, we want to record the most important details of our new jewel in the telescopic crawler crane range for you and the whole crane world.

The weather is no problem for the new crane. It feels at home in any weather and on any terrain. Patrik Braig sits at the control levers of the crawler crane. This is his profession, this is where he feels at home. He is familiar with every button and gear lever. He has been working at Liebherr in Ehingen for almost 20 years. He is an expert in telescopic crawler cranes at his workplace in the crane acceptance department. He knows the applications for

which these cranes are used. He is familiar with the advantages and development of the Liebherr crane series and is delighted with the latest addition: "I have often heard from crane operators that the LTR 1100 is a little too weak for many applications, while the LTR 1220 is too large and oversized. Until now, the market has lacked a good telescopic crawler crane in the 150-tonne class."





Transport miracle with power and finesse

With the new LTR 1150, Liebherr has developed a telescopic crawler crane in a class of its own – in many respects: With a maximum load capacity of 150 tonnes, it is positioned exactly between the LTR 1100 and the LTR 1220. And although the new crane offers around 50 percent more lifting capacity than the LTR 1100, it can be transported just as easily and economically as its 100-tonne sibling. “We transport the LTR 1150 complete with crawler carriers with a total weight of 60 tonnes and a width of just 3.5 metres or optionally without crawler carriers with a total weight of just 38 tonnes. This is a

unique selling point of the new crane and a huge advantage,” explains Patrik and continues: “For smaller transport weights and sizes, the crane can be dismantled quickly and easily. We have developed a new automatic support system for this purpose. This makes supporting on the necessary jack-up cylinders even easier and safer. The crane then dismantles the crawlers itself.” The two crawler carriers, each weighing 11 tonnes, can then be transported together on a standard semi-trailer with a width of 2.55 metres, while the basic machine is only 38 tonnes and 3.0 metres wide.



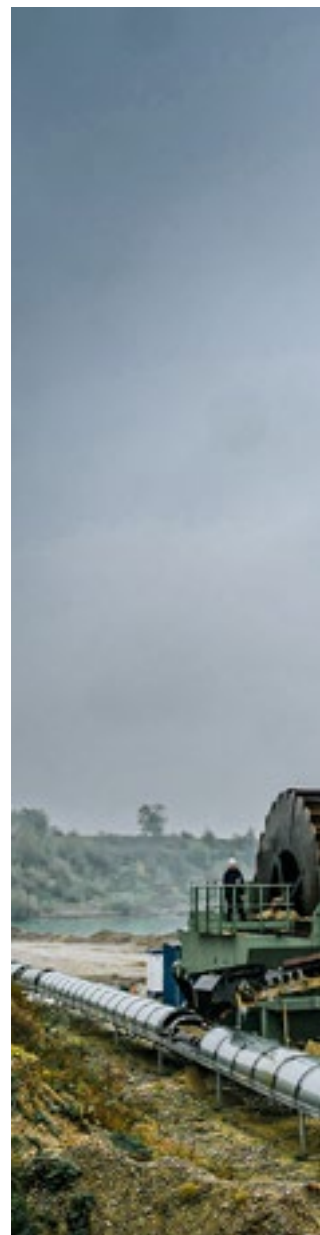
Coherent overall concept

"I was already familiar with VarioBase® from some of the LTM cranes I have tested. The system is impressive, and I would never have thought at first that we could integrate it into a telescopic crawler crane in a similar way," Patrik recalls. However, our colleagues in the control department have done a great job and developed a VarioBase® system for the new LTR: Depending on the fixed track width and the variable angle of rotation, the best possible load capacity is determined in real time. The greatest load-bearing advantages are achieved with lifts over the track corners, especially with reduced track widths. "I now also have VarioBase® on 'my' crane and it's really fun to work with it.

An additional advantage of the LTR is that you can also move with full load at the hook. Accordingly, the heavier

load that we can lift over the corners can also be moved. A great thing!" You can really see Patrik's enthusiasm. VarioBase® is available for the maximum track width of 5.8 metres, the reduced width of 5.0 metres and the narrow track of 3.5 metres. Thanks to the pick & carry option, the new LTR 1150 can be used perfectly as an auxiliary crane for the assembly of wind turbines as well as in the construction industry, for example, where many lifts have to be carried out in different places.

Patrik is very familiar with practical functionalities from his day-to-day work: Which handles and functions are helpful for ensuring safe and comfortable work, which work processes make sense, how do the activities go best by hand? He will now put the prototype through its paces and use his experience and practical expertise to put the finishing touches to the 150-tonne crawler.



“The best of the LTR 1100 and LTR 1220 has been packed into one crane. Working with the LTR 1150 is fun, it is compact, strong and easy to set up.”

Patrik Braig
Crane acceptance

Find out
more here:



Technical data



52 m



10,8 m – 19 m



2 x 7 m



2,9 m



max. 4°



218 kW (296 Hp)



41 t



22 t



Logistical masterpiece in the Alps



Special transporter takes LR 11350 to the site

The dismantling of a huge motorway bridge between Grenoble and Turin by a Liebherr LR 11350 crawler crane marked the end of an infrastructure problem in the Franco-Italian border region that had lasted for over four decades. The Charmaix Viaduct in the Auvergne-Rhône-Alpes region, built in 1978, had to be replaced due to structural problems. Last summer, the new structure, which runs parallel to the A43 motorway, was opened to traffic and work began on dismantling the old bridge. In autumn, the most powerful crawler crane from German crane and heavy-duty contractor Schmidbauer GmbH & Co. KG then lifted the last girders off of the highest pillars. The challenges involved in assembling the Liebherr crawler crane on the mountainside were immense.

An unsurfaced and winding gravel road with a gradient of 25 percent in places. This was the relentless hurdle over the last hundred metres that all the crane parts had to overcome on their way to the construction site. Steep downhill to the site where the Liebherr LR 11350 crawler crane had to be set up for its demanding deployment in a very limited space. Large boom sections were brought down the roughly 30 metres, as were the heaviest compo-

nents of the large crane: the almost 15-metre-long crawler carriers with gigantic unit weights of 72 tonnes. "A total of 80 heavy goods vehicles arrived at the site. And no space for parking, turning or storage. It was amazing!"

The person telling us this is Oliver Thum, External Technical Team at Schmidbauer who is also an "old hand" in the crane business. Thum, who started his career at Liebherr in Ehingen in 1977 as a teenager with an apprenticeship as a machine fitter, was involved in the dismantling of the motorway viaduct in the French Alps on the crane side. "The absolute challenge for us here was the rough terrain," reports Thum. "And not just when bringing in the crane parts. The assembly of the lattice booms in particular demanded a lot from us."

Logistical masterpiece

Due to the aforementioned difficult topography and lack of storage space, delivery and assembly of the enormous machine had to go hand in hand. A huge logistical challenge in itself. Almost all the material that was delivered from Marseille – where the brand new crane had its first job – had to be reloaded above the dusty gravel road and transported bit by bit to the valley floor using a special four-wheel-drive transporter. An arduous and time-consuming endeavour.

Made of steel

is the 18 tonne hook block of the LR 11350. Perhaps also the Schmidbauer crew, who did the arduous job in the French mountains with aplomb. Image featuring: Oliver Thum, External Technical Team (right) and crane driver Fabian Ueck.





Setting up the crane: Three weeks instead of three days

The assembly of the boom proved to be extremely difficult when setting up the crane. The derrick boom and the 108-metre-long main boom had to be assembled partly on a floating basis, i.e. suspended in the air. Due to a lack of levelled and horizontal surfaces, the Schmidbauer crew managed this strenuous undertaking along the steep access road. “We worked our tails off, uphill and downhill,” says Thum. With the help of several demolition excavators on site, the rough terrain was “adapted to the crane” several times for assembly of the gigantic lattice boom. The construction work took a full three weeks. “Normally, we can set up this configuration in around three days,” says Oliver Thum.

Finally, however, the LR 11350 towered over the valley, visible from afar and ready to lift. Work on dismantling the remains of the old “Viaduc du Charmaix” could begin. Commissioned in 1978, the originally 350-metre-long prestressed concrete structure caused major problems right from the start. And a lot of work. The stability of the

underground of slate rubble was incorrectly assessed during the planning phase and the bridge pillars between the two mountain slopes were not anchored deep enough. Just two years after commissioning, some of the girders had already shifted a few centimetres. Investigations revealed that the bridge pillars were moving downhill with the rubble layer. Since then, the affected pillars have been realigned at their foundations in three technically very complex operations, but ultimately the new building – that has now been completed – was decided upon.

Routined & focussed

Frank Wache at the controls has one of the old girders on the hook, which he now has to set down on the scree slope. The powerful teeth of the excavators then finish off the mighty reinforced concrete trusses on the ground.





Overview

The LR 11350 has already emptied the first of the three truss bays here with its lattice boom over 100 metres long. Two others are waiting to be dismantled after 45 years of service. The bird's eye view illustrates how cramped the usable space is for the large crawler crane. A few metres away, the new viaduct is already carrying traffic.

Crane travels with 245-tonne load on the hook

The crawler crane was needed during the dismantling of the disused structure to lift the huge concrete girders off the high pillars in the centre of the valley. Three girder bays, each with four trusses, had to be cleared and gross loads of around 245 tonnes had to be handled. In the two closest sections, the LR 11350 single-handedly managed the recovery of the 40-metre road sections. Equipped with up to 950 tonnes of ballast, the machine could handle overhangs of up to 70 metres. The most distant girders were finally lowered to the ground together with a 700-tonne mobile crane in a tandem lift.

In the cab of the LR 11350, crane drivers Frank Wache and Fabian Ueck took it in turns to hold the joysticks. The two were entrusted with the tricky job of carefully removing the trusses from the old bridge and placing them on the scree of the steep slope after a 180-degree turn. Due to the confined space, the crawler carriers had to cover a distance of around ten metres on the Bongossi base to allow the counterweight frame suspended from the derrick boom to swing through. After setting down the concrete section, four demolition excavators eagerly set to work on the reinforced concrete to make room for the next salvaged bridge section.

The crane and the Schmidbauer team spent around three months working in the Alps. By mid-December, the old viaduct had disappeared.

Huge and weighty

are the lifting means between the hook block and the load. High above the valley, the men heave these thick, sheathed steel cables over the hooks. Here, Simone Agostinetti (left) from the Dutch heavy haulage company Mammoet assists with the attachment of the next girder. Mammoet was responsible for the crane work during the dismantling of the viaduct. As the Dutch company did not have a suitable crawler crane in its own fleet for this bridge dismantling project, the LR 11350 from Schmidbauer was booked.





Sound of silence



Liebherr LTC 1050-3.1E Northern Europe's first hybrid compact crane in operation

Norway is considered the country of electromobility par excellence in Europe. In 2023, the percentage of new electric or hybrid cars was well over 90 percent. As early as next year, for example, cars with combustion engines will no longer be allowed to be used in Oslo city centre. And the capital is also increasingly requiring emission-free machines for its construction sites. Construction machinery with combustion engines may only be used in public-sector construction and infrastructure projects if no electrically powered alternatives are available. This puts great pressure on the construction industry to look for suitable equipment. In November last year, the first Liebherr compact crane was put into operation in Oslo. Although it drives to the construction site with a combustion engine, it can carry out all work there with zero emissions and no noise using site electricity: the Liebherr LTC 1050-3.1E.

A construction site in the middle of Oslo in autumn 2023. It is located between a school and a kindergarten. Excavators, cranes and many construction workers are building a new multi-purpose hall on the sports grounds. There is a lot of hustle and bustle. But there is also something else: silence. At least relative silence, because every now and then one of the men swings a hammer, an angle grinder spins at full speed or an impact drill fires a loud salvo into the concrete. But then calm returns. And this despite the fact that excavators and cranes continue to work as normal. Almost none of this can be heard, because the machines are all powered by electricity. The quiet humming is easily drowned out by the noise of the schoolchildren streaming outside and onto their football pitch at break time.

"The neighbours of construction sites will love us!"

The crane assembling the formwork for the long concrete walls on the construction site that day is our new LTC 1050-3.1E compact crane. This hybrid-powered mobile

crane is the first that we have delivered to Northern Europe. It was ordered by Skoveng Kranservice AS, a company based in Lillestrøm. The company, which operates in the cities of eastern Norway, but primarily in Oslo and its densely populated surrounding area, has ordered five of these cranes in one go, replacing a large part of its crane fleet. Together with a Liebherr MK 88-4.1 mobile construction crane, half of the fleet now consists of equipment that can also be operated electrically. "With these machines, we are now in a very strong position," says Lars Christian Steen, Managing Director of Skoveng, explaining his purchases. "For crane work in buildings or during night operations, the noise-free and pollutant-free machines are of course ideal. Those living near these construction sites will love us! Even today, only emission-free machines without engine noise may be used on construction sites at night in Oslo. And from 2025, this will apply across the board," says the busy company boss. A green logo with the words "Zero Utslipp" (zero emissions) is emblazoned on each side of his bright red crane.



Power point

Siv Hege Barstad draws the energy for her crane from the construction site's power supply.



But this advertising alone is not enough for Lars Christian Steen. To publicise his new electric cranes, he invited people to Lillestrøm for a crane initiation ceremony. Prominent politicians, building contractors, public officials and also competitors of Skoveng Kranservice celebrated the launch of the LTC 1050-3.1E at Norway's largest exhibition centre. A Liebherr Liduro Power Port type LPO 100 was available as the power source for the crane demonstrations. The mobile energy storage system based on lithium-ion batteries has a capacity of 100 kWh. On construction sites

with limited or no mains connection, it can supply electrically powered equipment with energy. "The battery should last for about one normal working day of an LTC 1050-3.1E," explains Joachim Eußem from Liebherr-Components GmbH, who travelled to Norway with the new compact crane to demonstrate the storage system. "The LPO 100 will be available from 2024 and, the following year, there should be the Liduro series with a total of five power ranges. The largest of these will have a storage capacity of 160 kWh."



Bundle of energy

The Liebherr Liduro Power Port type LPO 100 supplied the power for the demonstrations at the crane presentation.



"In a strong position"

The conversion of half the crane fleet to hybrid equipment will bring the company important orders from the construction sector, Skoveng Managing Director Lars Christian Steen is certain.

Oslo soon to have ten Liebherr hybrid cranes

Tommy Borgring, who is responsible for sales in Scandinavia and the Baltic States at the Liebherr plant in Ehingen, did not miss the presentation of our hybrid crane. Born in Sweden, he was instrumental in driving this project forward. "We have now sold ten of these electrically powered machines in the Oslo area. A new water supply system will be built in the capital over the next few years. Among other things, there is a large construction site where three of these E-LTCs will be working in tunnel construction," says Borgring. "In the Scandinavian countries in particular, great importance is attached to the fact that construction machinery can also be operated electrically. That's why we are currently working flat out to electrify more machines."

Siv Hege Barstad sits in her brand new Liebherr crane on the day of the presentation and impresses the guests again and again with how far she can telescope her cab upwards. "On the construction site," says the crane driver, "that's a real advantage when it comes to safety. If I can't see enough from below, I can drive up to a height of almost eight metres and look over walls, for example. This means I always have a very good view of what's happening on my construction site."

See and be seen

The presentation of the new Liebherr crane took place in front of an audience at Norway's largest exhibition centre.



This is where Siv Hege steers her crane vehicle again the next morning. Work on the hall construction mentioned at the beginning continues and the crane is urgently needed. The young woman has been working as a crane driver for six years. "However, I have always worked with all-terrain mobile cranes and it was quite a change for me to sit in the same cab during on-road driving and when working with the crane," she explains. "But it works very well." The journey from the company headquarters to the job site through the capital's rush-hour traffic goes smoothly. With a width of just 2.55 metres, the LTC 1050-3.1E gets through everywhere. "The vehicle is simply very manoeuvrable. I can also use it to drive into the city centre without any problems. The chassis is generally very versatile when it comes to manoeuvring in tight spaces."

"Unusual, but very pleasant"

The crane's steering programmes and compact design are also extremely useful on the current construction site. In the furthest corner of the site crane and driver are already awaited. "The large construction crane is currently busy elsewhere and I'm taking over the concreting work here for a while," explains Siv Hege. She routinely positions the machine, extends the crane supports and pushes the plug of the on-site power cable into the socket of her crane. Then she swings into the cab and the work starts almost silently. "I can also operate the crane with 125 amps, in which case it works just as fast as with its combustion engine. I don't notice any difference when swivelling, lifting or telescoping. On the construction site here, however, I only have 63 amps of power available, so it's a bit slower."

However, this drop in performance is only noticeable when several crane movements are being carried out simultaneously and require energy. If, for example, only the hoist is operated, the process is almost as fast as with a current of 125 amps.

On the construction site, the crane driver works her way through one truck mixer after the other, lifts the delivered concrete in a bucket to where it is needed and has large formwork panels on the hook from time to time. When asked about her experiences and impressions after the first few days with her new crane in powered mode, she reflects briefly: "It's a bit unusual when the engine noises are suddenly missing. But it's also very, very pleasant."

Suitable for city centres

With a width of just 2.55 metres, the LTC 1050-3.1E also fits through narrow alleyways or streets with parked cars.



Two ends, one goal





Stunning crane sight at Hawk Falls bridge

Using not one but two major crawler cranes for a bridge replacement is not a very common sight. Having two LR 11000s operating on a single bridge in Pennsylvania, United States, is worth taking a closer look at this North American infrastructure project.



Hawk Falls is maybe better known to outdoor adventure seekers than to the readership of our UpLoad magazine, offering a great hiking and biking trail system in Eastern Pennsylvania. Driving from New York City to Pittsburgh, Hawk Falls is located on Interstate 80. This is a very important road leading from New York through Pennsylvania to Cleveland and the Great Lakes area. In the rather tranquil area of Hawk Falls, two Liebherr LR 11000 crawler cranes, owned by Buckner HeavyLift Cranes are working simultaneously on a major bridge replacement, changing the quiet landscape into a stunning industrial engineering sight. The entire bridge replacement is done by the Trumbull Corporation.

Facts and figures

But first, let's go through some figures about the new bridge and project site: The overall length of the new steel arch bridge will be 200 metres (720 ft). The two large crawler cranes will install a 142 metre (465 ft) steel arch span as well as two 18 metre (60 ft) I-girder spans. The new steel structure will at the end stretch over the 73 (240 ft) deep ravine and will carry the turnpike's Northeast extension (I-496) over Mud Run in Carbon County, Pennsylvania. The huge extension project also includes a single-span steel girder bridge crossing Hickory Run Road. For such a large scale and complex project, the right cranes play an important role.

“Buckner has strategically expanded its fleet of Liebherr LR 11000 crawler cranes to over 30 units in the past decade. The recent surge in demand for higher capacity cranes underscores the LR 11000’s exceptional versatility, positioning it as the ideal solution to address the ever-changing demands of the infrastructure sector, particularly in areas like bridge construction,” said Brian Miller Vice President of Sales, Buckner.

Starting point

Back in July 2023, both of the Buckner LR 11000s arrived on the Hawk Falls bridge. Starting with the assembly of both cranes, Buckner’s team was already tasked with a huge challenge: limited space. As traffic on the existing part of the road had to continue and a mountainous terrain lies next to the road, space was really confined. Setting up the two large crawler cranes, required a SDWB2 configuration with 66 metre (217 ft) main boom, 90 metre (295 ft) W luffing jib, 210 tonnes (463,000 lb.) super-structure counterweight, 50 tonnes (110,200 lb.) central ballast, and 450 tonnes (992,100 lbs.) of counterweight on the tray. The maximum weight of the lift for this job will be 41 tonnes (90,000 lbs.) at 125 metre (410 ft) radius for both sides. And right from the start it was clear: This is not a quick job, as the two crawlers are projected to remain on site until March 2024.



Brian Miller
Vice President of Sales, Buckner



Variety of challenges

Due to the size and complexity of this bridge replacement, the project team faced a variety of challenges throughout the duration of the project. As both LR 11000 crawler cranes are working simultaneously to complete the installation in a timely manner, there is a limited work area to deliver, prepare and erect the structural steel elements. Once the middle piece is in place and the cranes begin lowering the bridge into position, there is only 0,6 centimetres ($\frac{1}{4}$ ") tolerance for positioning the beams. This area of Pennsylvania also has varying weather throughout the year, and the ambient temperature has to be a specific degree in order to keep all the plates from expanding and contracting.

Additionally, a ravine runs beneath the bridge replacement causing difficult site access to construct temporary shoring towers as well as environmental constraints with the Pennsylvania park service.

"But with its adaptable boom configurations and heavy lift attachments, the Liebherr LR 11000 seamlessly complements Buckner HeavyLift Cranes' extensive fleet, embodying a comprehensive solution bolstered by our highly skilled professionals, our collaborative culture, and an industry-leading commitment to safety, which all are highly important points for such a project," said Miller.



Two partners, one project

Buckner HeavyLift Cranes offers one of the largest crawler crane fleets in the United States, owning the largest LR 11000 crawler crane fleet around the world. With 75 years of experience, Buckner provides reliable, quality, and safe services to the heavy commercial and industrial market. Due to the massive size and undertaking of this project, the Trumbull Corporation turned to Buckner HeavyLift Cranes to rent the two Liebherr LR 11000 crawler cranes to complete the difficult job.

Trumbull Corporation is a family-owned business specializing in heavy and highway contractor and construction management. Established shortly after Buckner in 1955, the company is based out of Pittsburgh and operates throughout Pennsylvania, Maryland, West Virginia, Ohio, New York, and New Jersey offering best-in-class heavy civil and highway construction. Sharing the same values and principles, the two fit well together for such a project.

Standing strong

The LR 11000 crawler crane was presented to the North American market approximately 10 years ago and can cover a wide range of jobs with its various boom versions including port handling, industrial construction, infrastructure, or wind power. The crane's design is also perfect for constricted areas, such as refineries. The crawler crane is designed for a transport width of 3.5 metre (11.5 ft) and a transport height of 3.2 metre (10.5 ft) ensuring easy manoeuvrability and fast transportation all over the globe.

"The LR 11000 is an extremely flexible crane when equipped with the derrick and ballast tray, allowing for infinitely variable ballast radius for complex lifts. In the case of this project at Hawk Falls, the long luffing jibs allow for a very large lift radius on the jobsite where cranes cannot get closer to their final lift location," said Jim Jatho, Liebherr USA, Co. Product Manager of lattice boom crawler cranes. "As is normal for Liebherr cranes, the lightweight lattice sections can be slid into the larger sections saving both space and money. Additionally, special wind power configurations for turbines, blades and tower segments all over the globe deliver unique lifting capacities in this crane class."



"Liebherr's crawler crane portfolio provides an array of choices for customers with heavy-duty needs and specific site requirements to get the job done right."

Jim Jatho

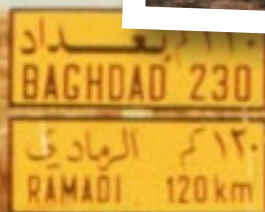
Product Manager Crawler Cranes, Liebherr USA, Co.



1000000



75
Years



Through water and dust – a logistics adventure

From Ehingen to Trieste via the Brenner Pass, by ship to Aqaba in Jordan and via the capital Amman, through the desert to Baghdad – within two and a half weeks in 1975, two telescopic cranes traversed Europe and the Orient to reach a customer in Iraq. The LT 1030 and an LT 1045 were accompanied by a three-man transfer team including a VW bus service vehicle.

Our colleagues from the company group archive have discovered an exciting travelogue about this transfer. The text was written by an employee of the Basel-based haulage company at the time. The end customer who bought and used the two cranes was an Iraqi state-owned construction company responsible for infrastructure projects in the country.

16 November 1975

On a Sunday evening in November, our three drivers Luginbühl, Vecchio and Müller [from a Basel-based haulage company, editor's note] board the train to Ulm. They are put up at the closest hotel and are picked up the next day by Mr Metzger from the Liebherr plant in Ehingen. There they familiarise themselves with their vehicles and the final preparations for the long journey can be made together with the employees of the shipping company.

17 November

In the late afternoon of 17 November 1975, the starting shot is fired, a moment we have all been longing for – the cranes and the VW bus roll away in the direction of Baghdad. A few hours later we pass through Munich. Shortly after dinner, they arrive at the motorway customs office in Kiefersfelden, where the customs agent is already waiting for them. After crossing the border into Austria, the drivers can rest for the first time. They spend the night and continue their journey to Innsbruck the next morning.

18 November

All three vehicles are serviced there. That same afternoon, in light snow, we climb the Brenner Pass. The drivers are aware that the snow is practically the only thing that could stop them, which is why they try at all costs to cross this pass before the snow covers it. There is only a little slush on the Europa Bridge, but the rest of the route is only unpleasantly wet and offers no serious obstacles. At the Brenner Pass, the Italian customs officer simply puts his stamp on the papers and we drive down and through South Tyrol. Trieste must be reached on the 19th in the morning so as not to miss the departure of the ship. However, the drivers are not yet aware that the ship's departure has now been postponed by a day.





19 November

The ro-ro ship "Corriere Dell'Est" docks in Trieste in the evening of the same day and the vehicles can be embarked on the 20th after customs formalities have been completed. For this purpose, the ship opens its aft side, which is folded down to the pier. The cranes and the service vehicle travel on the resulting bridge into the interior of the ferry.

20 November

The next day, the captain weighs anchor and Trieste soon disappears into the haze. The weather forecast doesn't exactly bode well, which doesn't necessarily instil confidence in our landlubbers, especially as it's not a huge ship. Near the island of Crete, the forecast storm promptly breaks out, causing not only nausea among the chauffeurs but also a deep frown on the captain's face. He decides to call at the harbour of Heraklion to wait for the storm to pass.

At the first relief we set off again, but only a few nautical miles out into the Mediterranean. The winds are still too strong for the captain's taste, so he heads for the harbour a second time. This game is repeated once more and only on the third attempt is the course set for Alexandria. These manoeuvres obviously didn't sit well with Walter Luginbühl from our party. But looking back, he only laughs about this incident.





28 November

In Alexandria, which will call on the 28th, some of the cargo can be unloaded and the drivers have the opportunity to go ashore for a

short time. They were particularly taken aback by the intrusiveness of the population in general and the children in particular. The loading and unloading of ro-ro ships takes very little time, so the shore leave in Alexandria comes to a quick end.

After this stopover, the journey continues directly through the Suez Canal to Aqaba. The Suez Canal only allows passage in one direction. The ships can only cross each other in the Great Bitter Lake. The "Corriere Dell'Est" travels in convoy with nine other ships from Port Said to Suez. Numerous vendors come on board with their souvenirs and other goods, and they swarm the passengers. These vendors commute daily between Port Said and Suez. To the left and right of the Suez Canal lie burnt-out tank wrecks and bunkers that bear witness to the fierce fighting of the last Middle East war.

30 November

The Sinai Peninsula is circumnavigated and on 30 November the "Corriere Dell'Est" docks in Aqaba. Once the freight has been unloaded, the haggling over customs clearance begins. Of course, the handling cannot be compared with Central European conditions. What's more, the arrival of the ro-ro ship presents the poor customs officers and customs agents with a completely new set of circumstances. This ship is the first of its kind to dock in this Jordanian harbour. Moreover, in Arabia, as in other parts of the world, time does not exactly play a very important role. Three days passed before the drivers were able to get behind the wheel again.

2 December

The next destination is Amman, the capital of the Hashemite Kingdom. The Jordanian roads pose no problems. They are all in good condition and there is not a lot of traffic. Traversing Amman with its winding streets is like walking through a labyrinth at a fairground.





However, the weather is looking good now, the sun is casting shadows on the cranes, but it hardly warms the air any more than it does back home at the same time.

After Amman, the journey continues straight on towards Baghdad. To the left and right of the road lies desolate desert. The end of the long journey is getting closer and closer.

4 December

And we are already in Baghdad, where the recipient can take delivery of the vehicles on 4 December 1975. They have been delivered to him in brand-new and undamaged condition. The drivers now board the next aeroplane to take them back to Switzerland.

In the meantime, we have received the order for a further five cranes via Aqaba and a small crane by land with a low-loader camion to Baghdad.

LT 1030 mobile crane

- Built in 1972
- 4 axles
- 240hp chassis engine
- 28m telescopic boom
- 34m hoisting height
- 30t load capacity

LT 1045 mobile crane

- Built in 1973
- 4 axles
- 313hp chassis engine
- 35m telescopic boom
- 50m hoisting height
- 45t load capacity

On behalf of science





From ancient turbines to the vastness of outer space – in action for extraordinary lifts

Every single one of our mobile cranes is designed to suit the requirements of our customers and markets. The technology in the machines differs depending on the size of the crane and the aim of the crane development process. In recent years, several of our cranes have also been used for extraordinary lifts. This can involve moving a turbine, removal of a telescope or setting up a radio telescope in the middle of the desert.

Since October 2015, the Deutsches Museum in Munich has been updating and redesigning its exhibitions. In the process, the historical building itself is also being brought up to the latest technical standard. Last year, the museum had to make room for a small container village in the courtyard in front of the original main entrance. Various large exhibits had to make way – including a historic impeller of a Francis turbine.

Over 80 years old, weighing 44 tonnes and measuring 4.6 metres in diameter – these are the turbine's key data. However, it was not the historical object, but the cramped

conditions at the new position of the exhibit that challenged the crane drivers: "In addition to the partly sloping museum garden, the traffic conditions in Munich are not easy – narrow bridges and narrow streets filled with parked cars required special skill. But thanks to the compactness and active rear axle steering of the LTM 1250-5.1, that wasn't a problem either," reports Susanne Maier, Managing Director of Kran-Maier from Landshut. In a convoy with escort vehicles and police escort, the historic impeller arrived at its destination within a very short time.

The impeller in the Deutsches Museum was produced in 1939 by Heidenheim-based J. M. Voith GmbH and was part of a turbine for a river power station on the Sungari River in the Chinese region of Manchuria. However, due to the start of the Second World War, the impeller was not delivered – it would have passed 8820 cubic metres of water at a drop height of 69 metres and a frequency of 125 revolutions per minute, thus achieving an output of 85 MW.

A Liebherr LTM 1250-5.1 mobile crane from Kran-Maier lifts the 44-tonne impeller out of the courtyard of the Deutsches Museum in Munich.



The SKA telescopes are set to become two of the largest and most sensitive radio telescopes of the next 50 years. The SKA project has been on the roadmap of the European Strategy Forum on Research Infrastructures since 2006 and has been recognised as a key institution for European research in astronomy.



A composite image of the future SKA telescopes combining an artist's impression with the elements already present on site. From left to right: the future SKA-Mid dishes blend into the existing dishes of the MeerKAT precursor telescope in South Africa, and antennas from the existing SKA-Low prototype station AAVS2 blend into the future SKA Low stations in Australia. Credit: SKAO

Back to the future: Mapping the universe

A scientific endeavour on a gigantic scale is underway involving governments and institutions on five continents, who are working together to build the SKA radio telescopes. SKA stands for Square Kilometre Array, and these two complementary, world-class instruments will revolutionise our understanding of the Universe. By the end of the 2020s, the SKA Observatory (SKAO) will have built 197 parabolic dishes in South Africa and 131,072 smaller antennas in Western Australia. These will be interconnected via sophisticated computer networks. The telescopes will collect radio waves from space to create the largest cosmic atlas to date and gain insights into the formation and development of the first stars and galaxies after the Big Bang, among a myriad of science goals.

Two remote locations were selected for the telescopes: the Karoo region in South Africa and the Murchison Shire in Western Australia, which benefit from protected radio quiet zones, essential for radio astronomy.

In spring 2019, the South African Radio Astronomy Observatory (SARAO), together with the Max Planck Society (MPG) – both partners of the SKAO – built the first on-site prototype for the telescope in South Africa. The parabolic antenna bears the official designation SKA-MPG telescope and has a diameter of 15 metres. The South African company CC Crane Hire was commissioned to erect the antenna with a height of 22 metres using an LTM 1220-5.2. The 5-axle vehicle has a 60-metre main boom and a maximum lifting capacity of 220 tonnes – enough power to erect a state-of-the-art telescope.



The LTM 1220-5.2 assembling the SKA MPG prototype antenna in the Karoo, South Africa. Image: Nasief Manie / SARAO



Made to measure – Museum staff align the telescope with centimetre precision so that it can be lifted out through the slit gate of the East Observatory.

From the observatory to the depot

Back to the Deutsches Museum in Munich: Two years ago in autumn, the Goerz reflector, a two-tonne telescope from 1913, floated through the air on the hook of an MK 88. Like all mobile construction crane models from the Liebherr plant in Biberach, this MK combines the functional advantages of a tower crane with the mobility of a classic mobile crane. With the manoeuvrable chassis, which is manufactured in Ehingen, the taxi crane requires very little space – whether during assembly or in operation.

The extensive refurbishment of the museum was also the reason for lifting the reflecting telescope. “With a hook height of 41 metres and equipped with 1.5 tonnes of ballast, the MK 88 had to lift the telescope out of the dome from a distance of 39 metres,” recalls Matthias Bulisch, Branch Manager of Treffler in Munich. In addition to a great deal of dexterity during the lift, the positioning of the crane was also no mean feat: due to the fact that the courtyard has a basement, a suitable load-bearing site had to be found in the museum courtyard.

The reason for lifting the reflecting telescope was also the extensive refurbishment of the museum. In October 2022, the second part of the exhibition building, which also includes the eastern observatory, was cleared out. The telescope was moved to the depot to protect it from construction site dust and potential vibrations that would interfere with the sensitive optics. While it is in storage, the museum staff are using the time to renew the coating on the mirrors – maintenance that is required on a regular basis.

It will be 2028 before visitors to the observatory have another opportunity to look through the telescope into the vastness of space. By then the museum will celebrate its 125th anniversary and the refurbishment will be complete. Perhaps a Liebherr crane will be used again until then.



The telescope from Berlin-based company Goerz was originally designed for an expedition by the observatory of the Königlich Technische Hochschule Berlin and Goerz. The occasion: the observation of the total solar eclipse on 21 August 1914 in Sandnessøen on the Norwegian island of Alsta.

However, the expedition was cancelled due to the outbreak of the First World War. Since the opening of the Deutsches Museum on Museum Island in 1925, the Goerz telescope has been the main instrument in the Deutsches Museum's East Observatory.

Image: Deutsches Museum, Felix Köckert



The Treffler MK 88 carefully lifts the Goerz telescope from the observatory of the Deutsches Museum into the transport vehicle.
Image: Bernhard Thaler



Image: Marco Sproviero

In focus

Night shift in Luxembourg

The busy A3 motorway connects Luxembourg and France. As part of the six-lane expansion, several bridges have to be widened, and the work can only take place at night. ATS Cranes from Luxembourg, a subsidiary of Steil Kranarbeiten from Trier, was on site with a duo of an LTM 1650-8.1, which is being ballasted here, and an LTM 1300-6.3.



TraXon DynamicPerform – proven in practice

Wear-free starting and centimetre-precise manoeuvring without overheating – this is exactly what TraXon DynamicPerform offers. Over the past few months, we have successively introduced this new transmission – more precisely, the new, oil-cooled clutch module of the TraXon transmission from ZF – into our current range of 5-axle vehicles as well as most of our 4-axle machines. We are currently in the process of installing it in our 3-axle LTM cranes.

We are naturally interested in how the new transmission is being received in practice. So we asked our customers. Hubert Maltan, who owns the family business Maltan Fuhr- und Entsorgungs GmbH in Schönaun am Königsee together with his brother Josef, is primarily responsible for technical matters and occasionally sits behind the wheel of one of his six mobile cranes himself.

The latest addition to the fleet is the LTM 1150-5.3 with the new clutch module. "In our mountainous region in the Berchtesgadener Land, the oil-cooled clutch is a big step forward. We can now also manoeuvre easily on inclines without having to worry about the clutch overheating. There's a lot of load on the clutch." Hubert Maltan's assessment of the TraXon transmission is generally very positive: "It has many gears and is finely tuned. But with the previous dry clutch, drivers had to be careful when manoeuvring. It's much more comfortable now."

Manoeuvring like clockwork

The new LTM 1230-5.1 from Emil Egger AG manoeuvres with TraXon DynamicPerform.



Tight construction sites
require manoeuvring with
centimetre precision.



Ueli Neuenschwander had the same experience. He's a crane driver at the Härkingen branch of the Swiss crane and logistics company Emil Eger AG: "Just today, I had to manoeuvre in the snow with my new LTM 1230-5.1 and I have to say the new transmission really is better than the old one. Especially in situations like this, you had to be careful that it doesn't get too hot. The new crane is also much smoother when starting off on steep terrain, almost like a torque converter gearbox."

Ueli knows what he's talking about, having also driven an LTM 1300-6.2 in the past. This crane type, like all Liebherr mobile cranes with 6 axles or more, is equipped with the

ZF TraXon Torque transmission with torque converter coupling. Even though very high input torques are involved, starting and manoeuvring is comfortable with no shuddering and also zero wear thanks to the hydrodynamic torque converter.

We are naturally delighted with this positive feedback. Our close collaboration with ZF and intensive testing of the new transmission variant have paid off. What experiences have you had with the new oil-cooled clutch? We look forward to hearing from you, too.

Write to upload@liebherr.com.

ZF TraXon DynamicPerform gear unit

The innovative DynamicPerform clutch module delivers almost zero wear starting and manoeuvring for the modular ZF TraXon gearbox without overheating. It transfers the engine power using an oil-cooled multi-disc package which is immersed in oil. The friction heat generated when starting is dissipated in the clutch oil and supplied to the vehicle's cooling system via an oil/water heat exchanger. Permanent, almost zero wear manoeuvring is made possible as a result of the high energy and power density using a calculation model. A coupling protection function also prevents the clutch from overheating in extreme load cases, thus preventing the associated wear and potentially the premature destruction of the clutch. This prevents downtimes and helps to significantly extend the service life of the drivetrain. Crane operators thus benefit from greater efficiency and lower maintenance costs. Drivers are assisted by the easily adjustable clutch.



■ hot oil [from coupling]
■ cold oil [to coupling]



Awarded: E-learning for mobile crane operator licence

Our revised training programme has been in use for around a year now and has received consistently positive feedback. We even received an award: Liebherr was honoured with the ESTA Award of Excellence in the 'Training' category in April 2023. This category was newly introduced by ESTA in 2023 to emphasise the importance of training and further education.

Michaela Gogeißl, Sales Manager Customer Training in our training department, is the contact for our customers worldwide for all topics relating to the training programme. "We have divided our training programme into three segments – crane operators, dispatchers and workshop personnel – in order to provide employees worldwide with even more targeted training. Our intention is to promote safety and accident prevention in the industry," explains Michaela Gogeißl and continues: "One major advantage is that we now offer a separate e-learning course for each segment, which covers the relevant basic knowledge. This is immensely important for newcomers, for example. It also ensures a standardised level of knowledge for more in-depth courses." The content of the 'Mobile Crane Operator' e-learning course is professionally prepared, structured and entertaining. All content is checked and regularly updated. For in-depth content, Liebherr continues

to offer a wide range of options in the form of face-to-face training as well as live online training or e-learning opportunities.

Michaela Gogeißl spoke to Heike Lange from Franz Bracht Kran-Vermietung for us about e-learning courses for mobile crane operators. She is the contact there for crane operator training and has – in this capacity – purchased several e-learning courses from us in recent months.

Ms Lange, we are delighted that you have agreed to answer a few questions on the subject of e-learning for mobile crane operators. How did you come to use e-learning?

We have been using Liebherr's education and training programme for a long time to train our employees and, in the past, we have always booked the two-week Liebherr

Totally digital



Heike Lange relies on e-learning for the mobile crane operator licence as an efficient and flexible training option for the employees of Franz Bracht Kran-Vermietung.



"Our aim is to ensure greater safety worldwide through trained crane operators," emphasises Michaela Gogeißl.

Further information about our training courses and the current training programme as a download can be found on the Liebherr homepage.



You can select and book the right e-learning course for you directly via the MyLiebherr customer portal in the "Licences and Services" section. my.liebherr.com

mobile crane operator course, which is held at Liebherr's site. Then our contact at the Liebherr Training Centre informed us that the Liebherr training programme includes the e-learning mobile crane operator course. If you complete this, you only need to do a one-week mobile crane operator course at Liebherr's site to obtain the Liebherr mobile crane operator certificate. We ultimately favoured this way of training. This reduces the costs and the duration of the employee's absence to just 1 week on site at Liebherr.

How would you rate the purchase on our MyLiebherr website?

Your products are clearly displayed on the personal MyLiebherr customer portal and you are guided through the programme. There are also work instructions for obtaining and assigning the e-learning licence, which makes it very easy to obtain an e-learning licence.

On average, how long did your employees spend on the e-learning?

I can't give an exact average. It takes about 15 to 18 hours to complete the course. Some took their time and completed the course in around 65 days. Access is valid for twelve months. Other employees were so keen and eager to learn that they completed the e-learning programme within two days.

How do you use the e-learning courses?

We use the courses both for new employees and as preparation for the mobile crane operator course. Some colleagues also use it to repeat what they have already learnt.

Over the past three years, we have increased the qualification rate of mobile crane operators by 78%. Some of your employees have already successfully completed the e-learning and subsequently the mobile crane operator licence. How do you rate the added value for your company?

We see the added value of e-learning in the fact that employees can complete the course at any time and from any location. This means that they are also available to our company during training, which is an important factor in times of labour shortages.

How motivated were your employees to take part in e-learning? What feedback have you received?

Our employees were very motivated and, as already mentioned, some of them completed the e-learning programme within two days. The feedback from our employees was positive. They got on well with the app and if there were any problems, Liebherr's IT department contacted our relevant employee directly. According to our employees, the course content was taught in an understandable way and was easy to master. Some aspects that were rated positively were that the e-learning programme could be completed at any time and from any location and that you always had access to all of the course content if you had forgotten something.

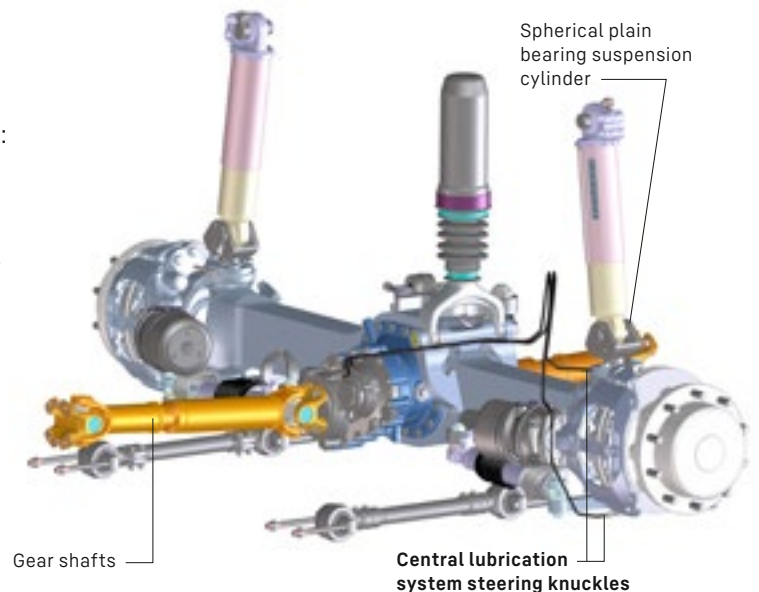
What are the advantages of the central lubrication system in the crane chassis?

For decades, our mobile cranes have been equipped with a central lubrication system in the superstructure as standard. This was not previously available for the chassis. However, we have recently started offering an optional central lubrication system for the travel gear. Tobias Baumann, group leader in our chassis design and development department, explains how this system came about and what advantages it offers.



The central lubrication system in the superstructure is absolutely essential, as the lube points would be difficult for maintenance personnel to reach. The chassis is different: The lube points are easily accessible and their number is manageable.

The suspension cylinders were converted to maintenance-free spherical plain bearings by our supplier back in the early 1990s. And from around 2006, the gear shafts in the drivetrain also became maintenance-free. Over the years, we have made our crane chassis more and more maintenance-friendly. Our aim was to avoid damage.





“The central lubrication system in the chassis ensures optimum lubrication and saves time”

Tobias Baumann

Group leader crane vehicles

Chassis design and development

Lifetime lubrication is only technically not feasible for the steering knuckles. They must be lubricated at two points each year. That's four points per axle. Incidentally, looking at the crane from below from time to time during servicing also has a lot in its favour.

But with the development of a central lubrication system for the chassis, we simply wanted to create even more comfort for our customers and also ensure that the steering knuckles are always optimally lubricated. Added to this

is the time saved for maintenance personnel: With a 9-axle vehicle such as the LTM 1750-9.1, there are a total of 36 lube points that are now managed by the central lubrication system.

Incidentally, the new option has been very well received by our customers, as many of the new mobile cranes are now being ordered with it. The central lubrication system is now available for almost all of our LTM cranes and the compact LTC.



Optimally lubricated

Steering knuckles with lubrication line.



Easily accessible

Filling the central lubrication system takes just a few minutes.

A dozen for the energy transition







Group work among Liebherr mobile cranes

A dozen Liebherr mobile cranes working together – what a picture! The twelve mobile cranes with load capacities of between 90 tonnes and 400 tonnes lifted a one-kilometre-long pipeline to position it correctly for insertion into the ground. The pipeline is part of the district heating network in the Netherlands, which is currently being expanded.

There are a wide variety of measures, options and ideas on how countries can reduce emissions and drive forward the energy transition. The European Climate Law commits the EU to becoming climate-neutral by 2050. The Dutch government has therefore decided to switch heating systems for private households and businesses from natural gas to sustainable energy sources such as district heating or electric heat pumps. To achieve this, the district heating network in the Netherlands must be expanded.

Richard Rijbroek is an environmental manager at Denys and supervised the construction of the pipeline in Delft. The client is Nederlandse Gasunie NV. Rijbroek explains: “Preparations for the “WarmtelinQ” project have been underway for 3 years. We will use the residual heat from industry in the port of Rotterdam and from waste incineration plants to heat homes and businesses in South Holland.” The pipeline runs from the port of Rotterdam to The Hague via Vlaardingen.

“The pipeline goes into the ground, runs under a watercourse at a depth of around 30 metres and comes back to the surface in Delft, 1 kilometre away.”

Richard Rijbroek
Environmental manager at Denys

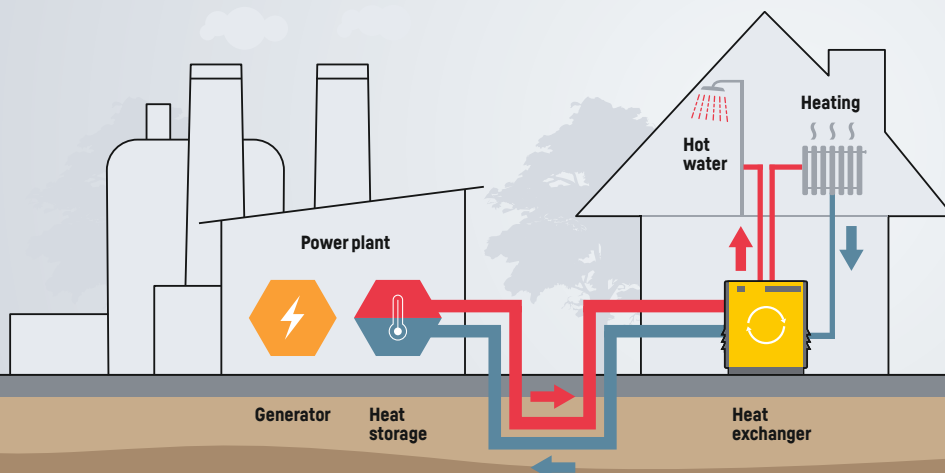


A motorway stands in the way

A drill head was installed on one side of the 1,000-metre-long district heating pipeline, as Harm van Dijk, project manager of the Dutch crane operator Boer B.V., explains: “We are drilling a bore here for the heating network. The pipeline is drilled into the ground.” To do this, the pipeline has to be lifted up and placed in a certain curve so that it is drilled into the ground at a defined angle. According to van Dijk, the length of the retractable arch is 275 metres:

“To get the exact curvature, we form the arch with ten cranes. Each of these cranes lifts 18 tonnes. For this reason, we need cranes with a capacity of 90–140 tonnes here. On the other side of the motorway, we used a 300-tonne and a 400-tonne crane because of the large radius over the motorway.” The kilometre-long pipeline cannot be completely pre-assembled on the ground, as a motorway and a bridge cross the route. It was therefore stored on containers at a sufficient height as required.

How does district heating work?



- In the case of district heating, the heat is mainly obtained as a by-product of power stations or waste incineration plants.
- The heat is fed into a distribution network of highly insulated pipes in the form of hot water and is mainly used for private households.
- Depending on the origin of the heat, district heating is considered sustainable heat generation and helps to reduce CO₂ emissions.

“The pipeline must be drilled into the earth at a certain angle. To do this, we form an arch with ten cranes.”

Harm van Dijk
Project manager of Boer B.V.



Van Dijk reports: “In the run-up to a job like this, thorough preparation is necessary. We create our work plans using AutoCad and the LICCON CranePlanner to determine the required capacity of the cranes. This job was special, firstly because the pipeline is very heavy and secondly because of its proximity to the motorway.” The pipeline,

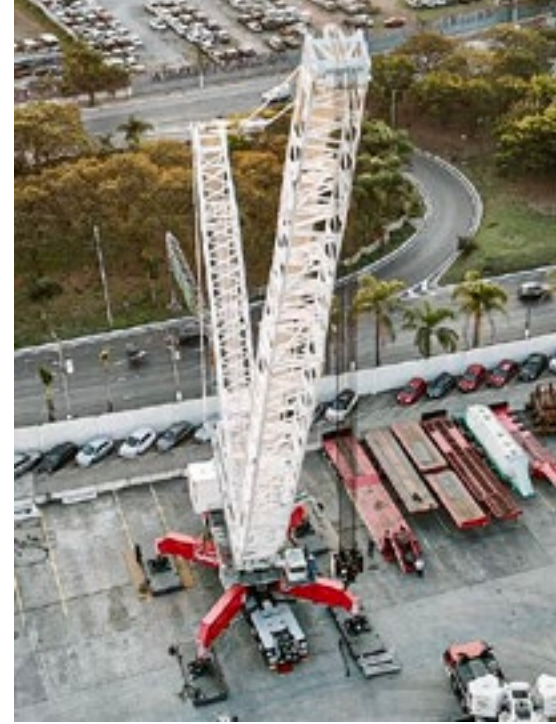
which is 1 kilometre long in total, has an outer diameter of 90 centimetres, weighs 500 kilograms per metre and weighs a total of 500 tonnes. “Our company prefers to work with Liebherr cranes,” adds Van Dijk. “The main reason for us is that the machines are reliable and of good quality. Liebherr also offers good customer service.”





Liebherr – A dozen for the
energy transition – YouTube





Ideal for the Brazilian wind sector: The new used LG 1750 from Guindastes Tatuapé.

Used cranes conquer the Brazilian market

They are quickly available, are characterised by proven quality and, all in all, are also a sustainable solution for the construction industry: used cranes. From 30-tonne cranes on tyres to large crawler cranes, Liebherr is also represented in this market with its complete product range. While demand has so far been particularly strong from the USA, Eastern Europe and Australia, the Brazilian market is also showing great interest in used mobile and crawler cranes from Liebherr.

No matter where in the world it was last used, a repurchased used Liebherr crane always finds its way to a Liebherr repair branch – often to Ehingen-Berg in southern Germany, Oberhausen in North Rhine-Westphalia or Alt-Bork near Berlin, but also to England, Spain, the USA and other countries. A total of around 300 used cranes are marketed annually via the German sites alone. “The cranes that come to us for reconditioning are between two and 20 years old,” reports Bernd Rechtsteiner, Sales Manager Used Cranes.

Supply and demand

Crane types with load capacities of 250 tonnes or more, 5-axle cranes and lattice boom cranes are particularly in demand. At the same time, many operators are replacing their cranes that are more than ten years old. “Liebherr cranes are very popular on the used market and have a

considerable resale value. This is due to several factors, such as their high quality, the availability of spare parts and the service we offer our customers on site, even after many years,” says Mathias Ehrlich from Sales Brazil. Ready-to-use used cranes are a lucrative alternative to a new crane due to the lower investment sums and fast delivery times.

“Before the used cranes are sold again, we bring them up to the latest state of the art, check them for safety and install additional equipment, if necessary,” says Ehrlich, explaining the concept. Customers can choose whether they want to buy their “new used crane” in as-is condition or completely reconditioned. “At the customer’s request, we can not only repaint our used cranes, but also deliver them with a different boom configuration, additional winches or lattice booms, for example.”



Bernd Rechtsteiner and Felix Mussotter



Rene Porto



Mathias Ehrlich

The Brazilian market – young, aspiring and full of potential

“While we initially only accepted used cranes in exchange for a new crane, we now also buy back our used cranes without this condition,” says Rechtsteiner. “At the same time, we are continuing to drive forward our used crane business internationally.” Brazil is still a relatively young but promising market – particularly with regard to the development of renewable energies and the associated construction projects, such as the erection of wind farms. This is where large cranes are used.

The Group is represented by two production companies at the Guaratinguetá location in the state of São Paulo. “As part of Liebherr Brasil, which was founded in 1974, we offer the complete programme for the mobile crane division here: technical customer service, a spare parts warehouse on site, 16 service engineers stationed at various locations throughout the country, as well as a workshop where any repairs can be carried out,” reports Felix Mussotter from Sales South America.

In recent years, business with used cranes has also picked up considerably in South America’s largest country. “For around two years, we have been supplying more used cranes to Brazil, particularly large cranes with five axles or more, as well as crawler cranes. This development is mainly due to the lengthy delivery times for new cranes, which can be around twelve months since the coronavirus pandemic,” reports Mussotter. And Rene Porto, Division Manager for Mobile and Crawler Cranes at Liebherr Brasil, adds: “On the one hand, the wind power sector is fuelling demand for used cranes. On the other hand, there are numerous projects in the mining and oil & gas sectors that give rise to corresponding demand. Young used cranes that are up to five years old are in high demand.”

Second hand, but first class

Since 2021, several used cranes ranging from the LTM 1250-5.1 to the 750-tonne crane have gone to long-standing customers – all of them Brazilian crane rental companies, which in turn operate in the oil & gas, mining and wind industries. One such company is Guindastes Tatuapé. To meet the growing demands of the wind energy sector, the company has acquired the LG 1750, a versatile mobile crane with a luffing jib. With a maximum load bearing capacity of 750 tonnes, this model can be used in a wide variety of areas. “After extensive research by our technical team and taking into account market demand, we have come to the conclusion that the LG 1750 has technical features and capacities that meet most current market requirements, particularly in the wind energy sector. The long-standing partnership between Guindastes Tatuapé and Liebherr, which is based on the reliability of all Liebherr machines in our fleet, also influenced the decision in favour of the LG 1750,” emphasises Commercial Manager Marcelo Monteiro.

Long-standing partnerships and trusting relationships

Thanks to long-standing partnerships, our customers in Brazil have also built up a great deal of trust in Liebherr. “Our customers know that they can rely on excellent after-sales support, even for older used cranes, and that they will still receive a reliable supply of spare parts after many years. This gives the customer great security when investing in a Liebherr used crane,” says Porto. Customers can expect fully repaired and reconditioned used cranes in very good condition. “And that’s what we can offer them!”

On site at Liebherr Brasil: a look inside the modern repair workshop in Guaratinguetá.



Curved thing





Lateral boom curvature due to temperature differences

We all know that a long telescopic boom bends downwards like a banana. However, if the boom leans sideways to the left or right, this is a worrying picture and the question arises: is the boom – and crane – really safe and stable? Joachim Henkel, a familiar face as Head of Design and Structural Engineering clarifies matters and calms worried minds.

The crux of the matter with steel

To do this, it is first necessary to take a look at materials science: In mobile crane construction, the highest possible ratio of load capacity to dead weight plays a decisive role in the competitiveness of the product. The use of high-tensile weldable fine-grain structural steels is the key to lightweight construction. Compared to the structural steel S355 frequently used in structural engineering, the high-tensile fine-grain structural steels used in mobile crane construction offer higher load-bearing capacity by up to a factor of 3.

But where there is sun, there is also shade. Due to the possible utilisation of the high strengths of the steels used, the elastic deformation of the crane's load-bearing structure also increases by a factor of 3 compared to an S355. The elastic deformation of a telescopic boom under load is particularly impressive. Depending on the angular position and extension length of the telescopic boom, this pre-forming is more or less pronounced, both in the direction of the radius and laterally, i.e. to the side of the boom.

The crane operator can cope well with the elastic deformation in the direction of the radius. One of the reasons for this is that the deformation in this direction is recorded by protractors on the telescopic boom and taken into account when calculating the nominal radius in LICCON. The deformation in a lateral direction to the longitudinal axis of the boom, which is particularly noticeable on very long booms in a steep position, is not appreciated by the crane operator, as it can subjectively convey a feeling that the crane is not safe. This deformation is also unavoidable in principle and is due to the lightweight construction and the high-tensile steels used.

Longer lengths ensure stronger curvatures

In recent years, there has been a trend towards ever longer telescopic booms. Whereas around 25 years ago a maximum telescopic boom length of 60 metres was sufficient for telescopic cranes in the 300 tonne lifting capacity class, today it can be 80 metres or even 90 metres for a six-axle mobile crane. As boom lengths have increased over the years, a topic that was also present 25 years ago, but was hardly noticed, is coming into focus: the additional curvature of the telescopic boom due to heating caused by solar radiation.



LTM 1300-6.3 with 90-metre boom: Lateral boom curvature due to solar radiation and suspended maximum load.

Particularly on cold and clear winter days, when the side of the telescopic boom facing the sun warms up, but the opposite, shaded side remains at the low ambient temperature, this effect is characterised by a significant increase in the lateral curvature of the telescopic boom. The initial lateral curvature due to one-sided heating is disproportionately increased by the lifted load, especially in the steep boom position.

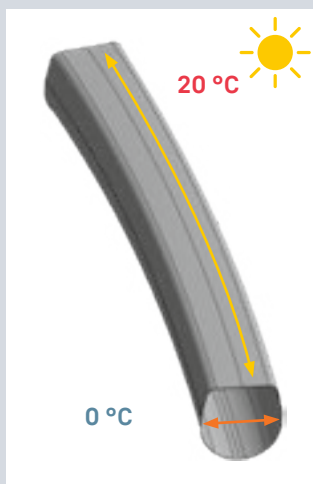


Joachim Henkel
Head of Design and Structural Engineering

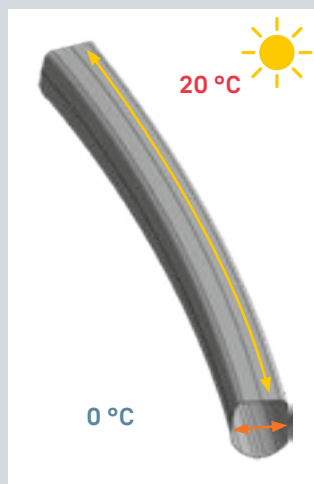
Simply explained

The amount of lateral deformation of the telescopic boom due to heating is largely determined by three factors:

Temperature difference between the left and right side of the telescopic boom	The greater the temperature difference, the greater the lateral deformation.
Extension length of the telescopic boom	The longer the boom, the greater the lateral deformation.
Cross-section width of the individual telescopic boom sections	The narrower the boom, the greater the lateral deformation.



- 10 m + 2.4 mm
- Wide boom cross-section
Smaller lateral curvature or deformation



- 10 m + 2.4 mm
- Narrow boom cross-section
Greater lateral curvature or deformation

Thermal expansion of solids

The extent to which a component expands is determined by the temperature difference and its coefficient of thermal expansion α .

Formula for calculating the change in length:

$$\Delta l = \alpha \cdot l_0 \cdot \Delta T$$

Δl = Change in length

α = Coefficient of thermal expansion for steel: $\alpha = \frac{12}{10^6 \cdot K}$

l_0 = Length

ΔT = Temperature difference

Example:

A 10-metre long steel component heated by 20 degrees:

$$\Delta l = \alpha \cdot l_0 \cdot \Delta T$$

$$\Delta l = \frac{12}{10^6 \cdot K} \cdot 10 \text{ m} \cdot 20 \text{ K}$$

$$\Delta l = 0.0024 \text{ m}$$

The component expands by 2.4 mm in the longitudinal direction

If these assumptions are transferred to a specific telescopic boom and the additional circular curvature caused by the one-sided expansion is taken into account, the formula for calculating the deformation due to thermal expansion becomes even more complex. With the LTM 1230 5.1, for example, a maximum telescopic boom length of 75 metres results in a lateral deformation of the boom head of 0.66 metres with a temperature difference of 20 degrees between the left and right side of the telescopic boom due to the thermal expansion of the steel alone. If the telescopic boom extended to 75 metres in the steepest possible boom position is additionally loaded by its own weight and by the maximum possible load capacity of 11.4 tonnes in this position, the lateral deformation can increase to up to 2.8 metres.

Extensive measurements at Liebherr have shown that a temperature difference of 20 degrees between the left and right side of the telescopic boom is a good approximation of a limit value. The resulting lateral deformation of the boom is taken into account in the structural calculation of the crane. This means that the crane can be operated safely up to this temperature difference within the valid load chart. Nevertheless, the lateral deformation of the telescopic boom can sometimes be an interference. The crane operator can counteract this by turning the superstructure through 180° to heat the side of the telescopic boom that was previously shaded. Changing to a higher reeving also reduces the force in the retracting part of the hoist rope from the pulley head to the winch and thus the lateral deformation of the boom under load.

What should I bear in mind when changing the diesel particle filter?

On 1 January 2019, EU Regulation 2016/1628 came into force, which affected all diesel engines installed in our cranes. For this reason, we have been supplying our cranes with Stage V engines to all EU countries and some other countries that also require this since then. In addition to the previous SCR technology (Selective Catalytic Reduction), a closed particle filter system was added, which filters almost all soot particles from the exhaust gas and also helps to protect the environment. Like most filters in technical systems and machines, the diesel particle filter (DPF) must also be replaced at certain intervals. Norbert Maier, Head of the Technical Customer Service department, is responsible for exhaust gas aftertreatment, among other things. He explains what needs to be considered when replacing the DPF.

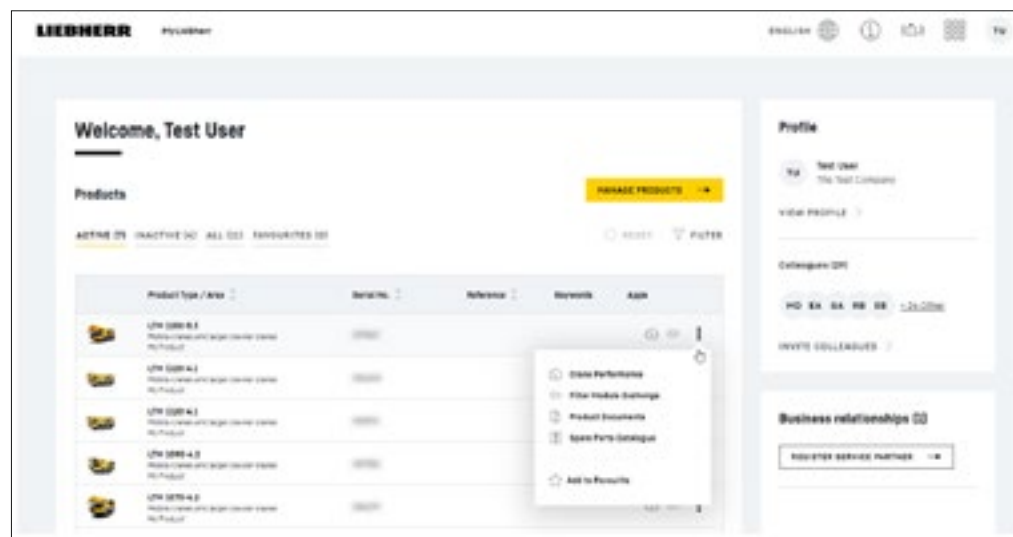
You are all used to changing oil and air filters regularly – this work is routine when servicing your cranes. But probably very few of you have ever replaced a diesel particle filter on a Liebherr crane, because the vast majority of cranes with emission level 5 have less than 5,000 operating hours on the clock. The DPF only needs to be replaced after this period of operation.

Display on the LICCON screen

When your crane is ready, its LICCON screen will display: “Particle filter DPF Cleaning interval reached, replace DPF filter element.” This message on the screen is the first level of information and warns you that you should now order a particle filter – preferably via the MyLiebherr

customer portal. We strongly recommend that you order the replacement filter, whether new or cleaned, from Liebherr, as you will receive a warranty from us.

In the second stage, the main warning, the LICCON screen will display: “Particle filter DPF Cleaning interval reached, replace DPF filter element – reduction!” Now the change must be carried out promptly, a power reduction is already triggered. In contrast to the replacement of other filters, we have decided to display the request to replace the DPF via LICCON instructions. It is essential that the filter is changed correctly, as the crane control system must be informed of the change and the load status of the filter, i.e. the amount of soot and ash, must be reset to “zero” at the



MyLiebherr supports the filter change step by step.



“You can change the diesel particulate filter completely by yourself. This saves costs and you remain flexible in your planning.”

Norbert Maier
Head of Technical Customer Service

same time. You will need a reset code from Liebherr. This is a matter of component protection – the filter could be destroyed if this is carried out incorrectly.

Support from MyLiebherr workflow

To support our customers, we have created a workflow via the MyLiebherr customer portal that accompanies the filter change step by step. It works for all LICCON2 cranes and allows you to change the DPF completely yourself. This saves costs and increases flexibility in your planning. Only on very few models with LICCON1 control do you need your Liebherr service partner to reset the load status of the DPF via the engine control unit.

Now to the workflow: A “Filter Module Exchange” button is available for your cranes registered in MyLiebherr from LICCON2 control and Stage V. If you activate this, you will receive a brief explanation of the “Generate reset code” function on the screen. In the next step, the required data is requested: Machine serial number, engine serial number, serial number of the newly installed filter module and the date on which the reset was carried out. The fields are already pre-assigned with the data available in MyLiebherr, including the filter serial number if it was purchased via Liebherr for a specific piece of equipment.

The reset code can be generated four weeks into the future from the current date. The reset code is generated for entry on the selected date and instructions are provided for download. In addition, you will receive all information by e-mail. Important: The reset via the LICCON control system must take place on the exact day planned. We recommend carrying out the complete replacement process, including resetting, on the same day: Filter change, MyLiebherr workflow and reset via the LICCON control system.

We are pleased to be able to make you a new digital offer free of charge with the workflow described. Of course, our Customer Service and our worldwide service partners will be happy to change the diesel particle filter for you.



Trainer Thomas Fritsch demonstrates the replacement of a diesel particulate filter on a model at the Liebherr training centre in Ehingen.

Girl power in open-cast mining: Wasel recruits two female crane drivers

Operating heavy rough-terrain and crawler cranes is no longer the domain of men. Crane rental company Wasel from Bergheim near Cologne has now been able to recruit two female specialists for the cockpit of telescopic cranes in the Rhenish lignite mining area.

RWE Rheinbraun AG is the largest coal-fired power producer in Germany. The Group currently operates four power plants in the Rhenish mining area. Production will continue until 2030 from the Garzweiler, Hambach and Inden open-cast mines. The gigantic bucket wheel excavators and spreaders at the heart of lignite mining are spectacular. But they don't work without an armada of auxiliary equipment. Telescopic cranes provide important support for maintenance and repairs. Liebherr customer Wasel from Bergheim near Cologne is the crane service provider on site and has been able to employ two women to operate state-of-the-art telescopic cranes for the first time. The subsidiary of the Hagedorn Group is convinced that when it comes to operating large machines, it's all about brains and a sure instinct for handling the latest technology. Hagedorn launched the "Women in Construction" campaign at the end of 2020 and has been a pioneer in the advancement of women ever since.

On-site visit to the 48 square kilometre Garzweiler open-cast mine, which will supply up to 25 million tonnes of lignite per year until 2030. There we meet Wasel's crane drivers. Angelina Heinen obtained her HGV driving licence in 2022 and reports: "After I had mastered operating tractors and trucks, I wanted to change careers and drive a crane for Wasel. And since October, that's exactly what I've been doing. With technical understanding and good guidance and support from colleagues at the beginning, the induction process went quickly. My conclusion: I'm sticking with it." Details were often explained during breaks, tips were given and tricks were shown. But there's more to it than that. And Rebecca Herkenrath explains: "The necessary knowledge of the many square kilometres of the site, the safety instructions specific to open-cast mining and information about escape routes and assembly points is extensive. There's a lot more on crane technology on top of that. But the job fulfils me – I like sitting in the cab and being in charge from there."



So much for "cranes are for men." Rebecca Herkenrath (left) and Angelina Heinen (right) have been operating state-of-the-art Liebherr mobile and crawler cranes in the Garzweiler open-cast mine since the beginning of 2023.



Rebecca Herkenrath's husband is a crane driver at Wasel and has permanently "infected" his wife with the crane virus. Their conclusion: "Liebherr technology is easy to control."

Rebecca Herkenrath's reasons for joining Wasel were family-related: "My husband has been working at Wasel on various cranes for years and when the children were growing up, I started looking for a job." She was already working at Wasel as a temp and, according to her husband's reports, she applied for a seat on the crane. "I got the job and was quickly burning with enthusiasm. I enjoy working responsibly with these powerful machines and completing orders." The "dead times" are a little tough, she explains: "I'm sitting in the LRT cab, the load is attached and little happens for hours because I'm holding a winch in the assembly position with the crane, for example. It takes time for the part to fit and I monitor everything from the cab during this time."

Speaking of learning, Angelina Heinen reports: "We practised this very quietly on dry land, so to speak. Fastening and lifting loads, driving with loads – the crane responds completely differently to a car. But it's fun and I'm really proud when I get down from the crane in the evening, without which the huge open-cast mining excavators wouldn't work." And your male colleagues? "All good," adds Angelina Heinen: "We were given a great reception. Our instructions are also accepted by external companies and our heavy goods transport drivers – as a woman, you are certainly a little more diplomatic in dealing with them. And there's full support from the Wasel team."



Angelina Heinen switched from trucks to rough-terrain and crawler cranes and doesn't regret it for a second. "My colleagues are great and not short of tips."

Christopher Neuhaus is head of department at Wasel and is responsible for RWE's fleet of around 11 Liebherr cranes. LTM, LTL, LRT and LTR cranes are in use. "When Rebecca and Angelina approached me and wanted to drive the crane, we said yes straight away. Because they have technical understanding and that alone is important when operating our modern Liebherr fleet. We also have optimal support in Ehingen and are happy to utilise the training opportunities there for our colleagues."

The two new Wasel employees agree that the telescopic crawler crane is easier to position with a load: "Because we can drive with a load, which makes working on the large open-cast mining equipment in particular much easier." They are both particularly proud to be able to drive the new LRT rough-terrain crane: After all, this really is a rare and very special crane in Germany."

The work is varied, with assembly work on large open-cast mining equipment, material loading and many other tasks keeping the blue and white Wasel athletes on their toes. Rebecca Herkenrath tells us: "I really enjoy doing the job – even if you sometimes have to concentrate on the suspended load for hours at night in challenging weather conditions – for example when repairing the large equipment or at belt transfer stations." Christopher Neuhaus adds: "We are urgently looking for staff, so we are all the more pleased that we now have two new colleagues on board who are happy to sit in the modern cockpits from Ehingen. The operation is super ergonomic and thanks to training and remote instruction from Liebherr, all new team members are optimally prepared – training at the Liebherr plant in Ehingen is already a foregone conclusion."

The world with Liebherr

Mobile crane on hooks

are a common sight. An LTM 1750-9.1 hoisted on board in tandem by two Liebherr LS 250 ship cranes, on the other hand, is a rather rare sight. The two cranes are working together to lift a brand new 9-axle crane from BMS Heavy Cranes weighing 106 tonnes over the edge of the harbour.

Photograph: Lause Paulsen





Floating like 300 tonnes





Tragedy on Lake Constance

A giant sheet of paper floats above Lake Constance – a perfect illusion of weightlessness, and yet the timber, polystyrene and steel structure weighs around 300 tonnes. This is the set for a production of Puccini's opera "Madame Butterfly", which premiered on the floating stage of Bregenz on July 20, 2022. But why is a sheet of paper the setting for this tragic love story? What gives all this heavyweight technology this illusion of lightness? And what does one Liebherr crane have to do with any of it?

Rising suspense as the stage is set

The premiere is getting closer by the day. Wolfgang Urstadt, technical director of the Bregenz Festival, is slightly nervous as he gazes toward Lake Constance, where the final lifting operations on the floating stage are taking place. Only a handful of the 117 individual parts that will later form the stage are still missing. Urstadt, who trained as a carpenter and stage manager, has been tackling a monumental undertaking over the past weeks and months: The world's largest floating stage is slowly but surely getting ready for the next opera season. And expectations are high – after all, the festival is well known for its spectacular backdrops and colossal stage sets. Urstadt has been planning, organizing and coordinating the work for the last three years. Now there is nothing left for him to do but watch as one by one the last sections are attached to the stage, which is more than 20 metres high. Liebherr was brought on board for the lifting work. The 150 EC-B 8 Litronic flat-top crane ensured smooth operations where scenery parts weighing several tonnes had to be transported with maximum precision.

Journey of an artwork: from imagination to reality

The idea for the stage design is the brainchild of Canadian designer Michael Levine, who has been designing sets for the world's most renowned stages for almost forty years. This is his first time in Bregenz. He began by designing a model and then digitizing it. His vision: a large, ultra-thin sheet of parchment floating on Lake Constance, looking as if it had been heedlessly crumpled and tossed into the water. One side of the sheet has a slight upward curve over the surface of the lake. An ink painting of a Japanese landscape can be seen on the bright white surface. It is unprotected and at the mercy of the waves. Nestled against it on the right is a paper ship, painted with elements of the American flag. "Fragile and ornate," is how Artistic Director Elisabeth Sobotka describes the set. The sheet of paper, with its fragility and delicacy, symbolizes the main character in this tragic opera.

The enormous technical challenge facing Urstadt was to turn Levine's vision into reality by placing a floating "sheet of paper" more than 1,340 square metres in size on the lake surface. Using folds and curves to create an impression of lightness – while building the entire structure in such a way that it will hold up in the water in all weather and be safe to walk on.

“Many years ago, we would construct the set without using a crane. But with the way expectations have grown and how we build today, that wouldn’t be possible now at all.”

Wolfgang Urstadt

Technical Director of the Bregenz Festival



Art under construction or an artistic construction site?

“For me, the essential work has already been done,” says Urstadt as the penultimate piece of scenery inches closer to the workers on the stage. The technicians, secured with safety harnesses at around 23 metres height and moving around the set at a fast pace, start attaching the piece of scenery as soon as the crane has come to a halt. “We spend about three to four years on average working on a project. We are well within schedule. Originally, four or five extra days had been planned for lifting the individual sections of the sheet of paper. Apparently, we don’t need them anymore,” says Urstadt with a smile, while on the shore of Lake Constance, other members of the team are busy preparing the last component for the next lift. The individual polystyrene blocks, which were placed in their positions on the stage one by one, were manufactured in an assembly hall in the neighboring town. They are all different sizes and were shipped by special transport to the shore of Lake Constance, where they were transformed into a walkable sculpture in the water, about 23 metres high and 33 metres wide.

“The crane fits the pieces together like a puzzle,” says Urstadt, commenting on the action. “Here on Lake Constance, we can of course achieve vastly different dimensions than in a theater. The components are all quite large and building the set is heavily dependent on the weather – in fact, it’s just like being on a construction site – only in the water. We needed divers for many of the tasks, such as the erection of the crane itself. The crane’s undercarriage was pre-assembled and partially ballasted on land because it was impossible to hammer in the bolts underwater.”

The workers on the shore watch the crane as the boom moves farther and farther away from the stage. As soon as the crane hook is back in position, they start attaching the last piece of scenery. “The 150 EC-B used here has a load capacity of eight tonnes. This meant that it was possible to construct the stage out of relatively heavy individual parts. If we had used a lower capacity crane, we would have had to make the set from many more individual parts,” explains Urstadt. It is also important to use a sensitive crane for the work, which is carried out in front of a perfect Alpine backdrop.

The shattered soul of Madame Butterfly

Today, “Madame Butterfly” is one of the most frequently performed operas in the world. Yet when it premiered at La Scala in Milan in 1904, it was a resounding flop. Puccini revised his creation and managed to win over the audience in Brescia in the same year. The tragedy revolves around the Japanese geisha Cio-Cio-San, or Butterfly, who falls in love with Pinkerton, a lieutenant in the US navy. He marries her according to Japanese custom before sailing back to his homeland. Butterfly gives birth to his child shortly after and waits three years for her beloved husband to return. It is not until he returns with his American wife in tow that she realizes he never took their union seriously. She hands the child over to him and takes her own life.



Profile of the floating stage 2022 / 2023

Size: almost two football fields

Weight: 300 tonnes

Parties involved: 33 technical companies, 14 festival technicians including crane operators

Substructure: 119 timber and steel piles, embedded in the lakebed to a depth of up to six metres

Planning period: two to three years

Crane deployment period: six to seven months

Construction period: around ten months from manufacturing to final technical adjustments

A jigsaw puzzle for crane operators

The sensitivity of the control system is particularly appreciated by the crane operator. Lifting sections onto the floating stage is a precision job that requires experience. Roland Bühler, who goes by the name of Chappie, has plenty of this. He has had one of the best views of the floating stage for 20 years now. Madame Butterfly is his tenth opera set. Despite this, even he finds the task challenging: "Fitting the 117 elements seamlessly into one another was high-grade precision work. But it went very smoothly thanks to the crane's control system. It does exactly what I want," says Chappie, who has an impressive total of 12,000 crane operating hours under his belt.

The floating stage technicians and the crane operator are a well-rehearsed team. Half of the stage set is underwater, where Chappie can't see anything. In some situations, this meant that he was like a pilot flying blind – wholly reliant on the ground crew's instructions. What felt like a 300-tonne weight fell from his shoulders when the last part of the set was firmly installed and the stage crew radioed the



signal for lunch. The basic framework of the stage was in place. "One of the things I love most about working up here is the variety. You start off with the steel construction, then move on to stage construction, and every two years something entirely different comes along again. One thing's for sure: I never get bored here," laughs Chappie.

The premiere is in sight

Wolfgang Urstadt ticks off one more item on the project plan: The stage is up. But the work goes on. His next challenge is to make the composite surface look like a unified whole. "We had to plan everything, starting from the materials, to ensure a smooth, even surface," says Urstadt. For this purpose, the entire scenery sheet had to be treated with facade plaster and painted to match.

When the performers finally took to the stage, Urstadt took on the role of the observer. The suspense will remain until all 26 performances, during which the stage set and all the technology must operate without a hitch, are over. "There are 400 to 500 people involved in the production. Everyone is important, every nut, bolt and screw. And of course, there is always plenty of opportunity for something to go wrong," says Urstadt. But even if it does: The roughly 250,000 people who attend the Bregenz Festival generally don't even notice.

And while the audience is enjoying the perfect illusion of 300 tonnes of weightlessness at every performance, Urstadt is already busy elsewhere. Because after the game is before the game in the arts as well: Planning for the 2024 production has long been underway, with other, equally spectacular challenges.



Crane operator Roland "Chappie" Bühler



Season 2009 and 2010: Aida
Image: Bregenzer Festspiele / Liebherr



Season 2011 and 2012: André Chenier
Image: Bregenzer Festspiele / andereart



Season 2013 and 2014: Magic Flute
Image: Bregenzer Festspiele / Benno Hagleitner



Season 2015 and 2016: Turandot
Image: Bregenzer Festspiele / pigrafik

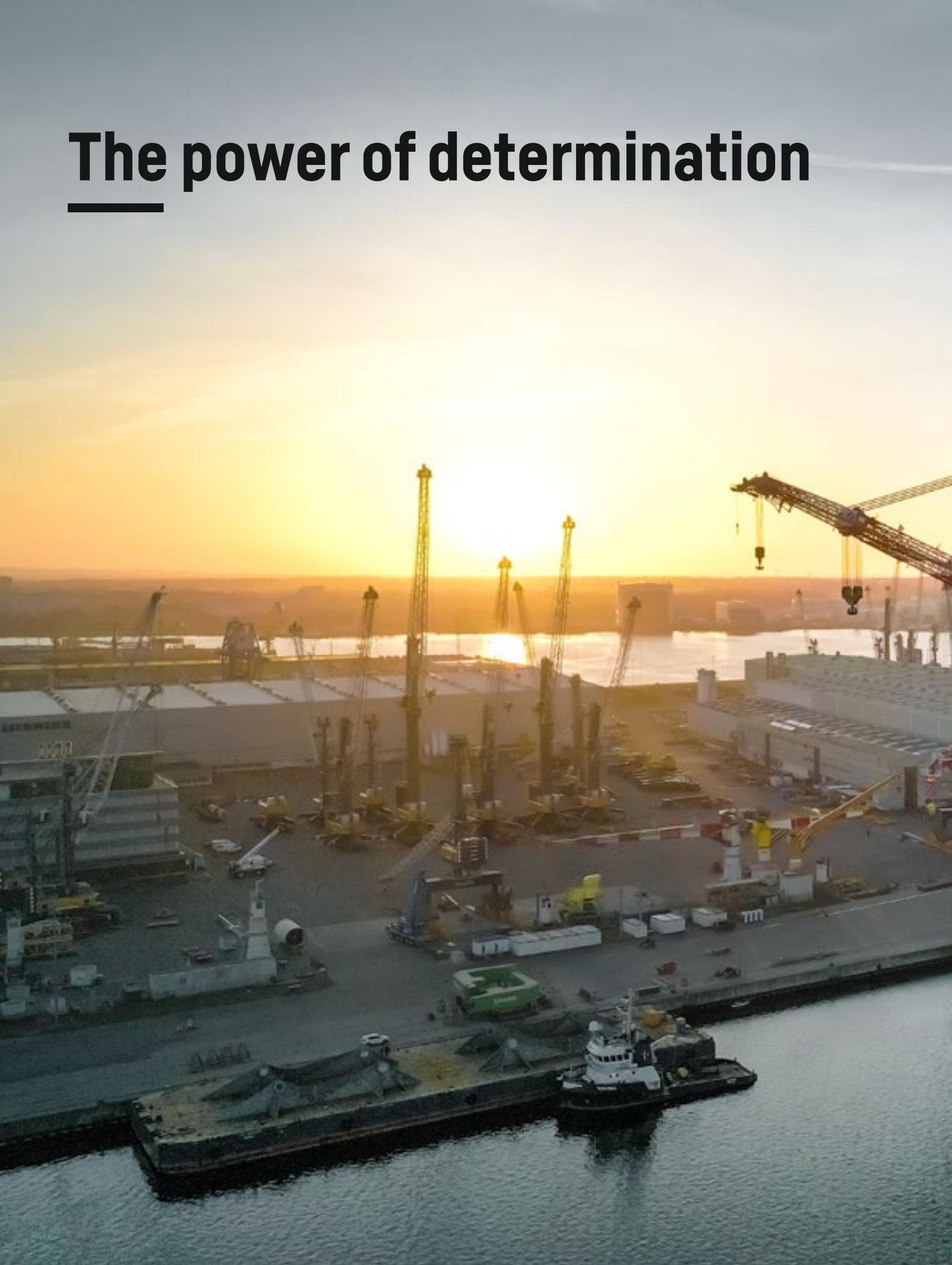


Season 2017 and 2018: Carmen
Image: Bregenzer Festspiele / Karl Forster



Season 2019 and 2021: Rigoletto
Image: Bregenzer Festspiele / Anja Köhler

The power of determination





Serving the energy transition

The most powerful crane Liebherr has ever developed, the HLC 295000, has now begun its service on the special ship "Orion." Its goal: to contribute to the energy transition. The offshore crane will fulfil its intended purpose thanks to a real tour de force of technical know-how and human determination. For shortly after the crane had been successfully installed on the ship, a devastating setback occurred.

Looking back

The beginning of a new era: the HLC 295000 embodies the next generation of Liebherr offshore cranes. Manufactured at one of our German sites, in the Hanseatic city of Rostock, it was installed on the special ship "Orion" of the Belgian DEME Group in Rostock harbour. Numerous teams

from a wide range of departments worked on this pioneering project for years. This is undoubtably a milestone in the relatively short company history of Liebherr-MCCtec Rostock GmbH. The entire workforce at the site watched the HLC 295000 grow over a period of months. As it grew, so did their pride in this unique product.





“Despite the difficult circumstances, we did not hide our heads in the sand, but instead rolled up our sleeves and got down to work.”

Frank Busse

Technical Advisor in Customer Service for Offshore Cranes



The crane is primarily used to install the increasingly large offshore wind turbines that will make a significant contribution to the energy transition. At the same time, the energy transition is also the driving force behind a rise in the dismantling of disused offshore oil and gas production facilities, where the HLC 295000 helps dismantle large and heavy parts offshore. Looking ahead to the future today is one of Liebherr's basic principles. The HLC 295000 is a vital tool for ensuring sustainable energy provision for present and future generations.

It was the 2nd of May 2020 – a date that will stick in the minds of the entire workforce at Liebherr-MCCtec Rostock GmbH for years to come. The last finishing touches to the assembly work had been completed. The HLC 295000 had been installed, and the Orion was ready for use. Before the ship embarked on its first journey however, the crane and ship were tested in Rostock harbour, as per regulations. In principle, this is a standard procedure in the industry. But then something happened that no one could have expected. During the last overload test, which involved hoisting a 5,500-tonne load, one of the purchased parts on the crane failed: the hook. It broke under a load of 2,600 tonnes. A hail of steel rained down. The noise was deafening. The load snapped off, triggering a disastrous chain reaction in which two people were injured and the crane suffered severe damage. It was an incident that shook the entire Liebherr plant to its core.

“It still sends shivers down my spine whenever I see pictures of it. At first we simply couldn't believe it,” recalls Frank Busse, Technical Advisor in Customer Service for Offshore Cranes, who had been monitoring the installation of the crane from the very beginning. “My first sensation was a feeling of helplessness. On that day, we saw the work of years literally come crashing down. At the same time, all the other prior tests had shown us that the crane was working. The only ray of hope at that moment: Thanks to the stringent safety precautions, nobody was seriously injured.



Salvage and dismantling of the HCL 295000 with Liebherr mobile and crawler cranes.

A new optimism sweeps through Rostock

The damage was huge. The flagship project was, to a great extent, destroyed. Components into which so much experience, sweat and lifeblood had been poured became unusable within seconds. Everyone involved was stunned. But the silence that fell over the entire Liebherr plant after the incident increasingly gave way to a new optimism that soon made itself felt everywhere. Without too much hesitation, solutions were sought for the challenges that now lay ahead. There was a sense of new beginnings in the air. Following a close dialogue with all the parties involved, the decision was made: The HLC 295000 was to be rebuilt. It was a sign of partnership and strong cohesion. Living values – especially in times of crisis.

When Frank Busse heard that the crane was to be salvaged and rebuilt, he rushed to the scene immediately. “It was a very memorable day for me. We were going to rebuild our crane!” he recalls. “You could immediately feel a surge of energy sweep throughout the entire team. Despite the difficult circumstances, we did not hide our heads in the sand, but instead rolled up our sleeves and got down to work. This is precisely why I work for Liebherr,” says Busse.

Shortly afterwards, Frank Busse was appointed to the coordination team due to his experience in projects and assembly. He and his colleagues set about planning and

implementing the salvage and reconstruction work. There was no blueprint for salvaging the crane; it had suffered enormous damage. “The situation was unclear. At first, we had only a rough idea of what was in store for us,” says Busse. “But that only made us more determined. For me, this goes hand in hand with an almost competitive sense of ambition that calls for passion and an equally enthusiastic team. All of this came together for the HLC 295000.”

During the salvage and dismantling operations, says Busse, his team was able to rely on cross-sector expertise and a wide range of highly specialised Liebherr machinery. “Our technical partners and suppliers all pitched in as well,” says Frank Busse. “We also had support from international experts who helped us salvage the crane. We definitely had the crème de la crème working together in Rostock.”

After dismantling, the entire crane was comprehensively inspected. A new boom and parts of the A-frame had to be made from scratch. All the main components were meticulously examined. “We wanted to know down to the smallest detail what had happened when the accident occurred and what effect it had on every single component of our crane,” Busse explains. “This was elementary if we were to be able to hand over a rebuilt crane on par with a newly manufactured piece of equipment.”



The Orion returns

In August 2021, the newly repaired Orion returned to the Rostock overseas port. When Frank Busse saw the bright green ship on the quayside at the start of his shift, his heart beat a little faster. “Now more than ever,” said the 36-year-old happily. The repaired crane was parked in the Rostock workshops where it awaited installation. Everything was ready.

“First we installed the revolving platform on the ship, then we mounted the A-frame and, in one last big hoist, we assembled the new boom,” says Busse.

As important and challenging as the installation of the large components was, however, the assembly and commissioning of the hydraulics, electrics and software that went on in the background were equally important. Attaching the rope was especially exciting for the team. It involved reeling in a steel cable: 3.1 kilometres long, and as thick as a sturdy sailor’s arm. “It’s absolutely fascinating every time,” says Busse.

Time to set off

The work was completed in March 2022. The team began putting the crane into operation. Everyone was unusually tense just before the overload test. This was the moment that the accident had happened many months ago. Everyone focussed on lifting the 5,500 tonnes. This time, the hook withstood the strain. “We expected nothing less. But with this kind of back story, one does feel a certain sense of relief,” admits Frank Busse after the last load test.

The Orion has a new shine to it with the HLC 295000 heavy-duty crane – clearly visible from afar – on board. “It’s finished. Amazing,” is the first thought that comes into Busse’s mind. And by that he doesn’t just mean the HLC 295000, but also the journey that brought him and his team to this goal.

His gaze drifts across the calm waters of Rostock’s overseas harbour. Time for Frank Busse to take stock: “I’ve been with Liebherr for 15 years now. Hopefully, this kind of incident will remain a one-off. What a challenge. Once again we have seen that unforeseen events can always happen. They can set us back. But the important thing is always how we deal with these setbacks,” he sums up as the Orion – and with it the most powerful Liebherr crane – finally embarks on its first assignment.



The Legend Grows

LG 1800-1.0

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Mobile and crawler cranes



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