

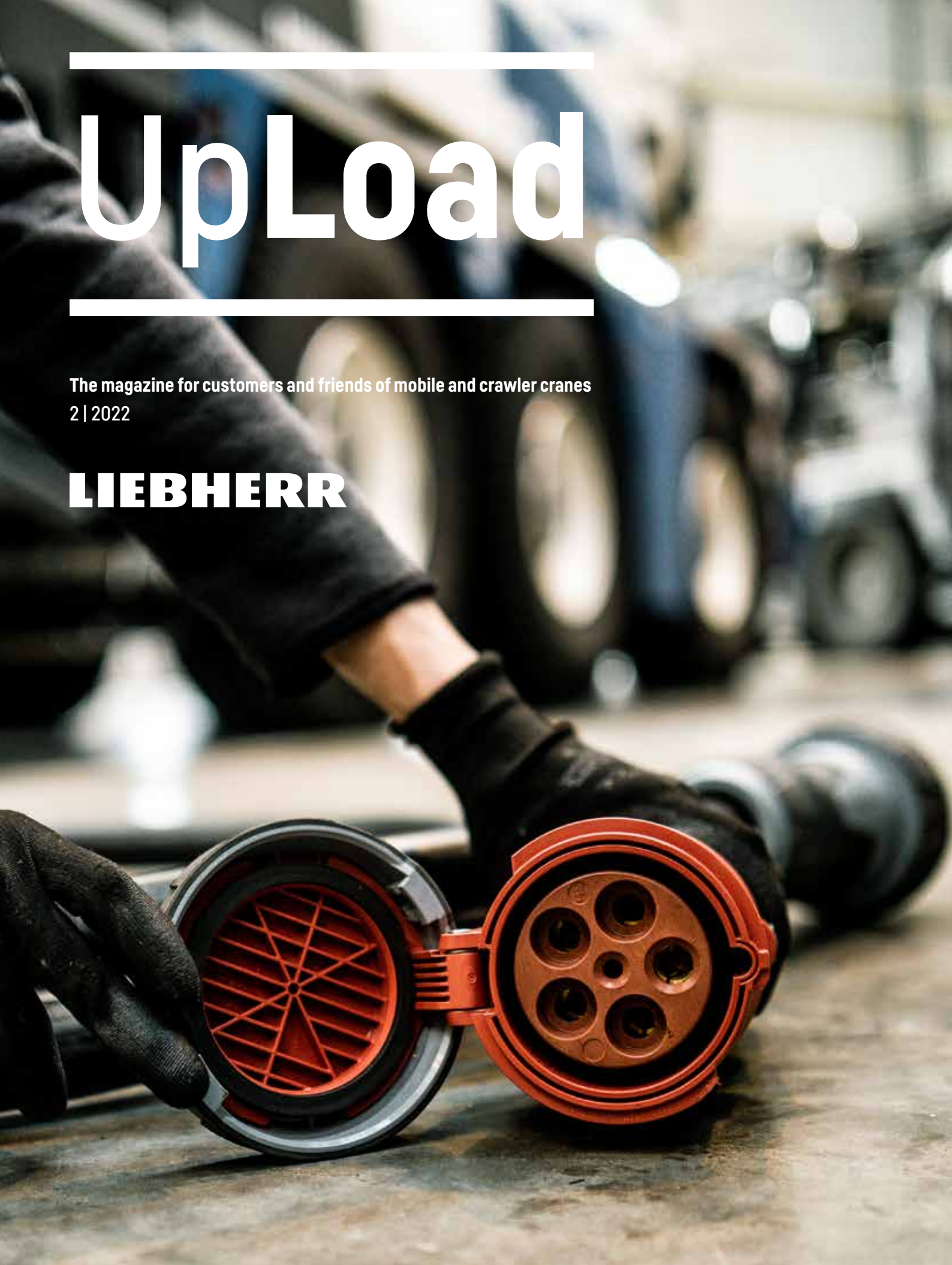
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# UpLoad

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The magazine for customers and friends of mobile and crawler cranes  
2 | 2022

**LIEBHERR**



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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,

At the start of the year, all of us in Ehingen were delighted because the outlook was encouraging – our high vaccination rates and few serious illnesses meant that we were looking forward to leaving the pandemic behind us fairly quickly, together with all the postponements and bottlenecks it had caused in our supply chains.

But unfortunately, things turned out very differently – some countries are still in lockdown, particularly in Asia. This is resulting in lengthy production downtimes and delays in deliveries. And then, in February we also saw the start of the war against the democratic, sovereign state of Ukraine. A war at the very heart of Europe, which is affecting all of us and which none of us thought possible. We all think of the countless victims and the people in Ukraine whose lives have changed so tragically from one day to the next. Compared to the humanitarian consequences of the war, the financial effects are insignificant, even though we are not fully aware of all of them as yet. However, we are already noticing a number of points which are extremely concerning, such as rising energy and material costs and, yet again, problems with the international shipment of goods. All this combined has led to rising prices in general, and we are by no means protected from them.

The whole thing is a challenge to us all, of course. Nevertheless, we managed to unveil two world firsts in spring – and to manufacture them on schedule in the run-up. The LTC 1050-3.1 is the very first crane which, thanks to its additional, integral electric motor, can be operated on site with zero emissions. Find out more about it on page 30. And the LR 12500-1.0 is a new heavy duty crane for handling offshore components and industrial structures – see page 12 for some components of the impressive boom.

We are daring to go down new paths and are trialling lots of methods to reduce CO<sub>2</sub> emissions and protect the climate. At the same time, we want to make significant reductions to road traffic. And in this respect, we are working with strong partners for transporting our cranes and you can read all about this starting on page 56. But we too are a strong partner – for example for digging out cranes from mounds of snow metres high near the North Cape. We have a report on this cool piece of customer service on page 64.



Our service for you includes our MyLiebherr customer portal. There are a few new features to report from this: New design, new functions and new content – find out on page 68 what we can already offer and what you can expect to see over the next few months. We also provide you with some valuable tools for planning crane jobs. Find out more about the subject of ground and accident prevention on site in our “Background” category on page 74.

Finally, I would like to highlight our article on fire service cranes. An offshoot of our all-terrain crane portfolio, specially designed for fire service use – and very much appreciated by many of them. We explain on page 48 how and where these special cranes are used.

Let me wish you and all of us what I hope will soon be quieter, more peaceful and happier times – and despite all the current problems, I am looking forward very much to seeing and welcoming many of you to the Bauma in Munich.

A handwritten signature in black ink, appearing to read 'Ulrich Heusel'.

**Ulrich Heusel**  
Managing Director Production  
Liebherr-Werk Ehingen GmbH

# The subjects of our articles.

## Mobile and crawler cranes

**Moments** ..... 6  
Exciting jobs and fascinating buildings.

**Power packs in action** ..... 24  
Two large cranes experience the pandemic in Sardinia.

**Milestone for cranes** ..... 42  
The development of the LICCON crane control system.

**Zero emissions and full power** ..... 30  
The LTC 1050-3.1 comes with an electric motor.

**With blue light and siren** ..... 48  
How firefighting cranes are built and used.

**On the road worldwide** ..... 36  
The LTM 1150-5.3 impresses on its first first jobs in Italy.





**Also online:**  
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to read, look at and download.

[www.liebherr.com/upload](http://www.liebherr.com/upload)



## In focus

- Sustainable new ways** ..... 56  
How transport routes are being changed to reduce CO<sub>2</sub> emissions.
- Defying snow and cold** ..... 64  
A service mission at the wintry North Cape in Norway.
- Totally digital** ..... 68  
MyLiebherr with its new interface and many valuable applications.
- Background** ..... 74  
What the ground means for crane operation.

- My tip** ..... 77  
How to protect the clutch.
- Simply explained** ..... 80  
The NK System for the LTM 1650-8.1.
- In conversation** ..... 84  
Stable and quick-witted?  
Then head for the crane industry.
- Katie Cranes** ..... 86  
Crane operator with a degree in literature.
- Land of contrasts** ..... 88  
How mobile and crawler cranes are used in Chile.

## The world with Liebherr

- Interview with the family shareholders** ..... 96  
A look back at the past year and an outlook for the coming months.
- Ode to the Wind** ..... 100  
What skills it takes to harness the power of the wind.



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# Moments

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## **Crane work where others go on vacation**

Above the rooftops of Nice on the Côte d'Azur in France, an LTM 1100-4.2 from Mediaco assembles a tower crane.

A special steel structure was required for the site in order to be able to place and erect the crane at all in the narrow old town.







## Bridging the Rhine

The new motorway bridge on the German A1 between Cologne and Leverkusen will have eight lanes. Completion is scheduled for 2024.

HKV Schmitz+Partner has been commissioned with a new LR 1700-1.0, equipped with V-Frame, for lifting the precast parts.













## Work is done

Several tower cranes have completed their work in the construction of a new office, administration and residential complex in the Kwu Tung district of Hong Kong. Now the Set Win Group is using its new LTM 1650-8.1 to dismantle the large top slewing cranes. Here, the maximum on eight axles convinces with its strong 80-metre telescopic boom.



Photo: Paul Leung



A large, heavy-duty industrial crane boom is shown in a factory setting. The boom is a thick, cylindrical metal structure, painted in a vibrant blue color. It is supported by a complex network of steel beams and brackets. The background shows the interior of a large industrial building with high ceilings and structural supports. The lighting is dramatic, with a strong blue glow highlighting the boom and its supporting structure, while the rest of the scene is in shadow.

## HighPerformanceBoom

An unrivalled wide main boom gives the new LR 12500-1.0 crawler crane the stability of a power boom.

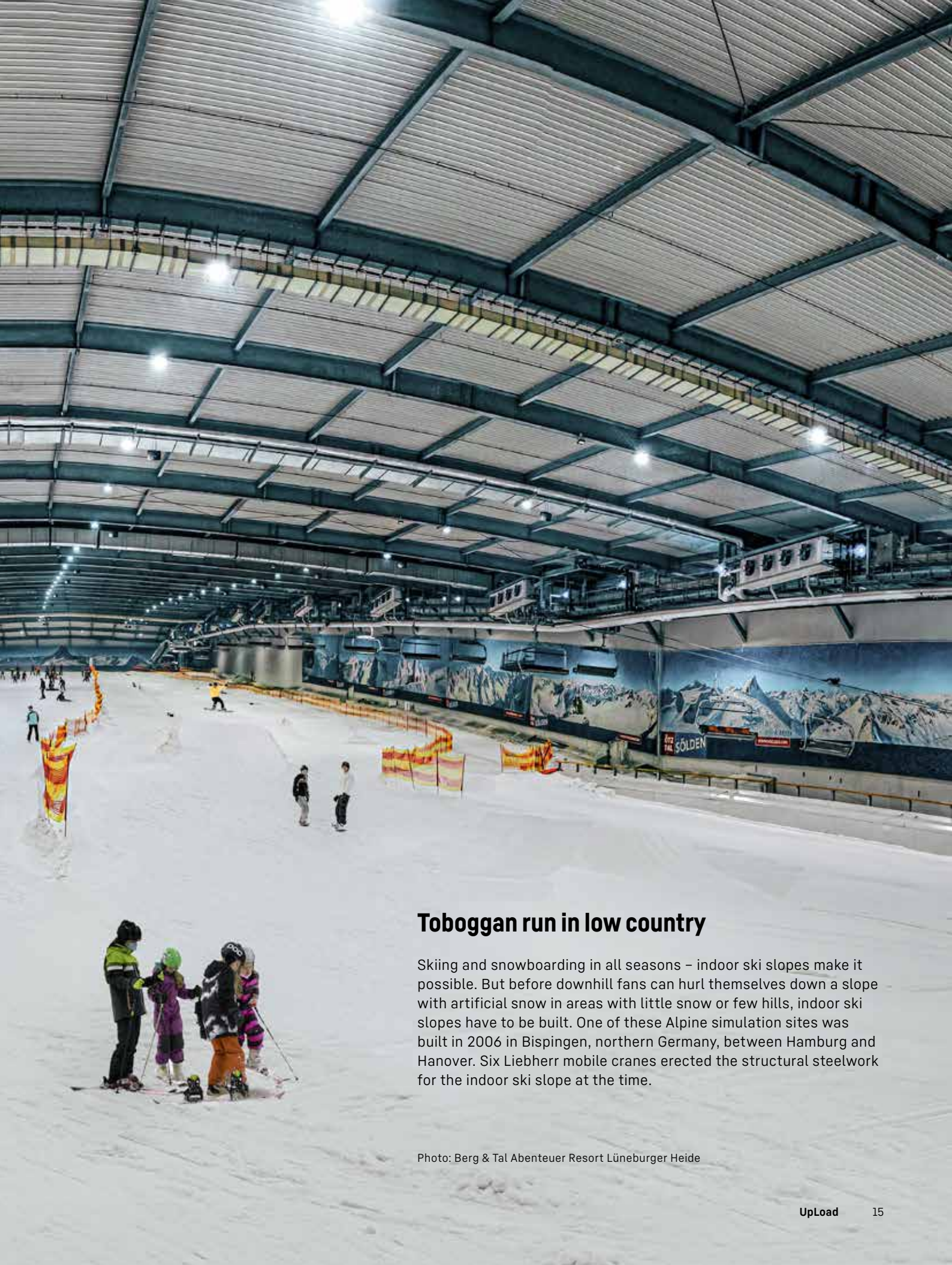












## Toboggan run in low country

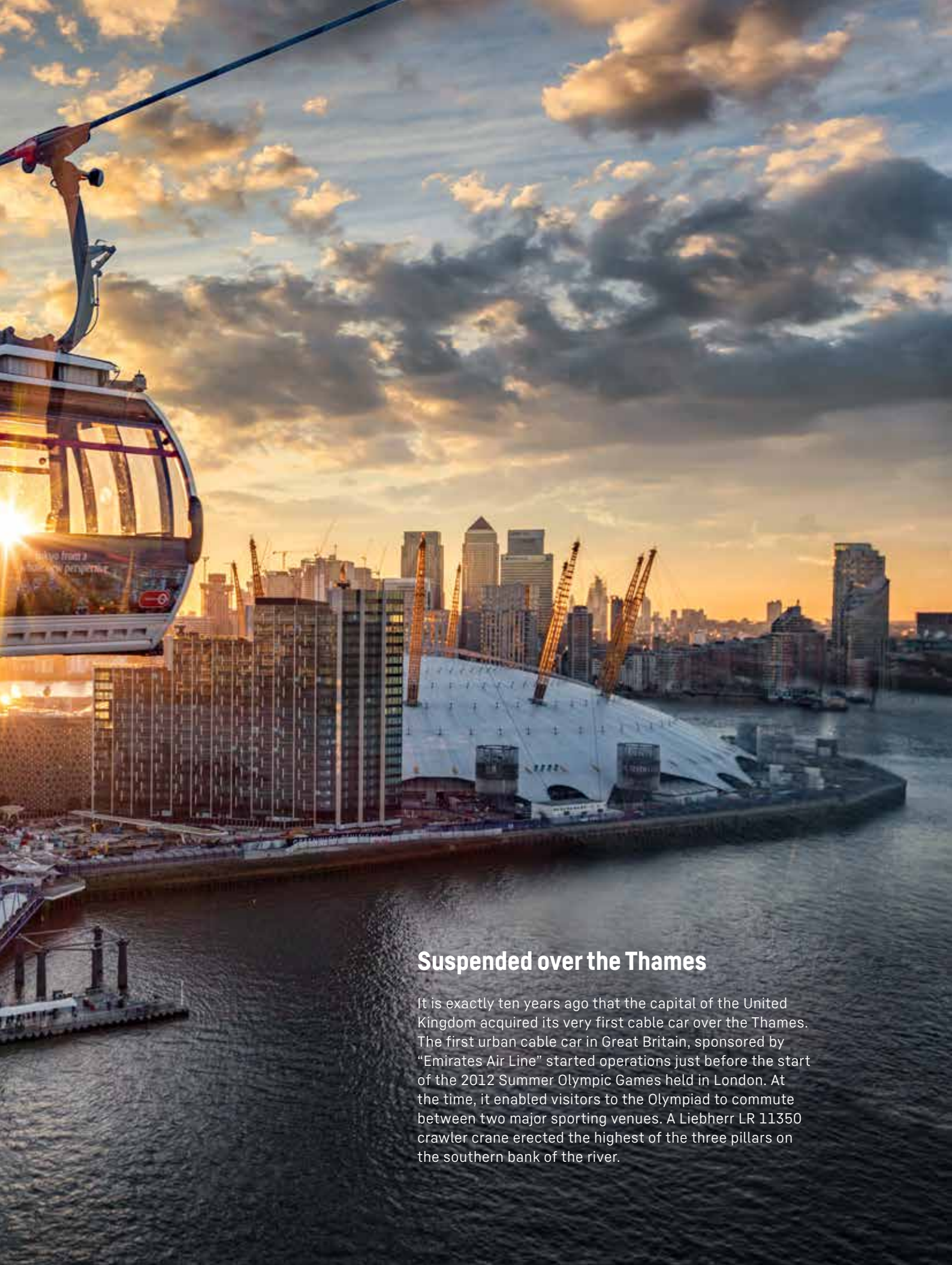
Skiing and snowboarding in all seasons – indoor ski slopes make it possible. But before downhill fans can hurl themselves down a slope with artificial snow in areas with little snow or few hills, indoor ski slopes have to be built. One of these Alpine simulation sites was built in 2006 in Bispingen, northern Germany, between Hamburg and Hanover. Six Liebherr mobile cranes erected the structural steelwork for the indoor ski slope at the time.

Photo: Berg & Tal Abenteuer Resort Lüneburger Heide









## Suspended over the Thames

It is exactly ten years ago that the capital of the United Kingdom acquired its very first cable car over the Thames. The first urban cable car in Great Britain, sponsored by “Emirates Air Line” started operations just before the start of the 2012 Summer Olympic Games held in London. At the time, it enabled visitors to the Olympiad to commute between two major sporting venues. A Liebherr LR 11350 crawler crane erected the highest of the three pillars on the southern bank of the river.





## **A view with elegance & charisma**

The striking Lower Rhine Bridge near Wesel (Germany) with its towering pylon spans the river at a point where it is over 300 metres wide. Stylishly illuminated, the cable-stayed bridge is particularly elegant in the dark. A Liebherr LG 1750 lattice boom crane completed the 130 metre pillar during the construction of the technically challenging river crossing.



# Made with Liebherr

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## Toboggan run in low country

There are around two dozen indoor ski slopes for skiers and snowboarders on the European mainland. One of them is located at Bispingen, 50 kilometres south of Hamburg in the centre of Lüneburg Heath. In this winter simulation, which is called "Snow Dome" and features a 300 metre piste, winter sports fans can practise their Alpine skills and prepare themselves for their winter holidays even in northern Germany, which is predominantly flat. Even tobogganing is possible there.

The building for the very first winter sports arena in northern Germany was erected sixteen years ago to make this winter experience possible. The work involved several Liebherr construction machines. They included six LTM cranes provided by Austrian contractor Felbermayr. This small fleet of mobile cranes from the group outlet in Bautzen, Saxony (Germany) worked on the structural steelwork for the building for more than six months. Pillars, trusses and supports comprising a total of 3,500 tonnes of steel were used in the job. One of the cranes on the site was a brand new LTM 1095-5.1. Equipped with a hydraulic swing-away jib, at the time the crane, which you can see in the photograph second from



the left, was absolutely essential for assembly work where there was little freedom of movement between sections which had already been completed. As an aside, the Dutch, who have one of the flattest countries in Europe, have the most indoor facilities for Alpine winter sports.





### Spanning the Rhine with no supports

Even from a distance, travellers will immediately notice the unusual pylon that makes up part of the Lower Rhine Bridge near Wesel. This special landmark in the flat Lower Rhine landscape looks like an upside-down Y. The 130 metre pillar is the central element of this bridge design. The river crossing is known as an asymmetric cable-stayed bridge and allows the busy Rhine shipping traffic to continue to flow smoothly, meeting the demands for a bridge with no supports.

In addition to a Liebherr 280 EC-H 16 Litronic top-slewing crane, a powerful lattice boom crane from our plant in Ehingen was also involved in the construction of the massive pylon. The LG 1750 delivered plenty of power to the site, enabling it to position several 75 tonne steel blocks at a great height to complete the imposing pillar structure. The fact that this mobile crane, which is still in production, completed its job in just one day at the time, was very important as the high-water peak of a major flood was approaching from the south and reached the Lower Rhine just days later. It left the set-up area for the crane at the foot of the pylon under several metres of water for a lengthy period of time.



### Lead-up to the Olympics

In the lead-up to the 2012 Olympic Games held in London, the idea of a cable car over the River Thames, which had first been conceived in the 1990s, was reprised. The aim was to link the Millennium Dome, the Olympic venue in Greenwich on the south bank of the river, with the sporting arena at the Royal Victoria Docks on the other side. The timetable for completing the cable car was drawn up in great haste and was extremely ambitious. Initially, the plan was to use a large mobile crane right next to the river, but this was abandoned due to structural problems with the surface of the bank. A new crane set-up area 120 metres away, however, meant that a significantly more powerful machine was required.

A Liebherr LR 11350 crawler crane from Weldex based in Scotland finally delivered the capacity and power required in the capital. The massive crane reached over the large distance from the site with its imposing 180 metre boom length, divided between the main boom and the lattice jib and using a total of around 1,000 tonnes of ballast. However, the lattice jib reached into the airspace and appeared on the radar of the nearby City Airport. This resulted in lots of interruptions on the site. Furthermore, the much-vaunted fog in London created even more delays in what was a very tight schedule to start with. Finally, a decision was made to continue the work at night. Lucky for us because it enabled us to produce this stunning night-time panoramic photograph. It shows our crawler crane hoisting the final large component weighing 71 tonnes onto the pillar and completing the 90 metre helical pylon. The illuminated buildings in the City of London and the bright Millennium Dome create a sparkling background for it.



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# Mobile and crawler cranes

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**House building Down Under**

In Sorrento, State of Victoria in Australia, Advanced Cranes and Rigging is building several residential units with an LTM 1450-8.1. Each house section weighs around 14 tonnes.

Photo: Another Dimension Project Photography







# Two power packs on Sardinia









## Pandemic surprises Mammoet team on Sardinia

Reports of what at the time was the newly discovered coronavirus first started to appear in the news in January 2020. At around the same time, three ships tied up against the quay in the port of Cagliari, the largest town on the Italian Mediterranean island of Sardinia. Their holds and decks contained crane materials and equipment from Dutch company Mammoet, specialist in engineered heavy lifting and logistics. They also had two of the very largest Liebherr crawler cranes on board. They had been sent to carry out extensive refurbishment work at a refinery. Just a few weeks later, the Italian authorities locked down large epicentres of coronavirus outbreaks in the country with many production sites being closed. For eight Mammoet employees in Sardinia, months of hardship began with a lot of work and no replacement. Substitutes were not allowed to travel to the island.



### Centimetre precision

The FCC regenerator weighing over 500 tonnes was transported past existing systems with great precision.

Naturally, Simone Agostinetti, the Mammoet Site Project Manager, and his seven colleagues had no idea at the time that their professional visit to the island would ultimately last for the entire project period of over six months. But the very strict travel restrictions that were implemented quickly throughout Italy, including on Sardinia, meant that the crew of crane operators and personnel for the SPMTs (self propelled modular transporters) could be neither strengthened nor relieved. This meant that the small team from the heavy lift contractor was left completely on its own to tackle the impending job with their extensive, massive equipment during the shut-down of the petrochemical

plant. In addition to a Liebherr LR 11350, the team also had one of the very largest Liebherr crawler cranes with them – an LR 13000. To date, Liebherr has built six of these enormous cranes and delivered them to its customers. The first one, shown here in the photographs, was handed over to the Dutch company almost exactly ten years ago. Since then, the crane has been used in major projects all over the world. For example, it was in action in Dubai building the largest Ferris wheel in the world. Mammoet has been an important partner for us for decades and also designs and manufactures special large cranes itself with enormous dimensions for its own applications.



***“Eight highly motivated men can achieve a lot if they get some food and coffee.”***

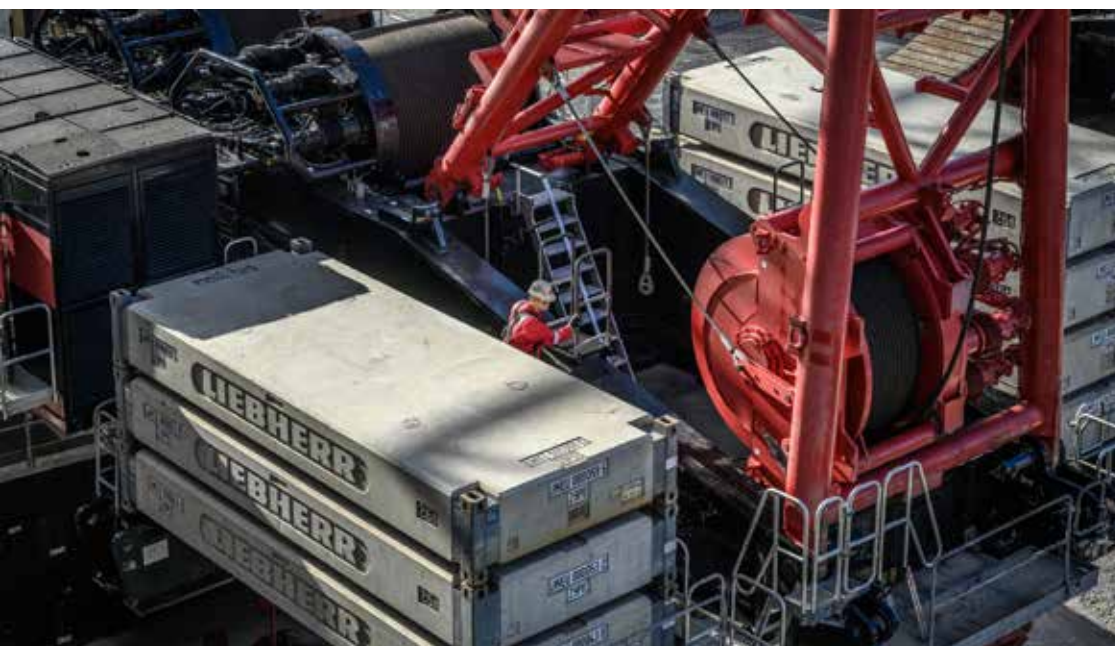
**Simone Agostinetta**  
Project Manager from Mammoet

But let's get back to the island. The two Liebherr crawler cranes were the ideal tools for the work required on the refinery site on Sardinia's southern coast. Many of the plant components and even the large reactors and columns had to be moved to carry out the factory refurbishment. The largest load for the LR 13000 was a so-called FCC regenerator. The abbreviation FCC stands for "fluid catalytic cracking" which is a material conversion process in the crude oil-processing industry. To hoist this colossal component, the 3,000 tonne crawler crane had to be rigged for the gross load case of a massive 695.5 tonnes at an enormous radius of 65 metres, including a reasonable safety reserve. The manoeuvre with the regenerator on the hook was a massive challenge for the entire team, because it had to pass through extremely constricted areas. In some cases, there was less than one metre between the load and the plant.



**No claustrophobia**

The restricted freedom of movement is shown quite clearly in this photograph of the LR 11350.



**Dimensions made visible**

Massive counterweights ensure adequate stability. The LR 13000 was fitted with a total of 2,050 tonnes of ballast for hoisting the heaviest components.



#### **Piggyback**

The small transport crew had to move enormous loads with their SPMTs, sometimes even during the night.

But it was not just the gigantic loads that posed a major challenge to the Mammoet team, but also the storage areas and movement areas for the cranes themselves within the extraordinarily constricted terrain surrounded by petrochemical systems. “It was for precisely these jobs that we equipped the LR 13000 with what are known as B0 table, a version of load charts for crane operations with suspended ballast”, says Jens Könneker, Product Manager for Crawler Cranes here in Echingen. “The net weight of the derrick drawing cylinder which remains on the counter boom and the draw bars is taken into account, however. Even though they only amount to 50 tonnes, we can use them as counterweights.” This means that the crane can be used on constricted sites or for working with a small radius very flexibly without having to restack ballast.

The Mammoet team took full advantage of this set-up version on Sardinia. Simone Agostinetto: “The ballast pallet only had a few centimetres of space to the side. That meant we were forced to pick up the regenerator with such a short radius that the LR 13000 could initially handle the load without any suspended ballast. We then docked the suspended ballast into place when the crawler crane was in position to unload the component. It worked really well.”

In any event, Agostinetto and his team delivered fantastic work on Sardinia. In the summer, after spending six months in island quarantine, he and his crew were finally able to pack their bags. Mission accomplished! When asked how the eight-man team managed to complete such an enormous task with no reinforcements and no relief, Project Manager Agostinetto commented: “The team was very experienced and flexible.” And he continued: “Eight highly motivated men can achieve a lot if they get some food and coffee.”

#### **Smart in constricted spaces**

The LR 13000 can put down the suspended ballast and operate in very tight spaces when it is used with a small radius. The 50 tonne weight of the derrick drawing cylinder which remains on the counter boom and draw bars are used as ballast and included in the calculations. This was an important feature for operating in the constricted space between the refinery systems on Sardinia.







# Zero emission, full power

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## LTC 1050-3.1 now also with electric drive

The accelerating climate revolution demands drive concepts to be used in the construction industry which reduce emissions of greenhouse gases. To meet the needs of customers and the demand for greener equipment as well as possible, Liebherr is working on alternative drive units, which are perfectly tailored to the application and location of the machine, without focusing on a single technology. Our LTC 1050-3.1 compact crane now gets an electric motor in addition to the conventional drive. This enables crane movements to be powered electrically as an option. The new version of the compact 50 tonne crane therefore helps to reduce CO<sub>2</sub> emissions and meets the requirements for operating on “zero emission” sites.

Liebherr developed the electric power unit for the LTC 1050-3.1 using the slogan “Zero emission, full power”. Dr Ulrich Hamme, Technical Director at Liebherr-Werk Ehingen GmbH, says: “We want to be able to offer our customers full crane performance even with the alternative electric power unit. The LTC 1050-3.1 still has a conventional internal combustion engine, powered by diesel or HVO, for driving on roads and for crane operations. However, as an alternative it also has an electric power unit for crane operations so that it generates “Zero emission”. That means that all the familiar usage properties of the crane will be retained, regardless of whether the crane operations are powered by its zero emission electric motor or its internal combustion engine.”

### Maximum flexibility for full green credentials and customer benefits

The new alternative LTC 1050-3.1 delivers the best possible combination of green credentials, customer benefits and efficiency. On the road and off-road, it has a conventional, low emissions internal combustion engine which complies with emissions stage 5 and develops 243 kW (326 bhp). The engine can be fuelled with hydrogenated vegetable oil (HVO) with absolutely no restrictions, enabling it to reduce its CO<sub>2</sub> emissions by up to 90 % compared to fuelling it with diesel.

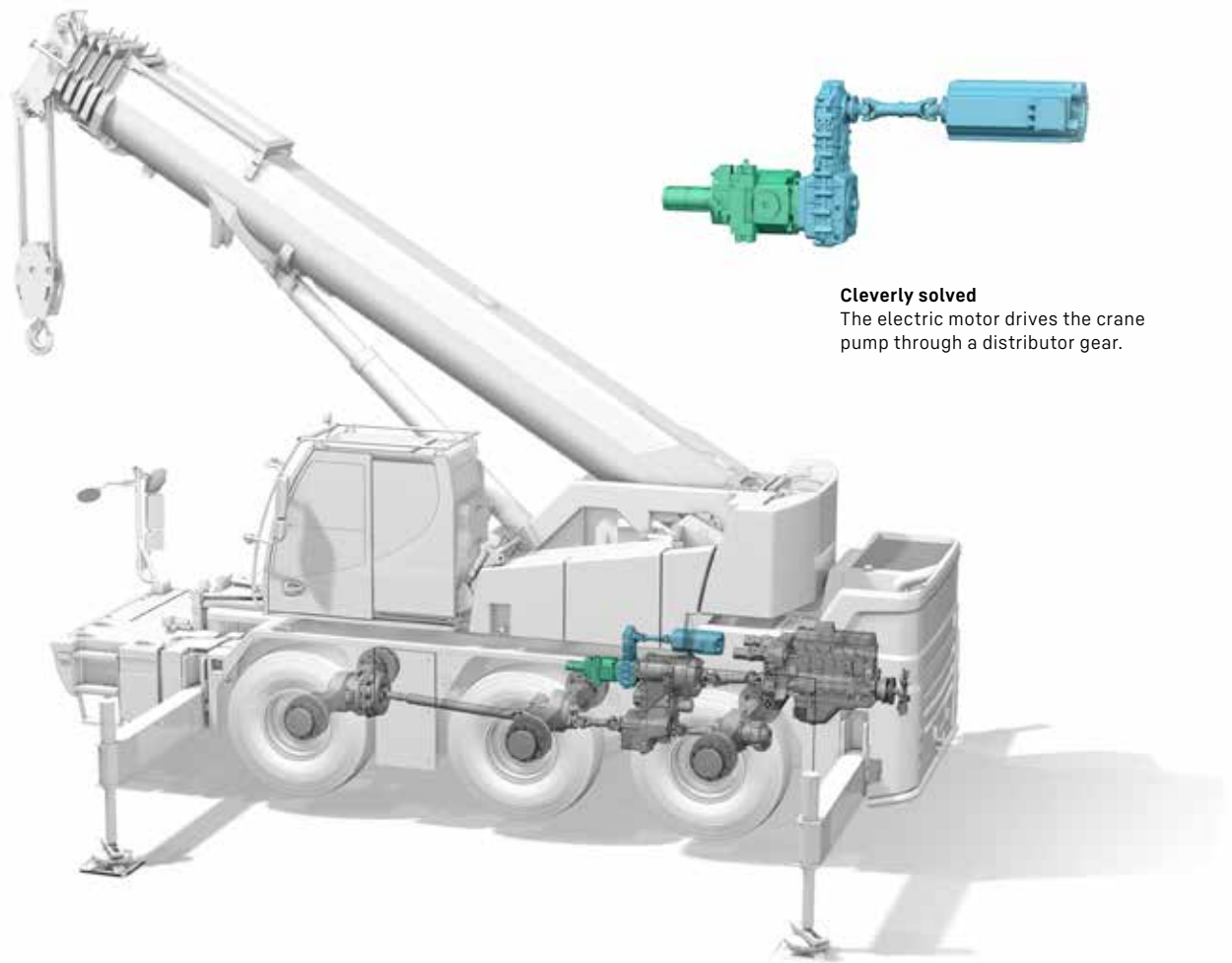
Either the engine or the electric motor can be selected in crane mode depending on the conditions for the job. The latter reduces both air and noise emissions to a minimum. This also means that the machine is suitable for use in noise-sensitive areas and in “zero emission areas”.



#### Indoor use

The LTC 1050-3.1 with electric drive and lift cabin in use in a factory workshop.





**Cleverly solved**  
The electric motor drives the crane pump through a distributor gear.

**Simple, clever electric motor concept – flexible electric power unit**

The newly developed power unit featuring an electric motor develops 72 kW and therefore enables the crane to be operated without restriction, in other words with almost the same performance as using the 6-cylinder engine. The electric motor uses the existing hydraulic pump, which is mounted direct on the powershift transmission on the conventional LTC 1050-3.1, to transfer the power to the consumers in the crane superstructure.

Only the electric motor and a distributor gear as well as the required control equipment must be added to the conventional LTC 1050-3.1 model to transform it into an electric version. The distributor gear is located directly between the crane pump and the powershift transmission. This clever yet simple solution enables the operator to switch flexibly between diesel-hydraulic power and electro-hydraulic power. Site current at 125 A is required to achieve full performance, but the crane also operates very well with a 63 A supply. Alternatively, the crane can operate using an external conventional battery pack if the site does not have the appropriate electrical infrastructure.

Liebherr supplies the electric model of the LTC 1050-3.1 for the version with the 36 metre TELEMATIK telescopic boom. The RemoteDrive option for remote-controlled driving and height-adjustable elevating cab are also available for the new crane. The prototype with the electric power unit is currently undergoing intensive testing. We are planning the first deliveries for the first half of 2023.



**Plug in and work**  
Full power with 125 amps, practical also with 63 amps.



# 3 questions for: **Lars Christian Steen**

Owner and CEO of Asle Skoveng Kranservice AS



## **The plug makes all the difference**

Lars Christian Steen (left) and co-owner Leif Petterhaagstad are convinced by the concept of the LTC 1050-3.1 with its additional superstructure electric power unit.

**Asle Skoveng Kranservice AS** was founded in 1976 and its head office is located in Skedsmokorset, a few kilometres north of Oslo. The crane and transport contractor has been playing a major role in the construction of the Norwegian capital for almost half a century. Sustainability, safety, efficiency and CO<sub>2</sub> reductions are major components of Skoveng's corporate strategy.



# 1 You were one of the first companies to order the new LTC 1050-3.1 with its electric power unit – and you did not just leave it at one but ordered five of them at once. What made you invest so heavily in cranes with electric power units?

Skoveng supports the Paris Climate Agreement and we are following a clear strategy – zero emissions. We are one of the leading crane contractors in the Oslo region and we have already reduced our CO<sub>2</sub> emissions to an industry-leading level using various methods including the use of hydrogenated vegetable oil HVO. But we intend to go even further. Our aim is to be a zero emissions crane contractor by 2025.

Norway is issuing ever more stringent regulations for construction sites. Seven large cities with a total of 1.4 million inhabitants, which actually accounts for 27 percent of the total population of Norway, have decided to ban fossil fuel emissions from construction sites completely from 2030. Emissions from construction sites make up around seven percent of the total emissions in the city of Oslo. Our capital is a pioneer and is pursuing some extremely ambitious targets with its climate and energy strategy. This is also preparing the way for other cities and communities. In the future, it will only be possible to use machines powered by hydrogen or electricity. Not only will this reduce CO<sub>2</sub> emissions, of course, but also air and noise pollution.

# 2 Why did you decide to buy the new Liebherr cranes?

Our partnership with Liebherr is what has enabled us to deliver high quality mobile cranes to our market over the last few decades. Liebherr supplies machines which are suitable for the use of HVO. And now we have reached the time to take the next big step – “Zero emissions mobile cranes”.

We held productive dialogue with Liebherr about how we could secure our future with zero emissions mobile cranes. At the end of last year, Liebherr then unveiled its first mobile crane whose superstructure is powered by electricity, the LTC 1050-3.1. We then placed an order for five of these

cranes. Our commitment to a zero emissions future using the technological innovations from Liebherr resulted in the largest ever order for mobile cranes in our corporate history.

Just like Skoveng, we believe that Liebherr has the motivation and commitment to play a leading role in the reduction of the CO<sub>2</sub> footprint of mobile cranes. We also purchased a Liebherr MK 88 mobile construction crane which can be powered by electricity on site. And we have also had a close look at the Unplugged cranes from Liebherr Nenzing.

# 3 How do you assess the further developments towards more environmental friendliness?

Even outside Norway, there are some very ambitious targets being set. In May, Finland started to support the measures put in place by its cities by signing off on the Green Deal Agreement which states that as from 2025, 20 percent of work on sites must be powered by electricity, biogas or hydrogen. As from 2030, the government wants to ensure that 50 percent of site work is carried out using these regenerative energy sources. Copenhagen, Stockholm and Amsterdam have also started to move in this direction by supporting pilot projects and adopting green criteria in their procurement strategies. Many cities and regions will follow their example over the next few years.



**Vision**  
Lars Christian Steen in the crane cabin of the new LTC 1050-3.1.



A large, rectangular concrete slab is being lifted by a crane using four heavy-duty chains. The slab is suspended in the air, and its surface is smooth and light-colored. In the background, a steel frame structure is visible, and the ground is a mix of dirt and concrete. The scene is set outdoors with mountains in the distance under a cloudy sky. The text "Ready quickly and really powerful" is overlaid on the slab in a bold, black font, with a horizontal line underlining the word "and".

**“Ready quickly  
and really powerful”**







## Less downtime using WindSpeed load charts

It is almost exactly one year ago that the first of our LTM 1150-5.3 mobile cranes was driven out of our crane factory here in Ehingen. The successor to the extremely popular LTM 1130-5.1, of which we built around 1,500, the new crane appears to be doing exactly the same as its predecessor in terms of being a success. Powerful, potentially record-breaking parameters in terms of hoist height, lifting capacity and weight as well as the compact design of the machine have already convinced many of our partners throughout the world of its merits. We watched the all-rounder complete two jobs in Italy and Switzerland.

A blue sign is fixed behind the windscreen with "NIK" written in large letters on it. It sparkles almost as much as the new crane itself. And it is even in the same colour as the crane's paintwork, the bright white and blue of Italian haulage and crane contractor Cristelli. Nicola Del Santo, who owns the metal sign, sits in his LTM 1150-5.3 and focuses on the tricky hoist. A long support made of 21 tonnes of reinforced concrete is suspended from the mobile crane's hook. We are on an enormous building site in South Tyrol. Or to be more precise, we are in Vinschgau,

almost at the most northerly tip of Italy. Nicola has to position the colossal component at a height of fourteen metres. Not really a problem for the experienced operator and his powerful machine. The contractors here are erecting enormous sheds for an expanding recycling company. Nicola and his Liebherr crane are in charge of the majority of them. He will be working at this site for around two weeks. For some of the even larger concrete supports, he is being ably assisted by Gianluca Romani with an LTM 1100/2. Then the pair of them get to work together. Gianluca manages the company, which was founded in 1976 and is based in Pergine near Trient, with his cousin Romina Cristelli.

"We took delivery of the new crane at the start of the year", says Nicola, who has been operating cranes, "my passion", for over thirty years. After working with the machine for several months, he does not believe that anything comes close to his LTM 1150-5.3: "The machine is ideal for this site", he says. "It has a very practical design and can be repositioned quickly. Despite its weight and lifting capacity class, the crane is really agile. Yesterday, for example, I had to hoist around 25 prefabricated components and I had to reposition the crane several times to do the work. But this new machine enables me to work pretty quickly." The boom can be telescoped to 66 metres in length and also delivers great reach and massive lifting capacity.

The view is very similar at Cristelli's head office, where, in addition to a crawler crane they have designed themselves, they also have nine loading and four mobile cranes as well as a range of special machines. The family-run company, which specialises in hoisting, transporting and assembling glass structures, was looking for a larger mobile crane for its fleet and found that the performance of the LTM 1150-5.3 was pretty much perfect: "The crane covers most of the requirements that we need for our customers", adds Gianluca Romani.

### Almost installed

Prefabricated component walls, pillars and supports made of reinforced concrete surround the mobile crane. 25 heavyweight hoists on one working day and having to reposition the crane a few times – all possible with this machine.







#### **Safety first**

Nicola Del Santo installs the anemometer on the jib head of the massive telescopic boom on his crane to ensure that he can complete his hoists safely in windy weather.

#### **Operating safely even in strong winds**

Apart from installing prefabricated concrete components, Nicola also has to erect construction cranes on a regular basis. "The important thing for me was the amended load charts for hoists in a range of wind speeds", he continues.

"They enable me to work safely without any accidents." The WindSpeed load charts can be opened using the LICCON control system. Depending on the prevailing wind speed, the program then makes different lifting capacity values available.



"It is often not the maximum lifting capacity that counts", says Jan Keppler, Product Manager here in Ehingen, "but the ability to operate safely on the site. The tables are extremely helpful for job planning because they enable precise calculations to be completed in advance to determine how critical a hoist will be and show the end customer how important the aspect of safety is. The use of the WindSpeed load charts also mean less downtime on site as we supply load charts for wind speeds of up to 15.6 metres per second."

#### **Crane driver with passion**

"We chose the crane in the version with the folding jib which enables us to reach hook heights of up to 85 metres", Nicola tells us. "We have found a great compromise between lifting capacity and hoist height, primarily for erecting construction cranes."





#### **Hoist at a world cultural heritage site**

The LTM 1150-5.3 from Swiss company Emil Egger AG was set up on the shores of Lake Geneva to dismantle an old pedestrian bridge over the railway line.

Our new mobile crane is not just very much appreciated in Italy, but also in neighbouring Switzerland. “We had several LTM 1130-5.1 cranes in daily use for many years and it quickly became clear that the successor to the successful crane would be a flexible machine for completing crane work of all types. Overall, it is an extremely successful design and therefore a must for Emil Egger AG”, says Managing Director Michael Egger about his purchase of the 5-axle crane. The active logistics and heavy haulage contractor has several outlets in Switzerland and operates well beyond the borders of its home country. Its considerable crane fleet, which extends up to the Liebherr LR 11000 crawler crane has also included the very latest LTM 1150-5.3 model since last autumn. “This LTM model can be readied for use quickly but is nevertheless extremely powerful”, says a delighted Egger about his new machine. “It’s a crane that we have work for every single day and which is extremely versatile in use.”

#### **Compact design and VarioBase® keep traffic flowing**

Its operator, Thomas Messerli, primarily uses his mobile crane to erect tower cranes. But he has also used it to assemble industrial machinery and an enormous range of prefabricated components. All that is everyday work. However, he tackled a job with a particularly charming backdrop at the beginning of May at a UNESCO world cultural heritage site in the wine-growing region of Lavaux. A rugged landscape with precipitous rock faces, innumerable stone walls and curved terraces on the north-eastern edge of Lake Geneva. Positioned on a steep gradient below a busy road along the bank of the lake, the crane had to remove a pedestrian bridge over a railway. During the dismantling of the structure, which had weakened with age, it had to be ensured, however, that traffic and rail replacement buses could pass the bottleneck caused by the crane which had to be set up on the road. This made it the perfect job for the highly compact LTM 1150-5.3.



“There were a whole twenty centimetres between the passing buses and the maximum slewing platform ballast of 45 tonnes”, says Messerli. Although he was able to extend the VarioBase® support for his Liebherr crane fully on the side towards the load, he had significantly less space towards the road. “Everything went perfectly.” He handled the 18 tonne crossing using a radius of 18 metres and placed it on the low loader waiting at the rear of the crane. The hoists required for the steps and bridge pillars as well as the work platform were a much easier task for the mobile crane operator in these lovely surroundings comprising the lake and terraced vineyards.

Thomas Messerli first operated his new LTM 1150-5.3 last autumn. “Since then I have actually used virtually nothing else. Prior to that I worked with the predecessor, the LTM 1130-5.1 and was always very satisfied with it. Liebherr’s are definitely my favourite cranes. Quite simply you know exactly what you have.”



**Compact**

The traffic flow on the only road around the lake had to be maintained throughout the one-day job. VarioBase® and the crane’s compact dimensions made the whole thing possible.



**Perfect!**

Even wide buses were able to get past the compact mobile crane.



# Back to the future – the development of the LICCON crane control system

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In edition 2/2021 of our UpLoad magazine, we introduced you to the latest Liebherr crane control system – LICCON3 means that we are ready for the future. A fast databus, new programming language and software, significantly more storage space, greater computer power and improved security tools. As we know, the future is based on the past, so in this edition we want to take a look at the history of Liebherr crane control systems.

We invited four experts to talk to us about them. Three of them are already enjoying their well-earned retirement – Erwin Morath established our Control System Department and managed it for decades. Max Leicht managed the Electrics Department for many years and is an expert in production and assembly. And Karl Müst is a crane

practitioner who has spent half of his life heading up our crane acceptance section. The group is rounded off by Klaus-Peter Brück. When he was a student, he wrote his dissertation on the launch of the LICCON (Liebherr Computed Control) system and may still contribute his experience for a few years in active professional life.



***“Mobile cranes operate for more than 30 years. So the control system must be durable and spare parts must be available. That was always an important aspect for us.”***

**Erwin Morath**

Head of Control System Department (retired)



### **Why did Liebherr develop its own crane control system?**

**Erwin Morath:** When I first came to Liebherr in 1985, there was a range of different hydraulic, electrical and electronic control systems, depending on the crane model. We only had a simple system of our own to limit the load moment (LMB). We therefore launched the LMB from PAT, a well-known manufacturer at the time. However, electronics were only available with analogue systems and did not feature any variable programming options. New plug-in boards had to be developed for each crane.

**Max Leicht:** This plug-in board technology was only able to cover a certain amount of the crane control system. The requirements for the crane control system increased as a result of the ongoing development of our crane portfolio. That meant that new integrated circuits had to be developed on the plug-in boards. Over time, we developed around 100 plug-in boards with a range of functions. The whole thing became very difficult to handle, which affected both production and the supply of spare parts. A crawler crane, for example, required up to 24 different plug-in boards containing a range of functions.

### **When was this and how did the development process take place?**

**Erwin Morath:** We took the first steps in 1985. We reduced and revised the existing analogue plug-in boards and developed programmable digital plug-in boards to replace them.

**Max Leicht:** That was enormously important to ensure we could continue to manufacture cranes. We were able to reduce the number of plug-in boards to just 20 – a massive step forward.

**Klaus-Peter Brück:** In the development of a new crane control system, therefore, one of the main objectives was to establish and retain the expertise we had within the

company. What we needed was a flexible control system which we could extend and expand ourselves within Liebherr.

**Erwin Morath:** The standardisation of the hydraulic and electrical control systems was another major step forward. Starting in 1986, we employed additional personnel who had the expertise to implement our concept of a modern microprocessor control system.

In terms of the hardware we wanted a control system with just three main components – a central unit with an interchangeable storage unit, a power supply with a memory and a monitor with a control panel. The system was designed to be expanded to up to six central units, which could communicate with each other.

Our objective in terms of the software was a Liebherr multiprocessor, multitasking operating system with an integrated diagnostic system. We developed our own programming system using a simple PLC language. The software was structured and management using a parts list generation system and a database. And to ensure that the software was reproducible, we linked this system to our commercial IT system. The LMB data from the structural engineering was transferred automatically in stages.

**Klaus-Peter Brück:** This was a massive benefit because before then, the data had to be entered manually. That was extremely time-consuming.

**Erwin Morath:** In retrospect we can certainly say that we achieved our objectives. The LICCON control system was unique in the industry and could not be copied. We managed to reduce expenditure and costs as well as achieve simplifications. The important thing from the very outset was to ensure availability. We wanted to be independent from external suppliers and therefore manufactured more and more components within the Liebherr Group.





***“We have laid the foundations for the future in the form of LICCON.”***

**Klaus-Peter Brück**  
Control System Software Developer

**Klaus-Peter Brück:** In 1988 we built four prototypes of the LTM 1035 featuring the LICCON control system and serial production started with the LTM 1120, which we unveiled at the Bauma in 1989. The PROGRESS 2000 project was particularly symbolic. At the time there was a great deal of rapprochement between the East and the West and Soviet SS-20 medium-range rockets were being scrapped as part of the disarmament treaties. We used the same chassis on which rockets were previously mounted to install the superstructure of our LTM 1120 – with the LICCON control system. One of the special cranes was also unveiled at the Bauma in 1989.

**What was so special about LICCON?  
Did it have any unique features?**

**Erwin Morath:** The LICCON was a universal control system which replaced everything else on the crane. It could not be copied because there were hardware components integrated in the control system whose logic we had created and programmed ourselves.

**Max Leicht:** The microprocessor system was a massive leap forwards. It meant that we now only had two plug-in boards. And a modern monitor. None of our competitors had a control system anything like it.

**Karl Münst (laughing):** One of my colleagues said: “Now they’ve really lost it – they’re installing a television in the crane.” Some customers were also rather sceptical at the start. But it was definitely the right thing to do. The new display features were simply fantastic.

The LICCON cranes also meant that the crane acceptance process was even faster as far as setting the parameters was concerned. The versatility of the new control system was impressive because it included a very wide range of operating modes. And the integrated test system provided us with a new, very convenient service. The launch of the LICCON control system laid the foundation stone for ensuring that all cranes could be controlled in exactly the same way. Our customers absolutely love that.



**1988 prototype**  
LTM 1035 with LICCON control system



**Klaus-Peter Brück:** We were then able to set up the crane very easily using buttons, displaying the ballast, support and accessories on the screen. The operating data could also be displayed on the monitor, in other words boom length, maximum load, actual load, radius and much more. That was completely new. The crane operator had all the information he needed at a glance. It was also possible to view the load charts on the monitor. There were worlds between the new system and the old one.

#### **Did everything work well straight away?**

**Karl Müntz:** Actually, we hardly had any problems at all. For us in the acceptance section, it was important that we were kept up to date right from the start. That worked well because the developers worked very closely with us and spent a great deal of time outside on the crane. And we received extensive training.

**Klaus-Peter Brück:** In fact some very close friendships were created at that time. Our colleagues were very open and highly motivated. And we were also in close contact with customers who then worked with the prototypes. These cranes had to be repeatedly updated to the latest version. We had particularly close contacts with Uwe Langer at Riga Mainz, with whom we also discussed my idea of load capacity interpolation for intermediate lengths and who then tested the idea after it had been implemented. The idea came from my own personal experience as I grew up in a crane company.

**Max Leicht:** The new control system also had an influence on crane production and our colleagues first had to get used to this new technology. Many of the production processes were changed. We had to give our colleagues lots of training and support. But at the end of it all, it all worked very well.

#### **What additional major developments were made over the years?**

**Erwin Morath:** In the mid-90s we developed a crane job planner which enable jobs to be planned and documented on a PC in an office. The special feature of this was that the current crane data were used and the layout of the display on the monitor in the crane corresponded. The scope and benefits of our planning tool were so great that it is still pretty much the same today and is used extensively by our customers. Currently we are replacing this tool with the new Crane Planner 2.0.

Another major milestone was the development of the LSB (Liebherr **S**ystem **B**us) bus system, which required no hardware modifications to the central unit. It enabled the cabling to be significantly reduced and safety levels enhanced. Analogue sensors were replaced with digital ones. The sensors delivered the intelligence. That enabled us to unveil the first mobile crane in the world with a databus system at the Bauma in 1998 in the form of the LTM 1030/2.

***“The LICCON control system was unique and provided inspiration for developments on mobile cranes.”***

**Max Leicht**  
Head of Electrical Department (retired)







**The first LICCON control system**  
with a tube monitor



**Max Leicht:** In principle there were only three wires and no shielded cables any longer. Naturally, that delivered massive benefits for the electrical assembly process.

**Karl Münst:** The development of the working range limiting system was an important step for practical crane operations. It means that the LICCON control system can limit the hoist height, radius and working angle. In addition, edges can be defined which must not be exceeded during crane operations.

**Max Leicht:** The pioneering development of the TELEMATIK telescoping cycle system in 1996 with a single cylinder would not have been conceivable without the LICCON control system. The whole thing was automatic – all the operator had to do was enter the length of the telescopic boom and the telescoping path and then press the master

switch. The control system did everything else. That was yet another unique feature on the mobile crane market at the time.

**Erwin Morath:** At the end of the 90s we developed to cascading universal control units for the crane chassis which could cover all the vehicle's functionalities. This also included a universal keyboard unit. This meant that we managed to standardise all our cranes with the same components, a massive benefit to our customers for their operators. The engine control units were included and the superstructure control unit was connected. This enabled us to make a whole host of developments on the crane chassis, such as the speed-dependent rear axle steering. The new universal control units then also provided the basis for the next LICCON2 control system generation, which we launched in 2007.



**The first standard crane with LICCON,**  
the LTM 1120 as from 1989





***“The sensitivity of the crane movements is perfect with the LICCON control system.”***

**Karl Münt**

Crane Acceptance Department manager (retired)

### **Why did Liebherr launch LICCON2?**

**Erwin Morath:** LICCON had reached the limits of its computer performance and storage space. We also had to purchase new hardware components. One of the new features was the colour monitor. Another factor was the fact that the safety requirements were getting more and more stringent. New applications, such as the VarioBase® variable supporting base, would not have been possible without the new development.

**Klaus-Peter Brück:** The new hand control panel BTT also enabled the axle suspension to be controlled from outside the crane, which I first managed to achieve in 1988 on an LTM 1070 from our crane company in analogue form with the help of Max Leicht (laughs). This application was once again developed from personal experience and resulted in a major simplification of the supporting operation.

**Karl Münt:** Operating the crane with LICCON2 was much more convenient – the BTT control and display unit allowed the crane to be set up easily and safely. Extending the outriggers, detaching the hook block and installing the auxiliary equipment - all by remote control. Initially the BTT required a little bit of getting used to, but now nobody will consider buying a crane without it.

**Klaus-Peter Brück:** LICCON2 also delivers the option of a simple and therefore cost-effective extension to create a complete remote control system for the crane. In addition to the relevant software on the crane, all that is required is a console with two master switches to which the existing BTT is plugged in. A significant advantage for the crane operator is that the console can also be used for other cranes with the LICCON2 control system which are programmed for remote control. It couldn't be any more economical.

**Thank you very much for your insights into the creation of the LICCON crane control system and pioneering developments during the years that followed. Now we are about to launch the third generation, the LICCON3, which is currently undergoing an intensive phase of testing. Visitors to the Bauma in October will be able to look at two crane models featuring LICCON3.**

**In other words, the future has arrived.**

### **Legendary**

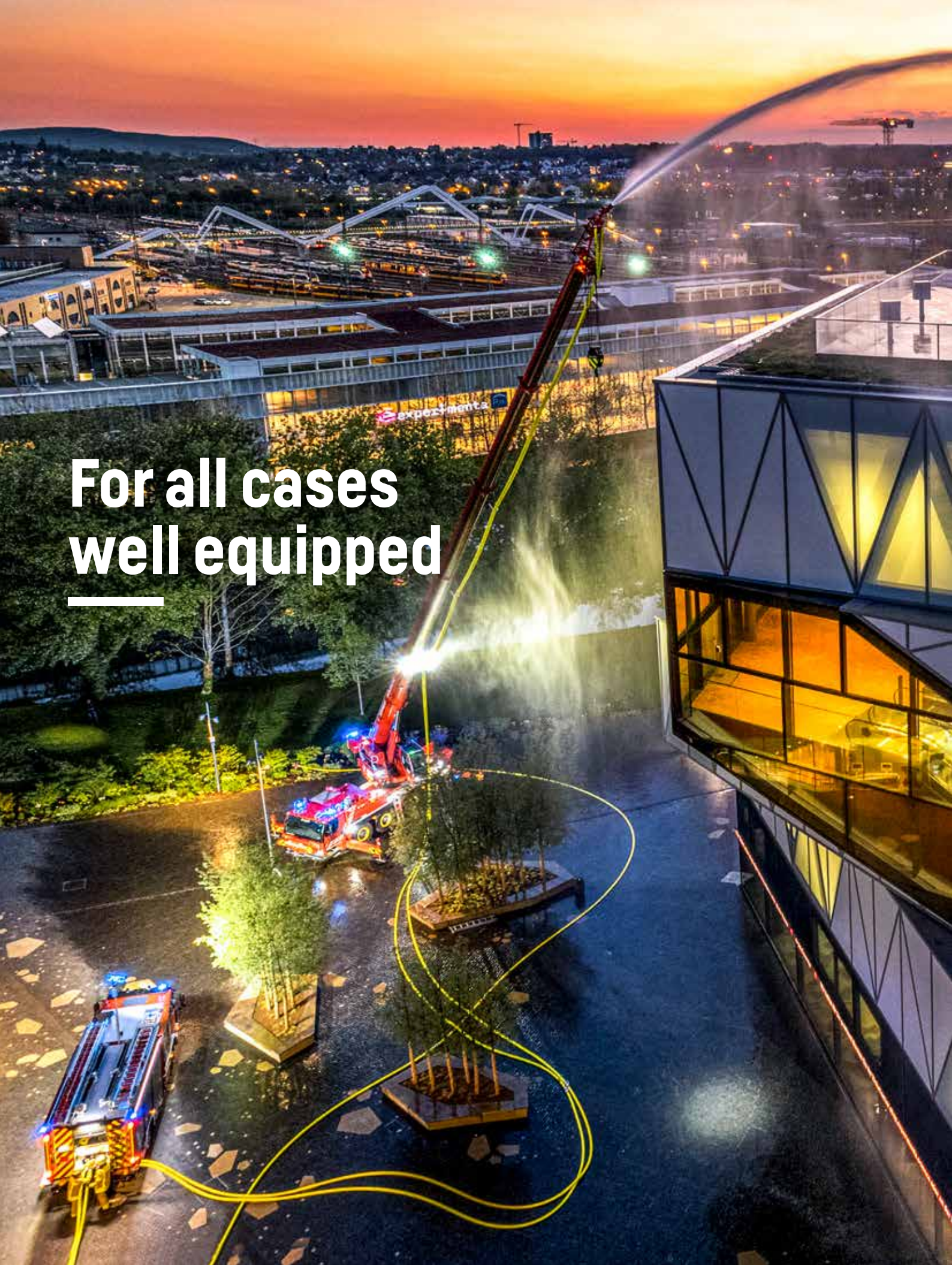
Several colleagues from the crane control sector formed the "LICCON band" to play music together. They played at private parties and company events.





**For all cases  
well equipped**

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## On a high

Our fire service cranes hoist, rescue and recover. Some of them can even fight fires.

Many people are not aware that such a thing exists – fire service cranes from Liebherr. In fact, they are mobile cranes operated by fire services. The special cranes, which are generally finished in red paint, wait to go into action in the giant garages at fire stations between painstakingly positioned fire fighting and turntable ladder vehicles. And they have a wide range of different designs. The crane vehicles have a range of different tasks depending on their location and the specific situations in their area of action. That means that these largest and heaviest vehicles for fire services all have bespoke equipment to suit their specific needs. Some of the cranes fitted with blue lights and horns are even able to fight fires from the very tip of their telescopic booms.







#### Caution – high voltage!

Stuttgart actually has two brand new fire service cranes from Liebherr. A total of 60 crane operators have been trained to use these special vehicles.



#### Off the track

Stuttgart's fire service team is shown here training with its new crane, recovering a motor tram unit which has become derailed. A special yoke is provided for derailed wagons to which the load can be attached despite the overhead cables being live.

It all started with the fire service in Kiel. The very first fire service crane manufactured by Liebherr entered service in this German city on the Baltic Sea in 1974. We have supplied our powerful fire service cranes to Vienna and Paris, Budapest, Barcelona and Athens, to name but a few of the larger cities. In total, since then we have handed over 113 of these special vehicles to fire service personnel throughout Europe. And now more than ever, we are the perfect partner for any fire service wishing to purchase its own mobile crane.

The city of Heilbronn, in the south of Germany just like our production site in Ehingen, decided to purchase a new mobile crane for its large fire station four years ago. Its old crane, a Liebherr LTM 1050-4, had become slightly outdated after thirty years of service. After issuing a public tender throughout Europe, Liebherr won the order to manufacture the special vehicle. "Our new LTM 1070-4.2 really is a quantum leap forward compared to its predecessor", is how Markus Widmann describes the modern mobile crane which features a wide range of options. Widmann is manager of the Technical Department at Heilbronn Emergency Services and was therefore directly involved in the procurement process for the new vehicle. He and his colleagues were kind enough to allow us to attend some of their exercises with "our" fire service crane in the Heilbronn area and look over the shoulders of the professional firemen.

#### Long range

At the "experimenta" Science Centre in Heilbronn, this LTM 1070-4.2 fire service crane is practising the use of the fire fighting monitor for an emergency. The water monitor at the top of the telescopic boom at a height of up to 50 metres is controlled remotely.

#### Fire fighting highlights – special camera and extinguishing monitor

Every mobile crane which we manufacture for fire services is crammed with special equipment. The features extend from the mandatory acoustic and optical signalling systems and important accessories such as tow bars, a load traverse on the front and a powerful winch at the rear of the vehicle to enable the safe recovery of vehicles which have been involved in accidents. But we had two special requests from the firemen in Heilbronn as well – a powerful high resolution camera with a large zoom function and a thermal imaging function for wireless image transfer that can be installed at the top of the boom when required.

Markus Widmann continues: "That enables us to obtain aerial photographs of large fires which will help us to assess the situation and prevent more damage. As far as I know, a camera system of this type has never been installed on a fire service crane. A special bracket had to be designed and manufactured by Liebherr for it. Working with them on this was really very good."





#### **Underground rescue**

The large rescue cage, which is part of the Heilbronn fire service's crane equipment, can hold up to ten people. The rescue of people from the hold of a freight ship is simulated in real-life conditions as part of an exercise in the city's industrial port.



Another highlight of the Heilbronn crane is its extinguishing monitor. This remote-controlled water monitor, which can be used to support fire fighting work efficiently from a great height, is only installed on a select few fire service cranes. Generally, it is the situation in the local area which decides whether it is necessary. "We have lots of industrial sites and a few chemical companies around here", says fireman and crane operator Steffen Haas.

"The 50 metre telescopic boom on the crane enables us to reach great heights which in turn means an enormous range. And we can deliver massive quantities of water over that range." An enormous 4,000 litres of fire fighting water per minute can be pumped through the device by a fire fighting vehicle and directed with a variable spray pattern.

#### **Brilliant engineering**

The crane operators require just ten minutes to install the fire fighting monitor and the water hoses. Every minute counts in an emergency.



### Crane operators and firemen

In contrast to using a turntable ladder, the personnel are not at risk from smoke and potentially toxic gases as the extinguisher monitor can be controlled remotely from a safe distance. "This high water capacity and the remote control for the water monitor are a massive benefit for us."

The complete fire fighting system can be installed extremely quickly for an exercise or in a real emergency. The well trained personnel need just around ten minutes to complete the work. The folding jib carried on the vehicle simply has to be attached to the pulley head and the water monitor can then be installed on it. Up to three hoses are raised with the crane boom with the help of loops positioned along the boom. Training is a high priority for the fire service crane operators to ensure that everything can be completed quickly and smoothly in an emergency. "We practise every week with the crane. We conduct joint exercises and exchange experience with other teams, who also have a fire service crane", adds Steffen Haas, who is also responsible for training the team. Around one-quarter of the Heilbronn fire service team, which numbers just over one hundred in total, are trained crane operators and able to control the new vehicle and its functions.

### There are always obstacles of one kind or another

When the new LTM 1070-4.2 fire service crane is on its way to an emergency with its blue lights flashing and siren blaring, it is always followed by another vehicle carrying a fully laden container. This roll-off container is then positioned close to the crane and contains tools, fire fighting equipment and some special equipment for specific jobs. It carries everything from hoses and fastening equipment to a large cage, with space for up to ten people for rescuing accident victims. It even contains a diesel-powered back-up generator in case the crane's electronics system fail. "In the four years since we bought the crane, we have carried out several jobs with it", continues Steffen Haas. "We always attend accidents involving trucks just in case." But rescuing people using the cage, recovering vehicle from open water and the use of the special camera for a major fire in the old town are also among the jobs that the still relatively new fire service crane has completed to date.

"The new LTM 1070-4.2 has some significant advantages over its predecessor, although that one was always extremely reliable", says the experienced fireman. "We now have much greater safety reserves, particularly as a result of VarioBase®, the system for supporting the crane flexibly, which enables us to extend the outriggers quickly and to different lengths. It is a fantastic innovation, because in constricted urban areas with parked cars, there are always obstacles of one kind or another."

### LTM 1070-4.2 in Geneva

Our fire service cranes are also in action in Switzerland. The image shows the Geneva fire service's new emergency vehicle. This Liebherr mobile crane with its sleek design recently replaced an LTM 1035-3 dating from 1988.





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# In focus

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## **Night shift at the edge of the Alps**

In Lausanne on Lake Geneva (Switzerland), Gyger Levage was commissioned to lift a pedestrian bridge. The new LTM 1150-5.3 was used to lift at night so as not to disrupt rail traffic.







# Daring to go new ways









## Shipping cranes by barge – a trial for low emissions transport on waterways

In this age of climate change, at Liebherr we are working on finding solutions to create sustainable production procedures and greener processes. For example, we want to make the planned extension of our crane factory carbon-neutral in terms of construction, energy, production and energy sources. As far as our products are concerned, a new LTC compact crane with an additional electric motor for site operations marks the route to zero emission versions of our power units. And since we want to go as far as we possibly can in terms of sustainability, we are also opting to dare to go new ways into uncharted territory. One of these new ways is a pilot for transporting a Liebherr rough terrain crane destined for overseas export. A report on an extraordinary journey.

The Liebherr plant in Ehingen is a genuine global player when it comes to mobile and crawler crane technology and also in terms of its sales figures. From here, our products are shipped all over the world. Every year, around 1,000 mobile and crawler cranes leave our factory to be loaded onto ocean-going vessels at major seaports – and this figure is on the rise. The terminals in Bremerhaven and Hamburg are the main export ports we use. Generally, our mobile cranes cover the routes to the ports under their own steam. Rough terrain cranes, crawler cranes, some prototypes and the components for our large cranes, on the other hand, must be transported to the ports using lots of heavy, high volume haulage trucks, which involves a great deal of logistics work. We conducted a trial recently to find out whether we could simplify this process, and above all, do so using fewer resources.



### On it goes

At the Industrial Port of Mannheim, the LRT 1090-2.1 moves onto the giant Rhine ferry, which will transport the rough terrain crane to Antwerp. The journey ends at the Port of Rotterdam for the red mobile crane destined for Great Britain (pictured on the left).

An LRT 1090-2.1 rough terrain crane destined for the North American market had to be delivered to Zeebrugge in Belgium for shipping. This powerful crane, suitable for use in open cast mines or large construction sites, with its enormous gross weight of around 55 tonnes is not licensed for driving on roads. Therefore, it is split into two packages for transport, namely the basic machine, including the superstructure and boom, in one parcel and accessories, such as the hook block and ballast slabs, in the other. However, instead of being driven on a low loader over the 800 kilometre trip to the Belgian coast, the journey actually covered just one third of the distance to Mannheim, around 80 kilometres south of Frankfurt am Main. At the Rhine port there, the crane was driven onto an enormous Rhine ferry, together with three other Liebherr mobile cranes destined for Great Britain, several new truck tractor units and around 100 tractors. The subsequent trip down the River Rhine on the 200 metre barge took around three days to Rotterdam and then on through the Schelde-Rhine Canal to Antwerp, the largest breakbulk port in the world. On arrival, the LRT 1090-2.1 was parked up for around a week between thousands of cars and enormous storage areas for breakbulk, which is the specialist term for large piece goods.

### Ship ahoy!

With its imposing length of 214 metres, the “Dynamica” starts its three-day journey in Mannheim on the River Rhine to Rotterdam and then on the Schelde-Rhine Canal to Antwerp in Belgium. In addition to several other Liebherr mobile cranes and truck tractor units, there are around 100 tractors on its upper and lower decks.





## High seas?

You might think so. But actually, the heavyweight barge train is actually shown here travelling across the wide mouth of the River Schelde towards the North Sea before turning back into Belgium's canal network.



## 220 Tons Liebherr technology on board

### Travelling with a mining excavator

Our crane had to wait. In fact, it was waiting for an R 9400 excavator to arrive from the Liebherr Plant in Colmar (France). This enormous machine was also travelling to Antwerp by waterway. Together with the components of this mining machine, our rough terrain crane was due to travel the rest of the way on a barge train comprising tug and RoRo (Roll on Roll off) pontoon. The planned route was on the River Schelde, which partly passes through the Netherlands, towards the open sea and finally on Belgium's internal waterways via Ghent and Bruges to the seaport of Zeebrugge. The Wallenius Wilhelmsen shipping company, whose enormous ocean-going vessels take care of the maritime transfer of Liebherr machines throughout the world, was responsible for this section of the journey.

"The Liebherr Group is an important partner for us and has been our customer for many decades", says Carsten Wendt from Wallenius Wilhelmsen. In his role as "Senior Manager High & Heavy and Breakbulk Sales Germany", he looks after breakbulk transport for German customers and was therefore responsible for planning the entire trip for this trip through Belgium. "We have plenty of load space on this large barge for rough terrain cranes from

Ehingen and for the mining excavator from Colmar", adds the experienced logistics expert. "We loaded the excavator components and the accessories for the LRT 1090-2.1 on a total of seven standard roll trailers. They are placed on the pontoon and then in Zeebrugge they are moved onto the ocean-going vessels without us having to unpack the goods again. The rough terrain crane, on the other hand, drives itself onto the pontoon and later also onto the ship." There is a simple reason why the LRT 1090-2.1 was unable to start its sea journey from Antwerp: "Because the Ehingen crane is going to North America, it can only be loaded onto one of our ships in Zeebrugge. From Antwerp, we go to different regions of the world."

Wendt was also there when the crane was loaded onto the barge in Antwerp: "After a long period of planning, I wanted to know how well loading breakbulk onto the pontoon works here and whether we might have created any logistics traps which we hadn't thought about." However, after just two hours, all the material had been effortlessly moved onto the vessel and safely secured. The trial involving a total of 220 tonnes of Liebherr expertise could begin.



### Sightseeing

On the Ringvaart Canal along the old town of Bruges in Belgium, our rough terrain crane on the front of the barge also passed several bascule bridges and windmills. The barge train is shown here passing the 600 year old former city gate known as "Kruispoort".







#### Arrival

At the Port of Zeebrugge, the rough terrain crane drives down the pontoon ramp onto dry land. The Wallenius Wilhelmsen shipping company has its own terminal where its ocean-going vessels are loaded before travelling to North America.

#### From Ehingen to Zeebrugge with just one stop

To put it bluntly, Wendt's plan ran like clockwork. Around two days and 150 kilometres of waterway later, the powerful pusher tug had manoeuvred its pontoon through the Belgian inland waterways and arrived at the shipping company's terminal in Zeebrugge with its heavyweight cargo. Waiting for vessels going in the opposite direction, at locks and bascule bridges reduced the speed of the barge train slightly. However, Jens Bachmann, Team Leader Crane Shipment at the Liebherr Plant in Ehingen, puts the time required for the journey by waterway compared to road transport into perspective: "The steady increase in traffic, ever longer diversions due to ramshackle motorway bridges and the complicated licensing processes for heavy haulage transport all mean that we regard the option using the ferry and barge as a genuine alternative." Shipment Manager Benjamin Buchmüller continues: "The Wallenius Wilhelmsen solution using the RoRo barge enables us to reach the ports of Antwerp and Zeebrugge with a single stop and we can deliver even more cargo on green inland waterway vessels."

The summary from the shipping company was very similar: "The detailed planning and preparations paid dividends, everything went perfectly", said a delighted Carsten Wendt, after the rough terrain crane and roll trailer had been unloaded in a very short time using the pontoon ramp at the Zeebrugge terminal. The shipping company regards the successful trial as motivation and a general opportunity for the more ecological shipping method which generates lower emissions of carbon dioxide. In future, the move from road to inland waterways could be used not only for containers but also for piece goods. "Actually, the Belgian government is very interested in moving traffic off its highly congested roads, and what's more, the availability of truck capacity is a massive problem at the moment."

#### 50 percent lower CO<sub>2</sub> emissions between Antwerp and Zeebrugge

At Liebherr, we are now conducting a thorough analysis of the pilot. But already we have discovered that the trial was positive from both an ecological and a financial point of view. "This method of transport is definitely an option for us", confirms Jens Bachmann. "We already ship around 160 cranes a year through the port of Mannheim. Ferries travel to Rotterdam and Antwerp twice a week. Now we can even ship machines to Zeebrugge waterway." The pontoon on the barge train through Belgium actually has enough space for up to nine cranes.

We've saved the best for last – Wallenius Wilhelmsen has now calculated the potential reductions in carbon dioxide for the route between Antwerp and Zeebrugge. Carsten Wendt continues: "On a positive note, we have found that this method using inland waterways halves the CO<sub>2</sub> emissions compared to the conventional solution using trucks."

#### Chewing the fat

Carsten Wendt, Senior Manager High & Heavy and Breakbulk Sales Germany, on the right of the photograph, and Werner van Dessel, Manager Sales Development EMEA (both from Wallenius Wilhelmsen), are both positive about the trial after the carefully planned trip on the water went like clockwork. According to van Dessel, ten to twelve road transport vehicles would have been required to move the entire cargo.





... followed up



**Benjamin Buchmüller, Head of the Shipment Department at Liebherr in Ehingen (right) and his colleague Jens Bachmann, Team Leader Crane Shipment, give us a little more information about the alternatives for transporting cranes and equipment by waterway.**

**Why were you looking for a new means of transport as an alternative to the road?**

**Benjamin Buchmüller:** Essentially, the search for new or better transport routes in financial and ecological terms is one of the main challenges facing the Shipment Department. In this specific case, the main idea was to find an alternative to the export ports we generally use in Bremerhaven and Hamburg, which we would be able to reach by waterway. Fortunately, the subject of sustainability is becoming more important in the transport sector as in every aspect of our lives. Furthermore, the route from Ehingen to Bremerhaven and Hamburg by road is becoming ever longer and more difficult. Infrastructure problems, particularly ramshackle, restricted bridges, mean that the routes approved by the authorities for transporting our products are becoming ever longer and the transport conditions are becoming more and more difficult.

**What do you mean by restricted bridges?**

**Jens Bachmann:** In order to protect older bridges or those that already show initial damage, the maximum vehicle weight is limited. Mobile cranes and heavy haulage trucks then have to take alternative routes. The direct route from our plant in Ehingen to Bremerhaven is actually around 800 kilometres, but the route approved for transporting our products is currently up to 1,190 kilometres depending on the crane model. That is the opposite of sustainable.

**Benjamin Buchmüller:** When we deliver cranes using their own engines or transporting them on a low loader, this is known as large volume and heavy haulage and we have

to obtain an official road permit for these trips. Without them, our machines cannot leave our yard. The road permit contains details of the route and this route must be followed precisely. For example, it states exactly when the journey may take place and when it must not, whether a second driver is required, the speed and distance that must be maintained on bridges and whether another vehicle or the police must escort the truck.

**Jens Bachmann:** The worse the infrastructure to the ports becomes, as is increasingly the case, the more diversions we have to include in the route, which in addition to increasing the distance also means higher costs for fuel, personnel and escort vehicles. What's more, it is becoming more and more difficult to obtain trucks in the time available and in the quantity we require.

**So what are the alternatives?**

**Benjamin Buchmüller:** One of them is transport by waterway. The nearest port to us is in Mannheim, around 200 kilometres away. From there, a ferry travels twice a week carrying tractors and trucks from local factories to the ports of Rotterdam and Antwerp, and it can also carry our basic machines easily, loading them using a ramp. Compared to transporting them to Bremerhaven, this saves the journey via Mannheim of around 560 kilometres, which our cranes would otherwise have to cover themselves or on a low loader. We have been using the Rhine ferry from Mannheim to Rotterdam and Antwerp for years. Last year alone, we transported over 160 cranes on this route, saving a lot of transport costs and CO<sub>2</sub>.



**You describe transporting the LRT rough terrain crane to the sea port of Zeebrugge as a pilot project.**

**What is new about it?**

**Jens Bachmann:** The challenge was that the Rhine ferry from Mannheim did not travel to Zeebrugge because firstly it is not suitable for travel on the high seas and secondly it is too large for Belgian canals and their locks. However, the Western ports are the only adequate alternative for the global export of our machines if we can reach both Antwerp and Zeebrugge. We wanted to make sure that this was possible.

**Benjamin Buchmüller:** Our sister company, Liebherr-Mining Equipment Colmar SAS, has been almost exclusively using barges from Neuf-Brisach to transport its machines for some considerable time. Just like the RoRo ferry from Mannheim, however, the trip to Zeebrugge is not possible from there. When we talked to our shipping company, Wallenius Wilhelmsen Ocean AS, therefore, we had the idea of linking the ports of Antwerp and Zeebrugge using a RoRo barge.

Wallenius Wilhelmsen also saw that this would be an opportunity to generate additional Liebherr cargo for its loading operation in Zeebrugge and in addition Liebherr-Mining Equipment Colmar SAS was also very much in favour of the idea straight away.

**And what is your conclusion?**

**Jens Bachmann:** The trial was extremely successful. The collaboration with our partners was excellent. Naturally, there are one or two points that have to be ironed out.

**Benjamin Buchmüller:** Transporting the LRT 1090-2.1 on a low loader from our plant to Mannheim, from there on a barge to Antwerp and then using the RoRo barge to Zeebrugge was more than 30 percent cheaper than by low loader from Ebingen straight to Zeebrugge, and we were also able to reduce our greenhouse gas emissions by around 28 percent. That is sustainable and is definitely a step in the right direction.

Transporting machines by waterway to the port of Zeebrugge is a good alternative transport solution for delivering them to customers overseas. The example of the LRT is clearly transferable to other mobile cranes and is a solution to the urgent need to move transport vehicles from the road to the water.





# Snow storm at North Cape

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## Liebherr Service team gets to work

The Raggovidda wind farm in Norway is located in N-Berlevåg, at the same latitude as the North Cape. This is the most northerly wind farm in the world and also one of the most efficient due to the constant strong wind in the area. 15 wind turbines with a total rating of 45 MW have been operating there since 2014. The wind farm is currently being expanded with an additional twelve turbines. And, of course, Liebherr cranes are in action there. In November 2021, the weather in N-Berlevåg proved to be something of a challenge with winter storms and snow. An engineer from our Norwegian Liebherr sales and service partner, Ing. Hans P. Øen AS, nevertheless made his way to the site, despite the adverse conditions, to carry out troubleshooting work on an LTM 1090-4.1, which would no longer start, so that he could order the required spare parts.



### On chains

Track vehicles transport the team to the site.



### Extreme winter weather conditions bury Liebherr cranes in snow

In January 2022, the weather conditions at the Raggovidda wind farm had deteriorated significantly. Our customer Windhoist requested our support – three of its Liebherr cranes, an LTM 1090-4.1, LTM 1130-5.1 and LTM 1200-5.1, had been completely buried in snow and damaged by the extreme weather conditions in the region. Frequent storms combined with snow made working at the site very challenging for our service team. Service engineer Björnar Flowers, who originates from northern Norway and is familiar with the challenging weather in the region, nevertheless set out to the site.

Track vehicles were required to transport Flowers and others to the machines due to the poor road conditions. The engineer was later given a snowmobile to ensure that he could travel around the site. The weather at the Raggovidda wind farm was so extreme that it was not even possible to complete a full day's work every day.

### Used to storms

Service engineer Björnar Flowers grew up in northern Norway.





### **Snow in every cavity**

The first of the three Liebherr cranes to be excavated from the mounds of snow was the LTM 1200-5.1. The snow had been driven into every cavity on the crane by the powerful storm, even into the outriggers and engine bay. Flowers takes up the narrative: “I removed snow from the engine with my bare hands, which took me over four hours. Then I was able to replace the V-belt and start the machine, whose battery was discharged, using external power.” Flowers used precisely the same procedure to remove the snow from the superstructure. Once again, the snow storm had left its mark and caused some damage – the tilt sensor was defective and a cable had been torn away.

Once the machine had been restarted, the next challenge immediately became apparent – all the snow around it first had to be removed before it would be possible to move the LTM 1200-5.1. Excavators had to be used for this work. “Near the crane, however we had to work by hand with shovels so that we didn’t damage the crane”, adds Flowers. Together with five people from Windhoist, he got to work. The men worked for hours with their shovels to free the crane from the snow. Then all the snow had to be removed from the cavities. A large hot air unit and a small heat gun were used for this purpose.



### **Frozen**

The ice is removed from the support plates using hot air and iron.

### **Snowblower clears the way**

When the crane had finally been freed, its route away from its position had to be cleared using a snowblower. The whole process took a lengthy 32 hours. After this, the machine was driven to N-Berlevåg, where it was placed in a warm storage shed so that the remaining snow could thaw and the crane could be prepared for further repair work.

The same process had to be repeated for the other two cranes, with each taking a full week to be recovered. The extreme weather conditions had caused a good deal of damage to all of the cranes. The compressed air tanks on the LTM 1090-4.1, for example, were empty and the gear-box was stuck between two gears which meant that the engine could not be started. The very low temperatures had even frozen the fuel in the superstructure. These challenges were also successfully mastered. All in all a demanding operation with great cooperation between our Liebherr service and our customer Windhoist.



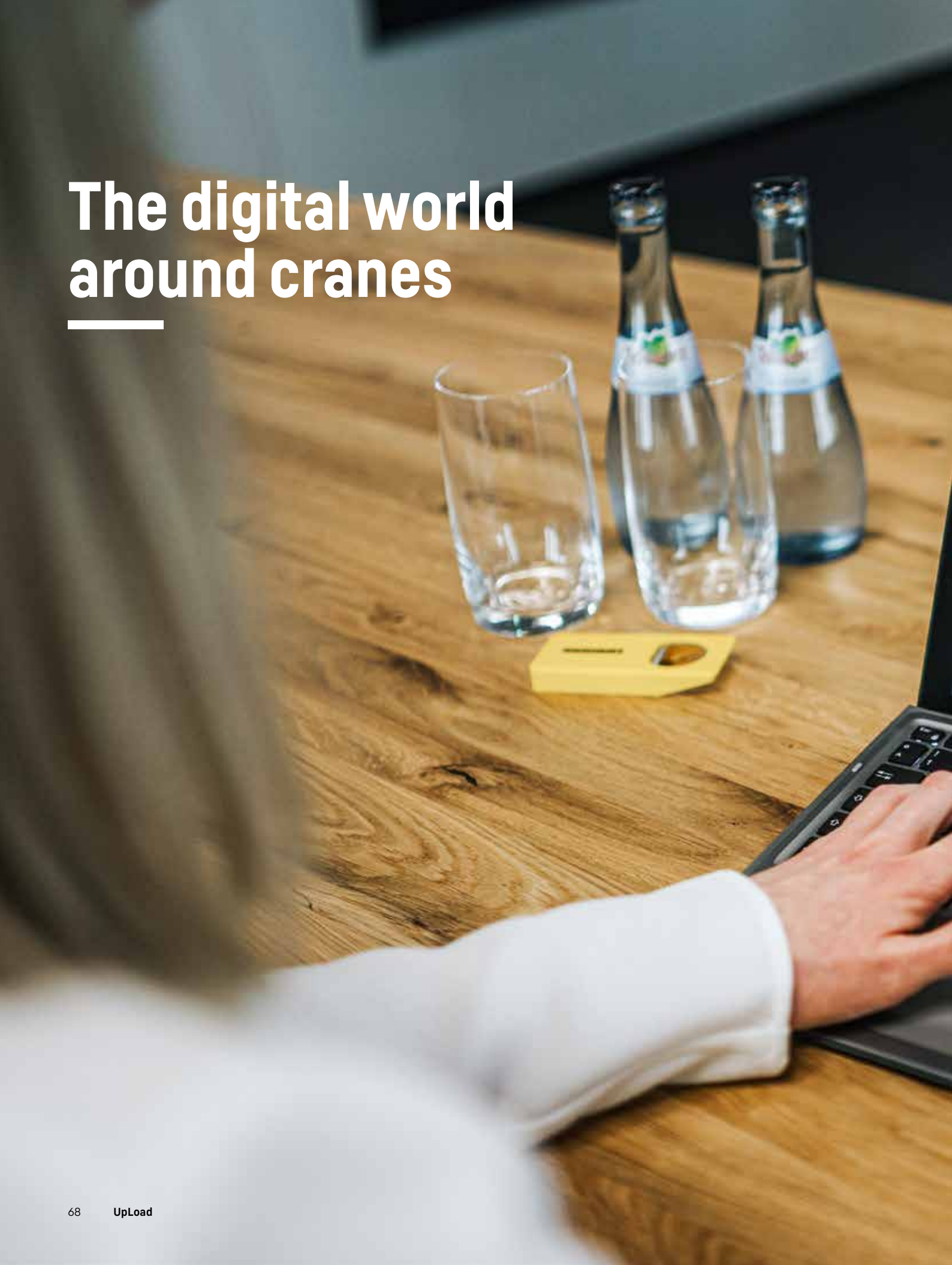
### **Manual labour**

The men move the masses of snow with shovels.



# The digital world around cranes

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Welcome to  
the new  
MyLiebherr

Welcome, John Doe

Products (4)

Profile

NAME: John Doe  
EMAIL: john.doe@myliebherr.com

VIEW PROFILE

DISPATCH DATE

85 7A 45 20 00 1 CALIBRO

WRITE COLLEAGUE

10:58  
21.05.2022



## MyLiebherr. One portal, all services.

Digitisation is constantly advancing. In the last issue, we presented to you the Crane Planner 2.0 in full operation. The new job planner is only one application, which we are providing through our MyLiebherr portal. What else is included and what will be coming soon? Learn more in a conversation with our experts Sarah Weidenbacher and Stephan Schrade from Customer Service, Wolfgang Boos from Product Management and Christoph Behmüller from Training.



***"New design, revised navigation, modern interface. MyLiebherr is on the right track, as initial feedback from our customers shows."***

Sarah Weidenbacher  
Customer Service



## **MyLiebherr – what can our customers expect here?**

**Stephan Schrade:** MyLiebherr is our digital customer portal. So it is where all digital offers, applications and services are combined and clearly and simply presented to our customers. It already includes a wide range of applications and functions - and there will be new options and enhancements coming all the time. One thing is important to us here: A large number of offers are free to use or at least free basic licences are available - which means that the customer just has to register to be able to use a large number of our offers. We want make our customers a clear simple offer with MyLiebherr. All services and all offers under one roof.

## **What are the latest developments?**

**Sarah Weidenbacher:** Last year, we worked on a new design and a completely new interface. Anyone who has logged in or registered since May will notice a big difference here. The homepage now shows registered customers their entire fleet of machines, with various applications that belong to the equipment, such as the documentation, the option to replace the diesel particulate filter or even the matching spare parts catalogue. In addition to the ability to quickly contact their contact partner in Customer Service, customers will see the app launcher in their overview, containing all available applications - so for example our Crane Planner 2.0, the Crane Finder, the LICCON job planner or the licence shop. I think we have taken a big step forward with this new launch and design. This has been clearly shown by the initial conversations with our customers and also some usability tests, in other words tests with crane operators who have clicked through the portal.

**Wolfgang Boos:** At the same time, we are working on our telemetry application. It is extremely important to us to not only show the crane's data - but also to prepare, analyse and present these data in a meaningful way. In future, for example, we want to precisely display and use elements known from the passenger car sector, such as fuel consumption, operating hours, etc. as well as data from the crane control and the ambient data, such as temperature and wind, which we will make available online in real time. The customer will have the ability to define sites of application and thereby create application logs, which for example state the support force or even the CO<sub>2</sub> emissions. The whole thing is of course a complex field and starts with data availability.

## **What does that mean specifically?**

**Wolfgang Boos:** The crane must be able to transmit operating and condition data. This is done using a modem. Most cranes that have been produced since early 2022 as well as our LICCON3 cranes already have the modems installed by default. For all older cranes, we would like to offer retrofit options in future. We will present our new telemetry application in full for the first time at Bauma.

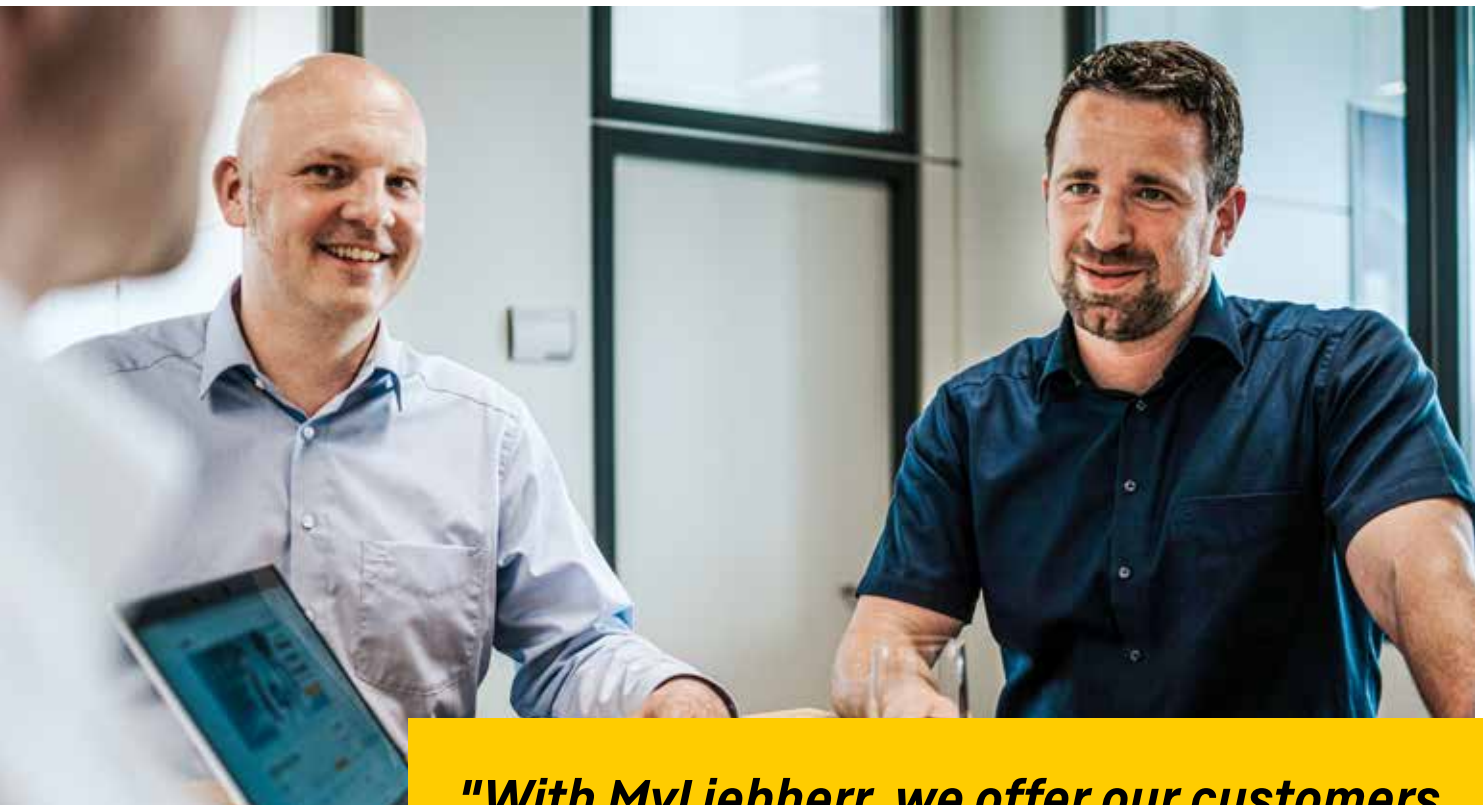
**Sarah Weidenbacher:** In order for the customer to use this, a MyLiebherr account is required of course on the one hand, and the customer's crane must also be registered. This is quick and easy to do and is absolutely free. The steps are simple: When registering via myliebherr.com, the customer's company is created or - if it already exists - the person is added to the company account. Then a business relationship can be taken up with the competent service partner and then the cranes can be registered. Once the crane is registered, we will provide numerous applications. Licences are required for some applications, which can then be purchased in the licence area.



**What other offers exist in MyLiebherr and what are you working on at the moment?**

**Christoph Behmüller:** We are already offering our e-learning for mobile crane operators in the portal. This is a theory unit, which crane drivers should always know as a sort of crane operating 101 training - there is even a free trial unit. We of course offer this training in different languages - it has the advantage that every participant here can learn whenever and wherever is most convenient. Practical training on cranes is of course still possible worldwide at our training centres. To meet employee needs, our digital training offer is currently being significantly expanded to allow crane drivers, dispatchers and workshop personnel an easier entry into the respective specialised area. This will then also be available via MyLiebherr and can be booked to match the respective crane - or, for general training sessions, for all equipment.

**Stephan Schrade:** There is still a whole range of other offers - I actually always recommend registering there and taking a look for yourself to get an overview. When it comes to customers' own fleets, simple topics can be covered here, such as naming equipment or assigning keywords for better searches, or even profile management. The end effect is that we offer a profile page for each product, like on a social network. In this way, the product details can be viewed directly. And we are working on numerous points to further improve and expand our digital service offering. The telemetry application mentioned and the training offer are only two points, but two very important ones. Because with every new development come new ideas, wishes and suggestions. That is why we are constantly speaking with our customers during MyLiebherr developments to get feedback, to incorporate feedback and to offer new applications and options.



**In interview**  
Stephan Schrade and  
Christoph Behmüller  
(f. l. t. r.)

***"With MyLiebherr, we offer our customers a digital world for simplifying their daily work processes."***

**Stephan Schrade**  
Customer Service





***"At Bauma, we will present our new application for telemetry and fleet management."***

**Wolfgang Boos**  
Product management

#### **How digitally savvy do I need to be to find my way with MyLiebherr?**

**Sarah Weidenbacher:** Ultimately not very savvy. If you use the Internet, then you'll manage very easily in MyLiebherr - otherwise we are always happy to help you through our global and local service organisations. All you need to do is call. It is important to engage with the topic. MyLiebherr is an offer for our customers that makes everything easier and simpler.

**Christoph Behmüller:** We are working with MyLiebherr in training sessions more and more frequently. This simply means that our training participants are already familiar with MyLiebherr and individual applications in the portal. What is always important to us: Remove reservations, create confidence. The world around cranes is becoming more networked and digital by the way - at the same time it is getting harder to find and train good suitable personnel. We want to not only offer our customers the best possible support with our portal and our applications, but also with our training offer.

#### **Keywords 'getting to know' MyLiebherr - what is possible here?**

**Stephan Schrade:** Basically: Register and off you go! But we also offer the possibility to view MyLiebherr at trade fairs, to have it explained and also to register. Of course this will be possible at Bauma this autumn in Munich or in March at the Conexpo in Las Vegas. But also at many other smaller trade fairs. Then of course, and as has already been said, also at training sessions all the time. And of course also at your service partner. Often all you need to do is call. What is always important to remember here: The portal of course is constantly evolving. New features and applications are constantly being added. And: We have more ideas and plans. So: Try it out, test it, and then use it in daily operation! We look forward to many users and their feedback.

Learn more about MyLiebherr here:  
[www.myliebherr.com](http://www.myliebherr.com)







# How important is the ground to ensure crane jobs can be completed safely?

As a crane manufacturer, safe crane operations are paramount to us. There is a great deal we can influence, for example the design, production, crane control system with overload warnings and intensive testing. But there are some things we have absolutely no control over. For example, a lack of stability in the ground is one of the most common causes of crane accidents. So we asked the question: Jan-Simon Völk is an expert and technical trainer at our training centre in Ehingen. He explains what you have to look for and which tools and services are helpful for planning crane jobs.

The ground is the foundation for the crane. If it does not provide sufficient load-bearing capacity, there is no way that the crane can operate properly and be stable. In fact, the ground beneath its feet will simply fall in. So there are two major questions that require answering: What is the load bearing capacity of the ground and to what forces will it be subjected during the job?

Firstly on the question of load bearing capacity, we always talk about the maximum ground pressure in  $\text{kN/m}^2$ . Let me give you a few examples: Ground consisting of sand, gravel, stone and mixtures of them can take a ground pressure of around  $200 \text{ kN/m}^2$ , which corresponds to around 20 tonnes per square metre. Clay-type soils have lower load bearing capacity. On the other hand, solid

soil types with mixed grain sizes have higher values, up to around  $300 \text{ kN/m}^2$ . Rocky ground is perfect. It can withstand loads of over  $1,500 \text{ kN/m}^2$ . If you have any doubt about the load bearing capacity of the ground, you must commission a study by an expert.

## The operating manual

Let's now look at the force that the crane places on the ground. The fastest information is provided by the operating manual for the crane. It provides the maximum support force. Let's look at a medium-sized crane as an example: The maximum support force of the LTM 1230-5.1 is 1,109 kN. The standard support plates measures  $0.6 \times 0.6$  metres, in other words  $0.36 \text{ m}^2$ . We reduce this area by 20 percent because the outer edge has





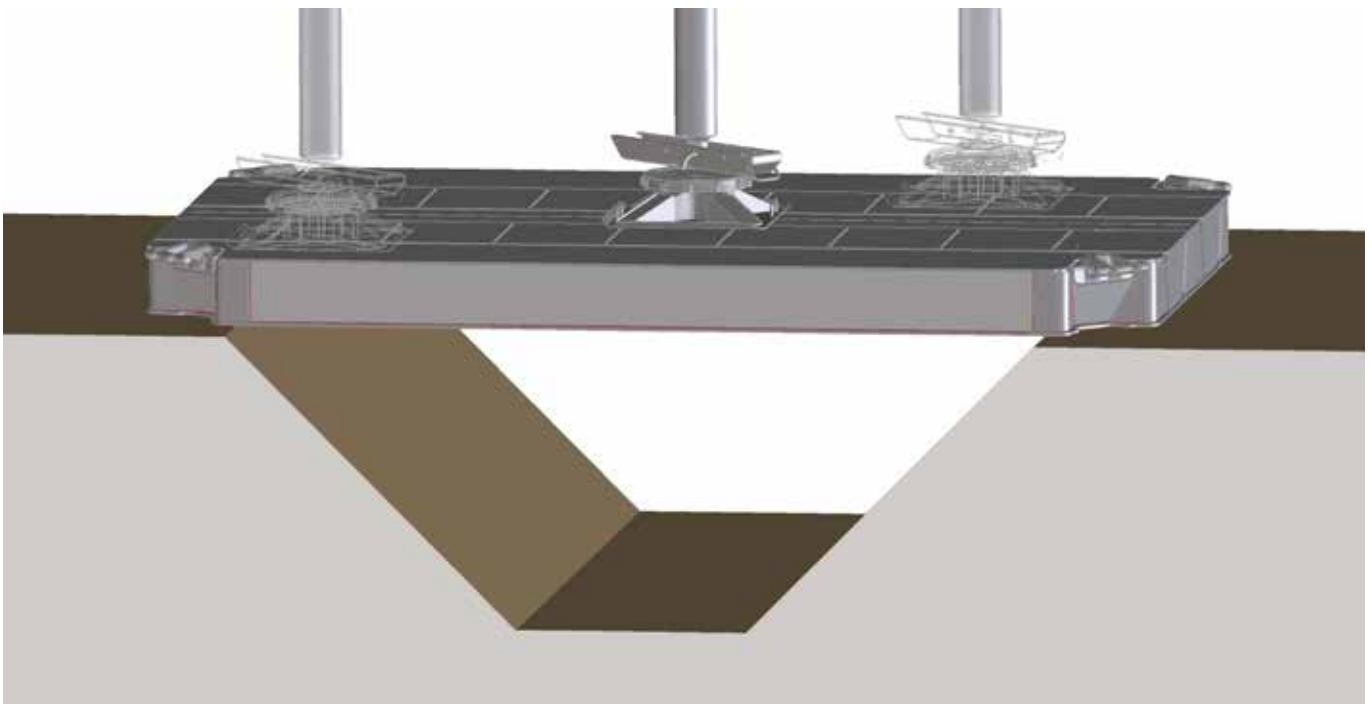
***“The question of the ground is a fundamental one. Build on our support and use our tools.”***

**Jan-Simon Völk**  
Technical Trainer

no load bearing capacity due to its having rounded edges. So the load bearing capacity of the ground must be  $3,851 \text{ kN/m}^2$  ( $1,109 \text{ kN}/0.288 \text{ m}^2$ ). As the ground on sites rarely provides these values, the only solution is to increase the support area. For example if we use support timber with an area of  $1 \text{ m}^2$ , we require a load bearing capacity of  $1,109 \text{ kN/m}^2$ . Vice versa, with a load bearing capacity of  $300 \text{ kN/m}^2$ , base plates measuring  $3.7 \text{ m}^2$  would be required ( $1,109 \text{ kN}/300 \text{ kN/m}^2$ ).

### **Job planning tools**

So now let me give you an important tip. On a specific job, it is possible that the maximum support force will not be reached. In this case, the LICCON job planner or Crane Planner 2.0 can help as these tools deliver the precise support force. If, for example, it is  $700 \text{ kN}$ , base plates measuring  $2.33 \text{ m}^2$  would suffice ( $700 \text{ kN}/300 \text{ kN/m}^2$ ). That saves handling work and costs.



### **Force transfer**

Our new base plates make eccentric support possible and they deliver maximum load bearing capacity even when positioned over cavities.



## VarioBase®

There are often areas on construction sites where it is simply not possible to support a crane, for example over sewage pipes or other cavities in the ground. This is where our VarioBase® variable supporting base comes into its own. Each individual outrigger can be extended to any length and the hoist can then be carried out safely using the load moment limitation of the LICCON control system. Plan the job using one of the job planning tools so that you also calculate the precise support forces involved with VarioBase®. What is more, you can actually simulate the job before carrying out the hoist on site using the LICCON2 control system – you can never be too safe.

## New Liebherr steel outrigger pads

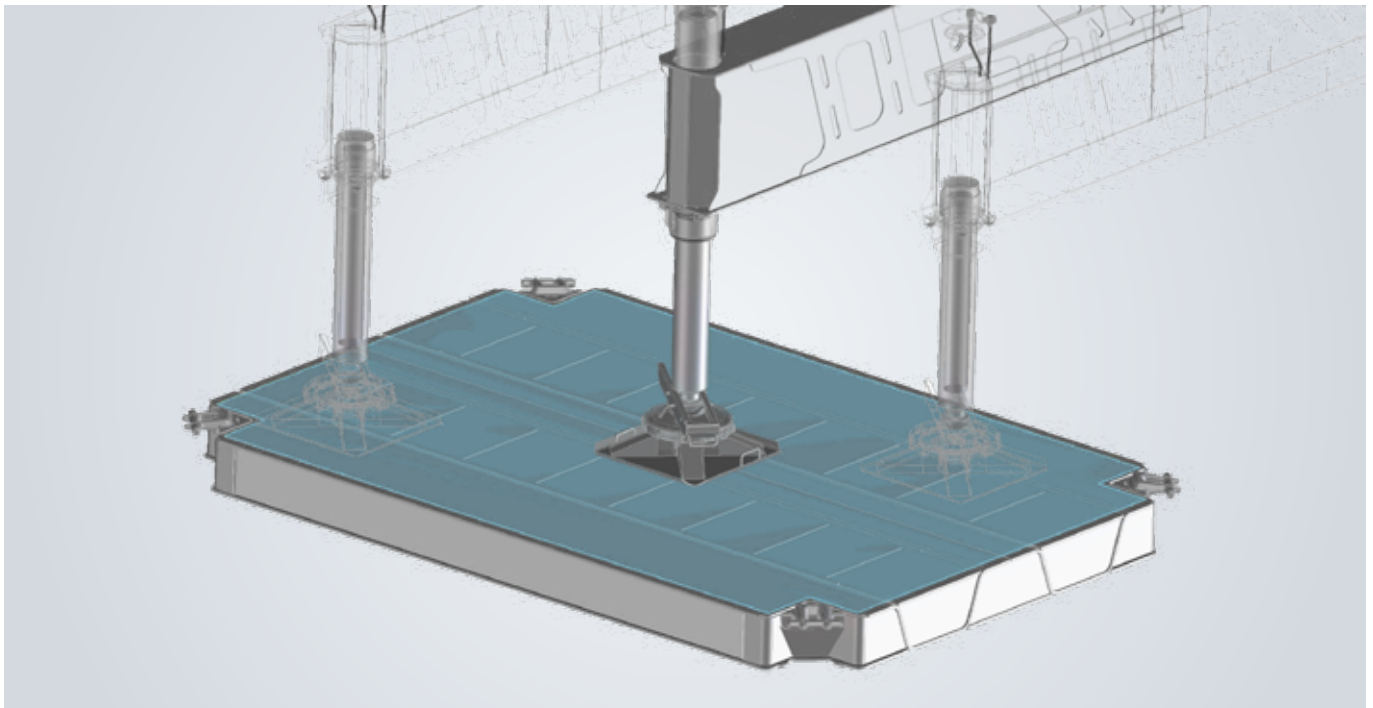
We have developed a new generation of steel outrigger pads for mobile cranes which deliver a whole host of benefits. They can be loaded over the full area and can be positioned over cavities – and still deliver maximum load bearing capacity. What is more, they are also designed for simple transport as they are easy to handle and have a maximum width of 2.4 metres. Their centring system also means that they can be stacked safely.

## Professional training courses and ECOL mobile crane operators licence

We provide professional training courses for practical subjects both at Ehingen and at other training centres all over the world to extend your expertise and ensure safe mobile and crawler crane operations. Despite all the technology, we must not forget about the person operating it. We all bear a great deal of responsibility, both manufacturers and contractors.

Liebherr was the very first company in Germany to offer training to acquire the new ECOL European mobile crane licence (European Crane Operators Licence) and these courses have been available since 2020. Safety is absolutely paramount. We want to avoid damage and in particular personal injuries. Not only does that require safe cranes, but also good training for crane operators. An internationally accepted crane operators licence will increase the safety of crane operations and enable our customers and crane operators to extend their activities internationally without different licences, and in some cases even beyond the borders of the EU.

Professional training is extremely important as ultimately the crane operator has the last word. He bears ultimate responsibility and decides whether he can carry out the hoist on the ground at the site or not.



You can find out more about our new steel outrigger pads here:

<https://go.liebherr.com/x4z7c2>



# Press the accelerator and protect your clutch

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In the last edition of our UpLoad magazine, we unveiled the new ZF TraXon DynamicPerform gearbox, a truly pioneering development – a cooling oil circuit prevents the clutch suffering wear and overheating. Starting with 5-axle models, we plan to install the new clutch module gradually in all our three to five-axle mobile cranes. However, since thousands of mobile cranes with a dry clutch are still in action, since 1999 in the ZF-AS-Tronic gearbox and since 2017 in the ZF-TraXon gearbox, in this edition we explain how you can also drive a crane with a dry clutch without causing a great deal of wear. These tips are provided by our experts, Peter Pflug from our Testing and Engine Application Department, and Jörg Schlegel, a trainer at our Ehingen training centre.

**Peter Pflug:** Our tip “Press the accelerator and protect your clutch” initially seems to be a contradiction in terms, but what you have to know is that the clutch closing process depends on the drive resistance and the accelerator setting. You should therefore always start a normal trip quickly with plenty of accelerator so that the clutch does not suffer wear for any length of time.

**Jörg Schlegel:** These are automated manual gearboxes. The gearshift is controlled automatically which means that a clutch pedal is not required. The gearbox control system is also responsible for closing the clutch. The more drive power that is required, the more the accelerator pedal has to be pressed to achieve the appropriate coupling moment at which the clutch no longer slips. Various factors play a role in this – the gradient, the weight of the vehicle, the driving resistance, the selected gear and the driving mode, in other words on-road driving, off-road gear or manoeuvring mode.



***“You can influence the closing process of the clutch by pressing the accelerator.”***

**Peter Pflug**  
Testing and Engine Application





**Peter Pflug:** The high gear ratio of the distributor gear is active for on-road driving, whilst the low one is active for off-road gear. If off-road gear is active, the second gear is automatically selected. This means on our 5-axle cranes, for example, when the clutch is closed, the crane has a minimum speed of 1.2 km/h. If an even lower speed is required, you should switch to manoeuvring mode. You have to proactively engage first gear. This enables you to travel at a minimum speed of 0.6 km/h when the clutch is closed.

**Jörg Schlegel:** Actually, you should not just use the off-road gear for driving off-road – it should also be used if you have to manoeuvre the crane for a lengthy period of time. The low ratio protects the clutch. It is essential that you ensure that the clutch is completely closed. You can check the monitoring lamp in the display unit to ensure that this is the case. If it is lit, the clutch is not fully closed. In that case, you have to press the accelerator a little further.

You need manoeuvring mode if you wish to drive even more slowly. This is the case, for example, if you have to position the crane precisely or you have to manoeuvre it out of a gap. The monitoring lamp will be permanently lit in manoeuvring mode to warn the driver not to remain in this mode for an excessive period of time.

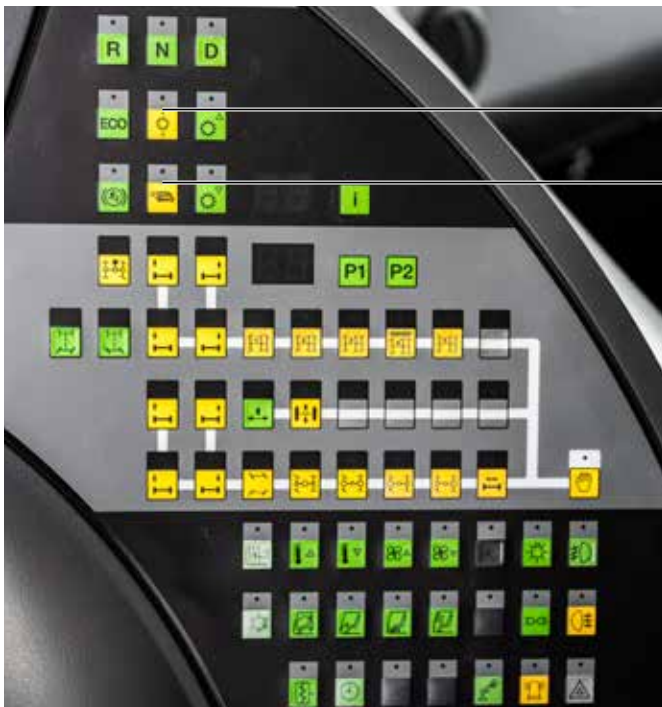
***“Our tips enable you to save money and downtime.”***

**Jörg Schlegel**  
Technical Trainer



**Peter Pflug:** Other situations in which there is a risk of increased clutch wear include traffic jams or stop and go traffic, particularly on gradients. We have two tips to help you with this: Switch from automatic mode to manual mode and engage a low road gear or even an off-road gear so that the clutch closes completely at a low speed. And reduce the number of starts to make by keeping a variable distance from the vehicle in front so that you can react to what is happening ahead.

**Jörg Schlegel:** If the clutch does become very heated, the symbol “CL” (clutch load) will appear on the display below the rev counter. If this happens, you should definitely allow the clutch to cool because if you subject it to any more stress, the clutch will suffer an extremely high level of wear. To do so, select neutral and leave the engine running. If you use our tips, they will enable you to drive the crane comfortably and with low wear, even if it has a gearbox with a dry clutch. Have a good trip!



**Automatic or manual gear shifting –**  
lit in manual mode



**On-road driving or off-road gear –**  
lit in off-road gear



# LTM 1650-8.1 NK system luffing jib

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#### **NK intermediate section**


The open fork in the lower fork/finger connection makes it possible to open the luffing jib during the assembly process.

# Simply explained

**Assembling and erecting long luffing jibs in constricted conditions is always a challenge in everyday crane operations. We discussed the situation with customers and found a solution which will be available as from next year. It's name – the NK system. Jennifer Enderle, a Designer in the Lattice Boom Department and responsible for the development of the new system, provides some insights:**

Sometimes it's just a matter of a few metres, but the space available on the site is often simply not enough to assemble a luffing jib on the ground and then erect it on the crane. Our challenge was therefore to find a fast, safe and easy solution for the space-saving assembly of a luffing jib. And the solution had to ensure that there was no need to use a platform or cage for working at heights.

Our solution is to hinge the luffing jib during its assembly. That is also the reason behind the name – **NK** stands for the German words **N**adelausleger (meaning luffing jib) and **K**lappen (meaning hinges) To achieve this, we designed a new, additional lattice section in which the hinge function is included, the NK intermediate section. The new system means that you on average require 30 percent less space on the site. For assembling a 63 metre luffing jib, for example, you require 30 metres less space. The system works for luffing jib lengths from 35 metres to the full length of 91 metres.



***“The new NK system enables you to assemble luffing jibs where previously there was not enough space.”***

**Jennifer Enderle**  
Lattice Jib Design



## Assembly and raising process

The 7 metre NK intermediate section, which is used instead of a conventional 7 metre intermediate section, splits the luffing jib into two halves – the “first luffing jib half” and the “second luffing jib half”, although, depending on the length of the luffing jib, the halves are not always exactly the same length. The main point is that the NK intermediate section has a separating point where it is hinged. This is achieved by an open fork in the bottom fork/finger connection. In other words, the NK intermediate section is divided into two parts: NK intermediate section 1 and NK intermediate section 2.

In the first stage of the process, the first half of the luffing jib, including NK intermediate section 1 is assembled whilst it is supported on a pulley cart. The telescopic boom is then luffed up and at the same time the luffing jib is lowered until the jib head hangs downwards. Depending on the length of the jib head, the boom may also have to be extended.

At this point NK intermediate section 2 is installed by pinning it to section 1 at the top fork/finger connection. The bottom connection is left open. Then follows the assembly of the second half of the luffing jib, including the head. The remainder is almost automatic – extend the telescopic boom and raise the luffing jib. It sounds simple – and it really is.

## Safety is paramount

All the work can be carried out from the ground or from near the ground using a folding ladder. The whole point is that no work has to be carried out at height using a platform or cage. The NK system is also monitored in full by the control system and features both electronic and mechanical safety devices.

However, the NK system does have one restriction that we must mention – there are ranges in which the lifting capacity of the standard luffing jib cannot be achieved. As the luffing jib is not guyed at the head section as usual, but instead at the NK intermediate section 1, the second half of the luffing jib becomes a cantilever with the reductions in lifting capacity that this involves. The good news is that in the main operating ranges, the NK system is nevertheless more powerful than our next smaller luffing jib crane. And there are even ranges where the new system is more powerful, particularly if a large radius is required.

The NK system will be available for both the 54 and the 80 metre telescopic boom, in other words T3NK and T5NK. An intensive period of testing is currently underway. The NK system will also be available for LTM 1650-8.1 cranes which have already been delivered. Please do not hesitate to ask if you require any further details.



### Up and down

After assembling the first half of the luffing jib, it must be luffed down whilst the telescopic boom is luffed up.





**Space-saving**  
The second half of the luffing jib is installed on the first half, which is hanging downwards.



**Closing the gap**  
The NK intermediate section is closed by telescoping the boom and raising the luffing jib.



**Cantilever**  
The NK system requires the luffing jib to be guyed on the NK intermediate section.



# In conversation

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## **It's a man's world...**

...that can still be said about some industries. The crane sector is one of them as well – and yet a change is noticeable: female engineers and fitters, designers and welders can also be found at Liebherr-Werk Ehingen (LWE). And it is undoubtedly a benefit to talk to them about careers, everyday working life and working together as a team.

## **Ms Prinz, together with your two colleagues, you are in charge of welding training and quality at LWE. How did you get this job?**

When I was young, I worked in a metalworking shop with 10 men during the school holidays. After school, I actually wanted to study architecture, but instead I followed my father's wishes (he manages a woodworking shop) that all his children should first learn a trade "as a good basis!" So I trained as a metalworker and technical designer at the metalworking shop. After another three years there, I moved to a welding training centre run by the Deutscher Verbandes für Schweißen und verwandte Verfahren e. V. (DVS) (German Federation of Welding and Associated Processes) where I was in charge of welding journeymen and master craftsmen examinations and whilst working there I underwent training as a master craftsman, welder and welding centre manager. Before I came to LWE, I worked at a construction company as a master craftsman and welding supervisor in structural steelwork.

## **So how did you end up at Liebherr?**

Whilst I was training as a welder, we were given the opportunity to visit the Liebherr plant in Ehingen. I was very interested in the challenges posed by using high-tensile fine grained steel. And also, how Liebherr was developing and driving forward this whole sector.

## **Do you still get your hands dirty at the SKZ?**

Yes. Welding is challenging and it requires training and lots of experience. In particular, I demonstrate various welding positions for new apprentices. Some of the apprentices and those taking the exams are fairly reticent or withdrawn initially. But when we've been working together for a week, we soon find a way of getting on.

## **Ms Enderle, you are a boom designer. How did you get here?**

I became interested in technology and engineering very early in life. I attended an all-girls grammar school and for one year every Friday afternoon I went to the "Student Engineering Academy (SIA)", where I was introduced to electrical engineering, robotics, injection moulding and other exciting things. The working group at the time made me really interested in pursuing engineering as a job. When I then found out about the Ulm Model sandwich course, a combination of a full degree course combined with a full apprenticeship, I thought the concept, pay and the good prospects for finding a job at the end and getting into a job at a good level were all great. And, of course, Liebherr is a company with a fascinating product which offers a very wide range of training.

I have worked as a designer of fly jibs since 2016 – from designing individual components and detailed design of the entire assembly to the decision of what we do in what position and using what production process – the whole thing is part of our planning process. The requirements placed on the product are easy to list – safety, functionality, customer benefits, economy, compliance with all standards and always attempting to make everything even easier and safer. We deal with almost every department in the company and are always learning new things! And whilst we're talking about learning – for the last nine months, I have been the training officer in my department, in other words I am the person to come and see about training and internships for students. It's always fun working with school and university students and seeing how they develop and work out what they want to do so quickly.



**Kathrin Prinz** (29) is a welding trainer at our Welding Competence Centre (SKZ). This is where she teaches apprentices the basics and where experienced welders have to come to pass a welding examination every three years. The customer service engineers who work in Germany and elsewhere at LWE's sales and service sites also have to take examinations at the Ehingen SKZ.



**Jennifer Enderle** (31) holds two qualifications – a Bachelor of Engineering and a certificate of proficiency as an industrial mechanic. She works as a designer. In a team comprising 17 colleagues, only one of whom is female, she develops fly jibs for the Liebherr telescopic cranes of the future to ensure that they always comply with the current safety and customer requirements.

#### **Do you think there are any differences between you and your (male) colleagues?**

**Kathrin Prinz:** I think there are differences between large and small companies. In a small company everybody knows everybody else and you quickly gain familiarity with each other. In a large company, you often talk to people that you don't know. That sometimes causes reservations the first time you actually meet in person. But at the second meeting the whole thing is very different. I think over time we will stop making any distinctions between male and female – and as far as I'm concerned that is proper equality!

**Jennifer Enderle:** I really can't remember any preference or disadvantage that I experience because I'm a woman either during my training or at work although, until the start of this year, I was the only woman in our team. At some point I hope that people will actually stop mentioning that women are getting into engineering!

#### **Does the women's quota then tend to go in the wrong direction?**

**Jennifer Enderle:** In theory, it will certainly mean that women take up some higher positions. However, in practice that's actually not a good thing because it makes people ask the wrong questions: Has she got the job because she's a woman? Can she actually do the job? As far as I'm concerned, I want to impress people with my strengths and competence, not with my gender.

#### **But would you like more female colleagues anyway?**

**Kathrin Prinz:** I have no problem whatsoever working with men. When I was at school, however, I always thought it was great that I wasn't the only girl. Everybody expects you to be the best in the class and there is real pressure on you – some of which you create yourself. In my courses I find that the mood in mixed groups is better and the working atmosphere is calmer. To ensure a good mix in the industry, it is essential that parents realise that vocational training and learning a trade are serious alternatives to going to university.

#### **And regardless of gender, what characteristics should somebody have if they want to go into the crane industry?**

**Kathrin Prinz:** Confidence and the ability to stand on their own feet are important and a sense of humour is certainly helpful. And then, of course, you need to be fascinated by the product.

**Jennifer Enderle:** That's right. They also need technical understanding, assertiveness and a high tolerance for frustration. That's because not everything works first time and sometimes you have to do start right from the beginning again. The ability to learn and flexibility are a real benefit in this case!



# Katie Cranes

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Katie Kelleher is leaving her mark in London – the crane operator and lifting technician has been involved in Crossrail, now known as the Elizabeth line, Tideway, nick-named the super-sewer and the High Speed 2 railway. She did not train as a lifting technician and crane operator until she was 30 – as a way to change her life and find out whether she would be “really good or really terrible” at the job, which until then had seemed unimaginable. Since then, she has been involved in project delivery, and in raising awareness of job opportunities available within the sector, particularly for women and young adults.

Anyone in the construction industry in Great Britain will have heard of Select Plant Hire. It is one of the largest and most versatile suppliers in the industry and has an enormous range of equipment, accommodation, and services in its portfolio – but until Katie Kelleher started work at the company, it had no female crane operators. And it had significantly less visibility on social media, at schools and colleges, at events and in industry working groups. After all, Katie Kelleher is not just interested in cranes, she wants to change the whole industry. “My aim is to encourage the next generation to take up lifting technology. That is why I speak on every available channel about my

experiences, our projects, our industry – hoping to inspire, explain and change its public face.”

The young Londoner, who has an enormous number of followers on social media, where she uses the name Katie Cranes, had never even considered working as a crane operator. She studied literature at university and then had jobs in sales, advertising, the car trade and at a recruitment agency working on a trades and labour desk. “I was desperately looking for a way out of sales. As everybody in the building trade that I helped into a job was earning more money than I was, I flirted with the idea of applying. But what as?”



***“There’s a reason  
for everything I do!”***

**Katie Kelleher**  
Crane operator and lifting technician



Training as a lifting technician was just the start. It was followed by licences to operate crawler and tower cranes, mobile cranes, among other things. She has now been in the industry for seven and a half years and is really shaking it up. "I have a wide range of duties – I recruit trainees, help to manage our LinkedIn site, give lectures and talks; I created a working group for female 'workforce' employees and act as a moderator for the "Women on the tools" group and much more.

You could say that Katie Kelleher is actually pursuing a sort of safety plan for the future. The next generation should be aware and be able to experience the fact that women can thrive at operating cranes, that there are forums and groups available to them and they have a strong connection to the industry. And, of course, the fact that all construction workers leave a legacy which enhances infrastructure and improves the lives of many people. "I have helped build a railway station which will help millions of people to travel, and I've been part of a team that has built a sewage tunnel which will make the whole of London cleaner. These projects and their effects will still exist well after I die and will remain part of the centre of London."

To encourage young people into the building trade, however, she still has many things she wants to change, "the teams on site are already fantastic, the projects are great and my company is forward thinking and progressive." Nevertheless, there is still a lot to do: "I always say that young people are not impressed by 60-70-hour weeks. And although the industry pays well, we must ensure that we provide the life balance that newcomers want. As an industry we must be more flexible with what we offer, show greater understanding for our workforce and be prepared to do things better. The next generation of young men and women do not necessarily want to work in the same way that we have done in the past."

Katie Kelleher definitely believes that there is a will to change, but in some areas, women still face a fight to be accepted. And for herself, she thinks she is getting on fine: "Perhaps it's because I feel able to share my views." She is so passionate about the industry and enthused about her own career progression that she has learnt to ignore the negative comments that sometimes come her way on social media. "After all, there's a good reason for everything I do. I simply feel so lucky to work for a great company which has a firm vision of progress and does everything to make mine and my colleagues lives better, whether that be upskilling or addressing working conditions. At Select we are keen to provide progressive long-term careers and high quality, standard-leading training - I love that!"

Katie also has a vision of the future in terms of the fleet, where she is desperate for more unplugged cranes: "I love our 250 and 160 tonne cranes, they're just so futuristic and pioneering. I'm proud to work for this company. We were the first ones in the UK to have unplugged cranes and we continue to invest in them. I think they are the future of construction sites in London – demand is already proving it."

During her visit to Liebherr in Ehingen, the LTC 1050-3.1, a zero emissions hybrid mobile crane, also impressed her greatly. "Sustainability is becoming more and more important to the company and its customers. It's all very exciting and I can hardly wait to see what the future of cranes has in store!"

**Discover more:**  
[katiecranes.com](http://katiecranes.com)  
[instagram.com/katie\\_cranes](https://www.instagram.com/katie_cranes)  
[twitter.com/katie\\_cranes](https://twitter.com/katie_cranes)  
[linkedin.com/in/katiekelleher](https://www.linkedin.com/in/katiekelleher)







# Chile – a country with many faces

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## No end in sight

**...and we don't just mean geographically. Chile, a country in South America measuring 4,275 km in length, is currently experiencing a booming economy and excellent prospects. The founder member of the UN and current OECD member on the Andes combines a whole host of superlatives, is a driving force behind Latin America and home to the three sites of Liebherr Chile S.p.A. So we have plenty of reasons to take a closer look at the country.**

That puts us on the trail of Robinson Crusoe who was shipwrecked over 300 years ago on the Juan Fernández Islands in the southern Pacific, which are part of Chile. The islands are over 600 km from the port city of Valparaíso – which actually puts them closer than the Antarctic Peninsular Cape Horn, which Chile also claims, around 1,000 km from Cape Horn, the southern tip of South America, which is also part of Chile. The central state with its 16 regions and a population of around 20 million features desert and ice, mountains and beaches as well as glaciers, lakes, lagoons, volcanoes and national parks. Travellers from all over the world regard Chile as an extraordinary adventure destination with excellent facilities for sports fans and nature lovers. The country also has unforgettable experiences to offer aficionados of wine and culture, cruise fans as well as those interested in astronomy and wildlife – with the habitat of alpacas, pumas, hummingbirds, penguins and pelicans extends over a distance equivalent to the centre of Denmark to the Sahara. Thousands of flamingos live in the salt lakes in this economically and socially stable country, whose incomes and living standards can bear any comparison on an international basis. Free trade agreements with the USA, EU and parts of Asia mean that trade is booming, with Chilean avocados and German cranes regularly making the smooth trip around the world.

Liebherr employs more than 400 people in Chile. The majority of them are based in the workshops at large copper mines providing maintenance services for Liebherr dump trucks and mining excavators. Liebherr Chile S.p.A. is based in the capital Santiago and is responsible for the sales and service of mining machines, maritime cranes, tower cranes as well as mobile and crawler cranes in Chile and neighbouring markets. To enable it to provide better service to the mines in the north of Chile, Liebherr has its own customer service centre, which is used by all the product divisions.

It also has a customer service centre specially for mobile and crawler cranes in the north of the capital near the international airport and right on the motorway. The EXPOMIN, the largest construction machinery show in the region, is held every two years very close by.

### Living and working

You will always find Hubertus von Sperber on the Liebherr stand at the EXPOMIN. He is Manager of the Mobile Cranes Division for Liebherr in Chile and believes that close ties with customers are both essential and the key to success: “Direct support, a local spare parts warehouse, training service engineers in Ehingen – all these things help us create long term partnerships.” And it is the personal relationships which are expressed by the warm way in which people greet each other, almost as if they were all one happy family: “Chile is a very happy, sociable country in which newcomers are received very openly. And what is more, even at business meals, they first talk about family, the children's school and their last holiday, before they actually get to the crane or their construction project maybe during desert.”

Von Sperber has lived in Santiago since September 2018 and, apart from a single Brazilian, works with a purely Chilean team. “There are lots of very good personnel here, they are motivated and well educated.” Social gatherings also play a major role for the team and after two years of strict coronavirus restrictions, they can finally get back to their popular asados. Asados are what the Chileans call their legendary barbecues with “the best meat that I have ever eaten”, adds von Sperber. The only important thing to remember is that every time you are invited you should arrive a little late as punctuality is impolite in Chile. So says Hubertus von Sperber in a telephone interview and laughs at the memory of how he had to learn the whole procedure initially. He has also got used to the massive distances in the country, which is 20 times longer than it is wide. “Our engineers have to commute over distances equivalent to between Copenhagen and Algiers. Catching a plane here is like catching a bus!”



***“Our customers appreciate the direct support they receive from Liebherr. That helps us create long term partnerships.”***

**Hubertus von Sperber**

Mobile Cranes Division Manager at Liebherr Chile S.p.A.

### **Mining**

Around 400 Liebherr mobile cranes with lifting capacities of up to 1,200 t are currently operating in the Chilean market. “Chile has over 40 % of the established copper reserves in the world. It also has the largest copper mine in the world. That is why mining is one of the most important industries, with mines constantly being expanded and opened”, explains Felix Mussotter, who is responsible for Latin America within the sales team at Liebherr-Werk Ehingen GmbH.

A whole host of mobile and crawler cranes from crane specialist Burger Grúas are used for the assembly, maintenance and repair of large mining machines. Managing

Director Raul Burger says: “Our cranes are often used in mines, which are generally located at high altitudes. The fact that they need low temperature equipment and an altitude package means that modern, innovative machines are an absolute must here.”

Crane contractor MPM based in Santiago also frequently uses its cranes in mines. “We bought our first Liebherr mobile crane in 2017. Today we have ten of them in our fleet, all with lifting capacities between 100 and 1,200 tonnes. We can send them out to our customers with confidence thanks to their high safety standards, advanced technology and reliability”, says company owner Daniel Vega.



**So much sand!**  
LR 1750/2 crawler crane at a mine in the Atacama Desert in the north of Chile



***“Liebherr is the only mobile crane manufacturer with its own sales and customer service teams in Chile.”***

**Felix Mussotter**

Latin America Sales at Liebherr-Werk Ehingen GmbH



### **Energy of the future**

One of the leading economic powers in Latin America and the largest producer of raw materials, there is also a great deal currently happening in Chile in the renewable energy sector. The objective is that 70 percent of the country's energy requirements should be generated by sun, wind and water by 2050. The country's long coastline, the enormous altitude differences and the expanse of the Atacama Desert mean that Chile has every chance of meeting this target. Mussotter continues: "The wide range of our large mobile and crawler cranes is required in the wind power sector. The large ones are needed to assemble the enormous turbines, whilst the medium and small ones are used for auxiliary and set-up work."

### **Lined up**

Liebherr mobile cranes wait at the port of Bremerhaven to be shipped to Chile.



### **May I introduce ... an angling crane**

Not only are our cranes used for special jobs in mines and high altitudes, they also tackle work in Chilean waters. For example, they help to hoist heavy nets filled with salmon and also to repair an historic sailing ship. The Buque Escuela Esmeralda is 75 years old, 113 metres long, 13 metres wide and has sails with an area of 2,870 square metres. You can only touch it with silk gloves – or with an LTM 1160-5.2, which Multiservice F.L. brought to the port of Valparaiso specially for it.

### **Long booms**

LTM 1160-5.2 at the port of Valparaiso carrying out repair work on the historic sailing ship, Buque Escuela Esmeralda.



### Stargazer

An LTM 1500-8.1 mobile crane working on the assembly of a telescope on the 2,682 metre Cerro Pachón.



### Look up to the sky

There is exclusive astronomy tourism available to the four and a half million tourists who travel to the country in the Andes from all over the world every year. The *Chile.travel* tourism portal promises constellations, planets and shooting stars in the cleanest skies in the southern hemisphere, 300 clear days per year and some of the most powerful scientific observatories. These include the Vera C. Rubin Observatory in the north of Chile, one of the largest telescopes in the world. An LTM 1500-8.1 helped assemble a component measuring ten metres wide and weighing 28 tonnes on the El Peñón peak of Cerro Pachón, a 2,682 metre high mountain. The telescope also houses the largest digital camera in the world – 3.2 billion pixels weighing 2.8 tonnes and measuring 3 metres in length. And the best thing is that in its photographs of the universe, there is absolutely no end in sight.

### Urban life

Its current population of around 20 million means that Chile's population has almost doubled over the last 40 years. The capital Santiago was named as the most secure city in Latin America in 2019 by the British Economist newspaper, with both making a contribution to growth in this metropolis. Heavy machinery is used for construction work there, including mobile and crawler cranes from Liebherr.



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# The world with Liebherr

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**The big five ...**

...are not the famous wild animals of Africa here, but five large cranes, which together lift the top section of a luxury yacht for assembly.

Two LTM 1750-9.1, one LTM 1650-8.1, one LTM 1500-8.1 and one mobile harbor crane type LHM 400 were used for this purpose in the port of Dordrecht, Netherlands.







# Interview with the family shareholders

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**Dr. h.c. Isolde Liebherr**, Vice-President of the Administrative Board of Liebherr-International AG, **Philipp Liebherr** and **Stéfanie Wohlfarth**, members of the Administrative Board of Liebherr-International AG and **Dr. h.c. Willi Liebherr**, President of the Administrative Board of Liebherr AG, in conversation (from left to right).

**When we spoke last year, we talked about how the coronavirus pandemic had changed the world. Today – one year later – it feels like we’re at another pivotal moment in history. What are your thoughts on the war in Ukraine?**

**Isolde Liebherr:** Above all, our hearts go out to the people of Ukraine and the many people who have been forced to flee their homes. And our deepest sympathies go to the families of those who have lost their lives.

**Willi Liebherr:** We are still hopeful that the fighting will end soon. Until recently, we never would have thought an escalation like this would be possible. It is inconceivable what is happening in Europe right now. It feels like something out of the distant past.

**How is Liebherr taking action to support the people of Ukraine?**

**Stéfanie Wohlfarth:** The war has created a devastating humanitarian crisis. That's why we've decided to donate to the Swiss Red Cross, the UN Refugee Agency and other organisations. Our goal is to support these organisations in the work they are doing to help the people in the warzone, as well as those who have been displaced.

**Do you expect the war to impact Liebherr's business?**

**Isolde Liebherr:** As far as we can tell at this moment, it's still too soon to assess how it will affect us in detail. If you look at the predictions from various institutions, it seems clear that there will be consequences for the global economy and the financial markets. Those forecasts suggest that increased energy and commodity prices will drive inflation even higher. The sanctions imposed on Russia will also have a major impact. We started 2022 with plenty of new orders, so we are cautiously optimistic about the rest of this year, even in spite of the latest developments.

**Of course, business takes a back seat in times like these, but we still want to look back on 2021 with you. What are your thoughts on how the company performed?**



**Willi Liebherr:** Well, to begin with, it must be said that the global situation last year was not easy. The coronavirus pandemic continued to have a major impact on business until the first quarter of 2021. We kept moving forward, even whilst dealing with all the restrictions. Our priority

was to keep our employees healthy and safe, and our customers satisfied. It was quite a challenge.

As soon as the global economy started to rebound in the second quarter, we were faced with bottlenecks in the global supply chains and rising procurement costs, as well as ongoing lockdowns and other pandemic-related restrictions in many regions. We not only managed to overcome all those challenges, we did it with flying colours.



**Isolde Liebherr:** Yes, absolutely. The company's performance really speaks for itself. After taking a downturn in 2020, we reported revenues of € 11,639 million last year, which was nearly on a par with our record turnover in 2019. At the same time, we started increasing our investments again. Our workforce also grew compared to the year before. Now, nearly 50,000 people are working for Liebherr around the world. And at the end of the year, we had a very high order volume, which is very beneficial to us now.

**The operating result also increased significantly, right?**

**Philipp Liebherr:** Yes, the operating result is pleasingly good and a sign that business in our product segments has developed positively – albeit to varying degrees. In general, however, we are more than satisfied.



**Tell us how the business is going in the various product segments.**

**Isolde Liebherr:** With the exception of maritime cranes and gear technology and automation systems, turnover were up in all the product segments compared to 2020. Key industries like construction and mining made a strong recovery. So, the product segments that supply those industries benefited from an increase in sales. Our mobile crane business is booming right now, due in part to the high demand coming from the wind industry. This and the upturn in the construction industry have also had a positive effect on our components business. We're also so glad to see that even our hard-hit aerospace area grew faster than originally expected.

**You mentioned supply chain bottlenecks, material shortages and rising procurement costs.**

**How is Liebherr coping with challenges like these?**

**Willi Liebherr:** The bottlenecks in global supply chains and material procurement were definitely some of the main challenges we faced last year. It's been impossible at times to procure all the parts we need to finish our products – especially electronic components. On top of that, we've seen extreme price hikes in raw materials, electronics, steel, plastics, energy and elsewhere. It's affected all our product segments to varying degrees and at different times. Especially when you consider the situation the world is currently facing, we think these issues are probably only going to get worse before they get better.

**Stéfanie Wohlfarth:** In the past, we've always enjoyed a stable supply chain thanks to our long-standing partnerships with suppliers and our own capacity to produce the parts we need. That's still the case for the most part. But if the current situation does not improve in the medium term, we'll make the necessary adjustments in each of our product segments and open up additional procurement channels. We're already in a good position to do that, thanks to our multi-sourcing strategy, and that's definitely an advantage. And we'll keep doing everything we can to maintain a secure supply chain going forward.

**What are some of the technological advances Liebherr made last year?**

**Philipp Liebherr:** For one thing, we continued our work on alternative drive technologies. Our goal is to make our machines even more efficient and environmentally friendly. We also made progress in the field of digital solutions. These include technologies for intelligent networking, remote control and automation, as well as various digital services.

**Can you give us a few examples?**

**Stéfanie Wohlfarth:** We have created a networking and control option for our new range of built-in refrigerators and freezers, with new generations of the SmartDevice app and the SmartDeviceBox. We also launched a smart-phone app that lets our customer service run diagnostics and perform maintenance on the new generation of appliances.

In our mining segment, we developed new machine automation and assistance systems. Our Trolley Guidance System automates various processes, such as steering mining trucks under the trolley line, or lifting and lowering the current collector.

**Philipp Liebherr:** Another example is our Remote Service app for crawler cranes, deep foundation machines and maritime cranes. It already offered real-time support and remote troubleshooting, but now we've added more service tools as well. We're also continually developing new features for MyJobsite. This lets us provide the best possible support, to help our deep foundation engineering customers meet stricter requirements for collecting, displaying, analysing, managing and evaluating data.



**You mentioned the company's goal of making drive systems more efficient and environmentally friendly. Can you tell us about the technologies Liebherr is focusing on?**

**Willi Liebherr:** Our products are used around the world in all kinds of industries and many different settings. We have to meet many different requirements, which is part of the reason why we're so open to embracing new technologies. When we talk about the energy transformation, our main focus right now is on electric engines, fuel cells, batteries, combustion engines or a combination in the form of hybrid drives. This enables us to take advantage of a wide range of energy sources. These include electrical energy, hydrogen, e-fuels such as ammonia and methanol, hydro-treated vegetable oils (HVO) or even fossil diesel in combination with the latest combustion engine and exhaust gas after-treatment technology.

**What was your main focus in this area last year?**

**Philipp Liebherr:** Among other things, we worked on solutions for hydrogen-powered combustion engines and their injection technologies, and approved several product lines for using hydrotreated vegetable oils (HVO), which are climate-neutral. Now, we're even delivering products from several of our locations with HVO instead of fossil diesel as standard ex works. These include mobile cranes, earthmoving and material handling machines.

We've also expanded the ranges of our all-electric truck mixers, electric crawler excavators and battery-powered crawler cranes. An all-electric offshore crane is also under development. We're also very proud of a new joint venture we've started with Airbus. We'll be working with them to develop technologies for their 100% hydrogen-powered ZeroE aircraft.

**Stéfanie Wohlfarth:** If we talk about energy efficiency, it's also important to mention our refrigerators and freezers. Last year, a new EU regulation went into effect, regarding the energy efficiency labelling of electronic appliances. We're very proud that our appliances are still the most efficient, even after the change in labelling criteria.

From my perspective, Liebherr is contributing to a lower-emissions future by reducing the ecological footprint of our products, but it doesn't stop there. We're also active in industries that are enormously important for the energy transformation, such as the wind industry. Our cranes are used to install wind turbines, which also happen to contain our components. And our gear technology and automation systems product segment is helping promote e-mobility with its technologies.

**A lot of the topics you've touched on relate to Liebherr's corporate responsibility. That's a topic that is becoming increasingly important – and much stricter – for many companies. What is Liebherr's position when it comes to CR?**

**Isolde Liebherr:** It's something we take seriously. Our corporate responsibility has been one of our guiding principles and part of our core values for decades. It also guides the decisions we make as the company's leaders. Our company's structure is decentralised and diversified, so in the past we implemented many CR activities that focused separately on our individual product segments. We've also enacted CR policies that extend to the Group as a whole.



**Stéfanie Wohlfarth:** We're currently in the process of developing an overall CR concept that will be fully embedded throughout our organisation. Based on this, we'll start reporting on key CR-related topics across the entire Group. We expect to release our first company-wide CR report in 2024. By then, we hope we'll be operating in a more stable market once again.

**Thank you very much for sharing your thoughts.**

This interview was conducted in March 2022.



# An ode to the wind

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The energy transition is progressing. The ever more perceptible advance of climate change and increasing supply bottlenecks provide a significant tailwind for the development of renewable energies. Climate-neutral and eco-friendly power generation through wind power is a special focus area in this regard. Liebherr product segments provide diverse contributions to the success of this task that affects all humankind.







## Time to turn

An old Chinese proverb says, “When the winds of change blow, some people build walls and others build windmills”. In an era of climate change and extensive transformations in the economy and society, this proverb can most definitely be taken literally. The EU Commission has placed climate protection at the top of its agenda with the objectives of reducing CO<sub>2</sub> emissions by 50 or 55 percent by the year 2030 and to become climate-neutral by 2050.

The “Green Deal” means massive investment in research and development of renewable energies, and in extending the grid. This is not just a major task for humankind, however, it is also a challenge for the manufacturing industry, which must provide the technologies and machines required to reach these objectives. In this regard, Liebherr is superbly positioned worldwide and today the Group is already implementing comprehensive solutions for the wind power industry.

Harnessing the power of wind is not a new invention. For centuries, people have been using windmills that convert wind energy into rotary motion to drive millstones that grind grain or to pump water for irrigation systems. Modern wind turbines are similar in function to the old windmills: Gigantic, propeller-like rotors that are driven by the wind sit on top of their narrow tower. In appropriately exposed positions – on hills, in coastal areas, and on the high seas – rotor movement is transferred to a generator, which like a dynamo converts the energy into electrical power.

### **There is (almost) always a wind blowing**

The formula is simple: The stronger the wind blows, the more electrical power can be generated. However, this also means that: For this type of energy, without a suitable accumulator, if there is no wind, the lights literally will go out. The answer is a mix of renewable energies: In addition to wind, the primary sources are solar energy, biogas and hydro-power. Energy shortfalls from an at times highly fluctuating injection of wind power and solar power can be compensated by means of sector coupling in the heating, mobility and energy fields and/or energy can be stored via energy accumulators. In other words: For plant developers, operators, executing companies and maintenance services, the energy transition is an extremely complex field with many challenges imposed on the quality of products and solutions.

### **Sailing close to the wind**

While some models currently installed on land generate up to more than five megawatts of electricity, the latest generation of offshore turbines have an output of eleven megawatts. In addition, offshore wind turbines are considered to be particularly efficient, as there is significantly more wind and it blows very evenly. Thus, an offshore wind farm with 80 turbines can cover the electricity consumption of 400,000 households with clean energy from the sea.

Wind turbines impact landscapes and cultural areas. Acceptance on the part of the local populace is also increased if they are offered an opportunity to participate financially in the project. The “Citizens’ Wind Park” model offsets possible impairments in the quality of life with an attractive financial investment for the citizens involved and their municipality. More and more, this type of civic investment in the future is setting precedents.

## How wind is formed?

Wind is created when air fronts with different air pressures meet. The greater the differences, the stronger the wind. Solar radiation causes the air to heat up, expand, become lighter and rise. This creates low pressure. At altitude, it is again colder than at ground level. The air therefore cools and sinks back down. High pressure forms. The colder air flows to where the warmer air rises. A kind of cycle is created and it winds.

## A strong partner in the energy transition

Liebherr is a strong partner for wind farms both onshore and offshore, offering the right solution for a wide range of requirements - worldwide. These include the design and development of components as well as earthmoving equipment for site preparation work, precast concrete parts for the towers, mobile and crawler cranes, and heavy-duty offshore cranes for assembly.

### Preparations for a solid fundament

Earthmoving equipment from Liebherr does the ground-work for the erection (and future eco-friendly dismantling) of onshore wind turbines.

Liebherr-EMtec GmbH offers a broad range of earthmoving equipment and materials handling machines, which are also used along the entire building process chain for wind turbines.

In addition, in the automation systems segment, Liebherr has developed a processing gantry for rotor blades. Last but not least, large roller bearings for rotor blade adjustment and azimuth adjustment are manufactured on high-precision Liebherr gear cutting machines. In other words: Virtually the entire wind energy world benefits from Liebherr solutions. The wind energy sector is a showcase for the performance and innovation of the family company.

This already starts with the loading of components by Liebherr handling machines, for example in ports. During the construction of the plants themselves, the core competencies of Liebherr earthmoving machines come into play: crawler excavators are used to develop the terrain and excavation work is carried out to prepare the construction sites for building the foundations, for example. This excavated material is removed by dump trucks or wheel loaders. Bulldozers are then used to level the area of the site and thus prepare it for the crane site.







The concrete mixing plants from Liebherr can be joined directly to the production facility for tower sections to ensure the desired highest material quality.

### Concrete landmarks

Among other things, the towers of modern wind turbines are assembled on site from precast concrete elements. The production of these concrete tower segments in the precast plant therefore places the highest demands on the high-tech concrete. At Liebherr-Mischtechnik GmbH in Bad Schussenried, high-efficiency mixing systems have been specially developed for the particularly demanding concrete recipes that are used to produce tower sections.

For example, the rotational speeds of the mixers and agitators can be variably adjusted independently of each other during the mixing process, depending on the materials

added and the recipe. The Litronic-MPS process control system in conjunction with the Litronic-FMS moisture measuring system developed by Liebherr ensure high quality of the concrete and proper consistency.

Liebherr has set up its own test centre for collaborating with the customer in the continuous further development of products made from quality concrete and subject to demanding requirements concerning shape and load capacity. New recipes can be tested in small-batch laboratory mixer tests in the test centre. The recipes can then be transferred to the large mixing plants for production.

## How does wind power work?

Wind power is currently the most important form of renewable energy source. Wind turbines convert the energy of the wind into electrical energy without emitting CO<sub>2</sub>, which can then be fed into the power grid. Wind turbines can be used in all climatic zones. They are installed either on land (onshore) or in the sea (offshore). When wind hits the rotor blades of a wind turbine, negative pressure is created, which sets the blades in motion. This causes the rotor to start running. The kinetic energy of the wind is converted into rotary motion, which in turn drives a generator that converts the mechanical energy into electrical energy.



At Liebherr, the main bearings for wind turbines are tested on a specially developed test rig, where rigidity ratios are realistically simulated.

### **Mechanical masterpieces**

Wind turbines are not just getting higher and higher. The configuration of existing ball bearings and roller bearings with external gearing or internal gearing must also be adapted to ever more demanding load profiles. Component quality and reliability are the top priorities in this regard.

A single bearing fault can bring the entire wind turbine to a standstill. In such cases, repairs are always very time-intensive and very costly. In addition, access to these adjusting units is extremely difficult; usually the rotor star is installed at a height of over 100 meters. Therefore, the bearings responsible for movement must be extremely reliable, and are configured for a service life in excess of 20 years.

Liebherr-Component Technologies AG has been building key components for wind turbines since 1996. These include slewing bearings, slewing drives, hydraulic cylinders and integrated lubrication systems, as well as the entire spectrum of electromechanical and hydraulic rotor blade control and horizontal yaw control of the nacelle, also known as azimuth adjustment, in wind turbines.

An essential part of our collaboration with customers around the world is applications engineering for tuning the individual components. In the wind power industry, Liebherr works together with all well-known wind turbine manufacturers; at this point in time Liebherr has equipped more than 15,000 wind turbines with components. The product spectrum extends from components for 800 kW turbines to solutions for multi-megawatt turbines used in offshore wind parks.

In addition to the current single- and double-row four-point contact bearings, Liebherr now also offers three-row roller bearings for pitch systems as well as slewing bearings. Liebherr is the innovation leader in this area and is continuously expanding its expertise and production capacities in Europe, Mexico, Brazil and on the Asian market. A new plant for slewing bearings, hydraulic cylinders and drives is currently being built in China.



### Lifting and moving

It takes ultra-high performance lifting technology to erect and dismantle wind turbines. At Liebherr, lifting technology is categorised in different load classes, and precisely matched to the needs of the wind power industry with new boom systems for particularly high load capacities.

The telescopic mobile cranes (LTM) offer particularly flexible and versatile implementation. They can be driven autonomously on public roads, resulting in lower transportation costs. They can be quickly set up on construction sites and require minimal space. Another advantage: With the telescopic boom retracted and additional equipment, they can move on narrow paths from one turbine to the next. The basic unit of the lattice boom mobile crane

(LG) can also be driven on public roads. This reduces the number of transport units compared to lattice boom crawler cranes.

To construct ever larger wind turbines (formerly 60-80 meters, now 160-165 meters high in Europe today, and there are even 180-meter towers) crawler cranes with a load capacity between 500 and 1,000 tonnes have also proven their worth. They are capable of lifting the heaviest loads (ever larger rotor blades and larger nacelles) to increasing heights. As a rule, the large equipment is also supported by smaller auxiliary cranes, for example, the 4-6 axle equipment telescopic mobile and crawler cranes or all-terrain cranes, especially during setup.



Larger turbines require larger cranes and new technologies. Here, Liebherr is working with customers to develop high-performance technologies for the erection of wind turbines of the future.

Naturally, wind is nice to have in wind parks. But not when setting up. In this case, wind often delays lifts and deployments. Liebherr set a milestone for greater safety and longer deployment times for crane tasks in windy conditions with its development of special “WindSpeed Load Charts”. With these load charts, Liebherr engineers in Biberach (Germany), Ehingen (Germany) and Nenzing (Austria) have made a number of new mobile and crawler cranes more stable for deployment in stormy weather.

Liebherr-MCCtec Rostock GmbH specialises in “heavy-lift offshore” and supplies cranes that can be used for installation of turbines and wind turbine foundations on the high seas. The product segment supplies both ends of the energy transition: On one hand, it supports erection of offshore wind parks. On the other hand, through decommissioning, it dismantles “old” forms of energy, which to this point had been extracted on the high seas.

The challenge and the potential for efficient solutions in this maritime field lies in smart, project-specific adaptation of the crane (together with the ship) to the respective application. In this regard, Liebherr cranes are compact by design; they take up little space, on platforms, for example. Yet they have wide booms and high maximum lifting capacities of several thousands of tonnes. In addition, the HLC series has a foldable A-frame for passing under bridges. Thus the cranes can be used quickly, efficiently and flexibly for wind energy.

Liebherr cranes are manufactured in Europe to the highest quality standards. As part of the commissioning procedure, the equipment is subsequently supported 24/7 by experts from Liebherr's tight-knit global service network. Here, the key factor is rapid availability of more than 50,000 spare parts.

These are good prospects. Particularly now, at a time when the energy transition has a lot of tailwind. Experts estimate that the installed capacity in the offshore wind segment will increase sixfold by 2030. To this end, additional installation ships that can supply the new generation of 15 megawatt turbines will be urgently needed. This course was set long ago in Rostock.



Offshore heavy-duty cranes have load capacities of up to 5,000 tonnes.



# Six facts about wind power



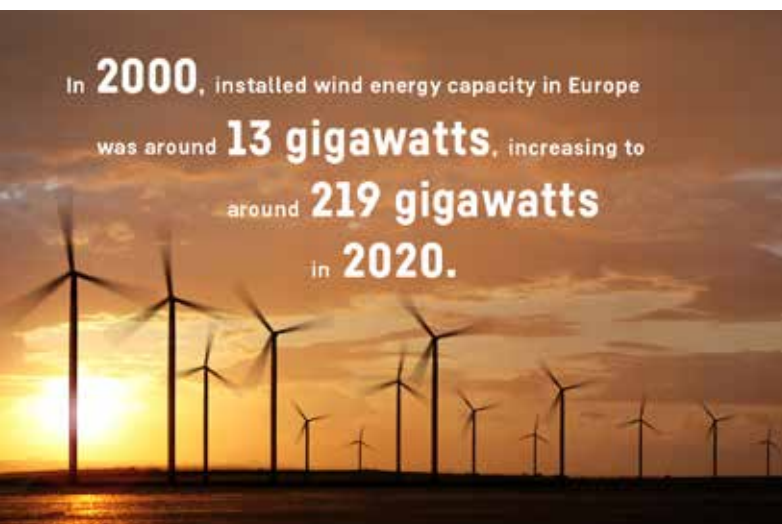
Offshore wind turbines are considered to be especially efficient:

A wind farm with

**80 turbines**

can meet the power requirements of

**400,000 households.**



In **2000**, installed wind energy capacity in Europe was around **13 gigawatts**, increasing to around **219 gigawatts** in **2020**.



Countries with the most wind turbine capacity:

- 1.** China
- 2.** USA
- 3.** Germany

(as of 2020)





In **2020** , around  
**743 gigawatts** of wind  
power were generated worldwide.

For comparison: Around  
**24 gigawatts**  
were generated in  
in **2011.**



In a single year, **one wind turbine**  
provides an average of  
**6,000 hours**  
of power to the grid.



As far back as **2,500 years** ago,  
the ancient Persians used the power of the wind to grind grain and  
perform other mechanical work.



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