LIEBHERR

UP LOAD

The magazine for customers and friends of mobile and crawler cranes

1 | 2020

Dear Readers,

First of all, we hope that you are well. 2020 will definitely be a year for the history books. The SARS-CoV-2 virus has reached almost every corner of our planet at an alarming rate and has completely changed our personal and business lives.

Unfortunately, there is no sign at the moment that the pandemic is coming to an end which means that there is great uncertainty all over the world. This, of course, is affecting the health and lives of many people. Millions of people have also lost their jobs. Business has been brought to a standstill and many places are still not on the path back to normality.

This situation has also affected our industry, of course, and therefore has also affected both your and our order books. Not only have we taken extensive safety precautions to protect the health of our workforce, but we also had to cease production at Easter for two weeks as our supply chain failed. Our production is now running again at a satisfactory level. We hope that your company has also returned to this situation.

Did you know? In ancient times, corona meant a garland awarded to a winner. Let's all do everything we can to stop this virus' winning streak in its tracks. The pandemic has shown us once again that success depends on us acting together – rationally and collaboratively and with a cautiously optimistic view of the future.

This is also the approach we take in our product development. Whilst we develop and manufacture our products, you work every day with them – sometimes in some particularly challenging situations. That is why your ideas and requests are so important to us in the development process. The results of the close collaboration with our customers include RemoteDrive, driving the crane chassis by remote control, and the new SL8F2 boom system. See pages 30 and 40 for more details.

We are also working on making our cranes more powerful and therefore more economical. At the Conexpo in Las Vegas in March, we unveiled our new LTM 1120-4.1, the most powerful all-terrain crane on four axles ever. You can read about the feature which promotes it to the 200 tonne class on page 22 of this edition.

Digitalisation presents a range of massive possibilities in our industry. However, it is particularly important to us that you, the crane owners, benefit from this and therefore we would like the opportunity to expand our discussions with you about future developments in this sector. Page 52 contains the first of a series of articles on the subject of digitalisation.

We are looking forward to hopefully seeing you again in person soon – here at our plant, at your premises or even at events. Until then: Keep healthy and stay positive!

Yours

Dr. Ulrich Hamme

Technical Director of Liebherr-Werk Ehingen GmbH

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Title

An LR 1800-1.0 under clear skies in Marsberg, Germany. It is in action for the first time with wind equipment.

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In focus

The world with Liebherr

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www.liebherr.com/upload

Moments

A picture is worth a thousand words: in the following we have captured some extraordinary crane moments for you (and posterity).

Ascent
The Canton of Wallis is home to an LTR 1060 operated by Swiss crane contractor Clausen. This region has the most mountains above four thousand metres in the Alps. One of them is the Matterhorn – the most beautiful mountain on Earth.

Down under
BMS assembling wind turbines at Lincoln Gap wind farm near Port Augusta in South Australia using an LG 1750 lattice boom mobile crane.


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#LiebherrConexpo

The Conexpo in Las Vegas in March
The main construction trade show in North America was one of the last international fairs to be held before the global COVID-19 pandemic. The new LTM 1120-4.1 mobile crane was the focus of the celebrations to mark the 50th anniversary of Liebherr in the USA.

Flying fish

Every year in May, around the time that the cherry trees blossom, there is a major holiday in Japan dedicated to children. Traditionally, families hoist colourful Koi-Nobori or carp streamers on this day, which work on the same principle as wind socks. This tradition has been going on for around 1,500 years, when a silk, hand-painted carp streamer was flown for the father, mother and sons in the family. The colourful Koi-Nobori are now also flown for girls. An LTM 1500-8.1 was used to hoist a very special Koi-Nobori a few years ago.

A landmark sets the tone
Recently, just as the coronavirus brought the world to a standstill, “Merci” was displayed on the Eiffel Tower in a tribute to all the helpers working against the pandemic. The landmark has often displayed special lighting as a sign of solidarity and hope. An initiative by French doctors in 2017 also caused a stir, and resulted in a regatta boat being displayed on the Eiffel Tower. The initiative was in support of heart operations for children throughout the world.

A circle of light
The big wheel turns stoically between Hong Kong's skyscrapers and Victoria Harbour. From its gondolas it provides a fantastic view of the hustle and bustle of the metropolis. An LTM 1400-7.1 operated by Set Win erected the eye-catcher in 2014.

Made with Liebherr

Liebherr cranes can build, load, transfer and assemble. They work in industry, infrastructure and other segments. But they can do more. Liebherr cranes can also do culture. They can do art. And they can attract attention – all over the world. Liebherr mobile and crawler cranes and their traces can be found in almost every area of human life.

Koi-Nobori festival in Kaiserslautern

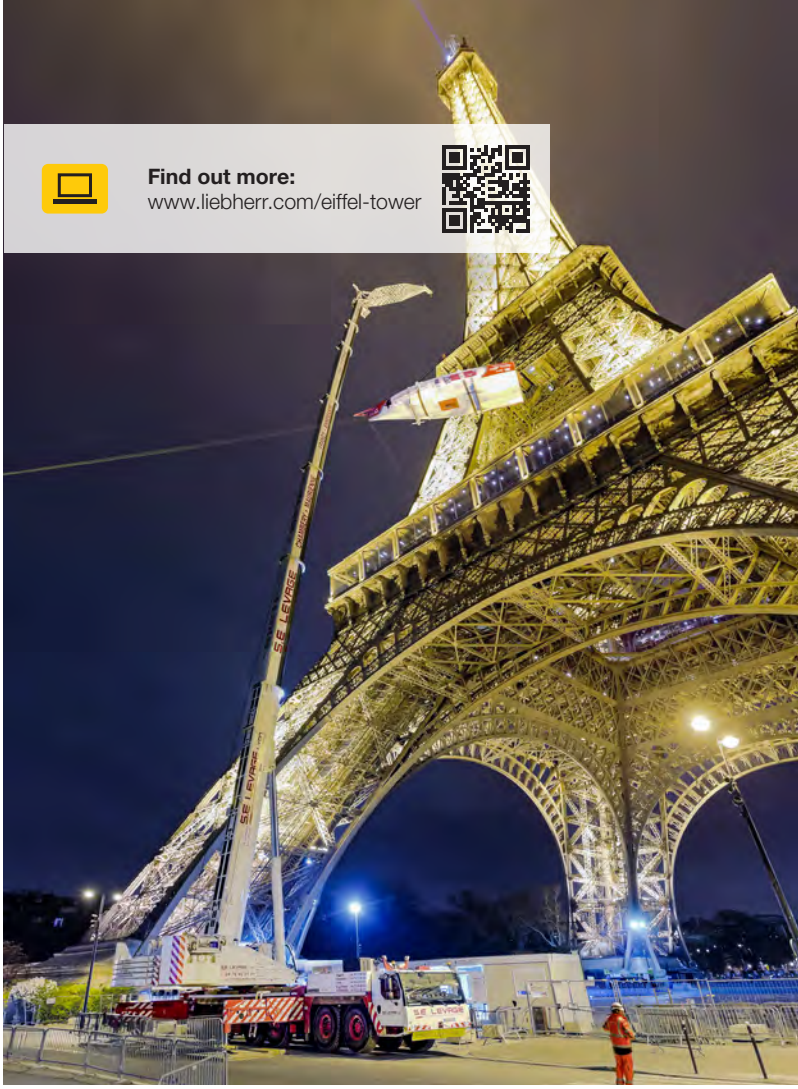
The German city of Kaiserslautern and Bunkyō, a district within the prefecture of Tokyo, have been twinned since 1988. As part of the festival to celebrate this friendship, what was claimed to be the largest carp streamer outside of Japan was launched into the air for the first time in Kaiserslautern in 2006. The hundred metre long silk streamer, which represents a Japanese Koi carp, fluttered majestically in the sky above the city, attached to the boom of an LTM 1500-8.1 owned by the Weiland Group based in Lampertheim.

“Of course, that was a really unusual crane job for me. At the time we even discussed the job with Liebherr”, says Volker Degenhardt, a senior executive at the Weiland Group, thinking back. In fact, the structural engineers in Ehingen carried out a calculation using the details of the giant silk streamer and discovered that the hook block would require four tonnes of weight to enable the Koi-Nobori to fly properly. The Japanese team, which numbered over 20 and travelled specially for the occasion to take responsibility for flying the streamer, were delighted. Domenico Alonso, who was behind the controls of the 500 tonne crane at the time, remembers the praise from the Japanese very well: "I was assured that the giant carp streamer had never flown so beautifully and calmly in the sky.”

A boat on the Eiffel Tower

Many of the visitors to the Eiffel Tower in 2017 must have rubbed their eyes in amazement. A large regatta boat was advertising a French doctors' initiative for two months to promote heart operations for children all over the world on the so-called gallery, the first storey of the structure at a height of around 60 metres.

A Liebherr LTM 1300-6.2 mobile crane operated by French crane contractor S.E Levage positioned the sailing boat, albeit without its mast and sail, but still measuring 18 metres long and six metres wide, on the lattice tower in a spectacular hoist during the night. The strong wind turbulence created a real challenge for the crane team. The original plan was to hoist the boat through the inside of the Eiffel Tower up to the first level, but this proved to be too great a risk. That meant that the crane had to be moved and its load weighing over five tonnes had to be hoisted up the structure from the new crane location to the side of the structure. Company boss Eric Salvi and his men had their hands full securing the boat and holding it stable as the wind gusted around it. The team from S.E Levage nevertheless, completed the job perfectly and positioned the "advertising vehicle" in perfect condition on the gallery of the "Tour Eiffel".

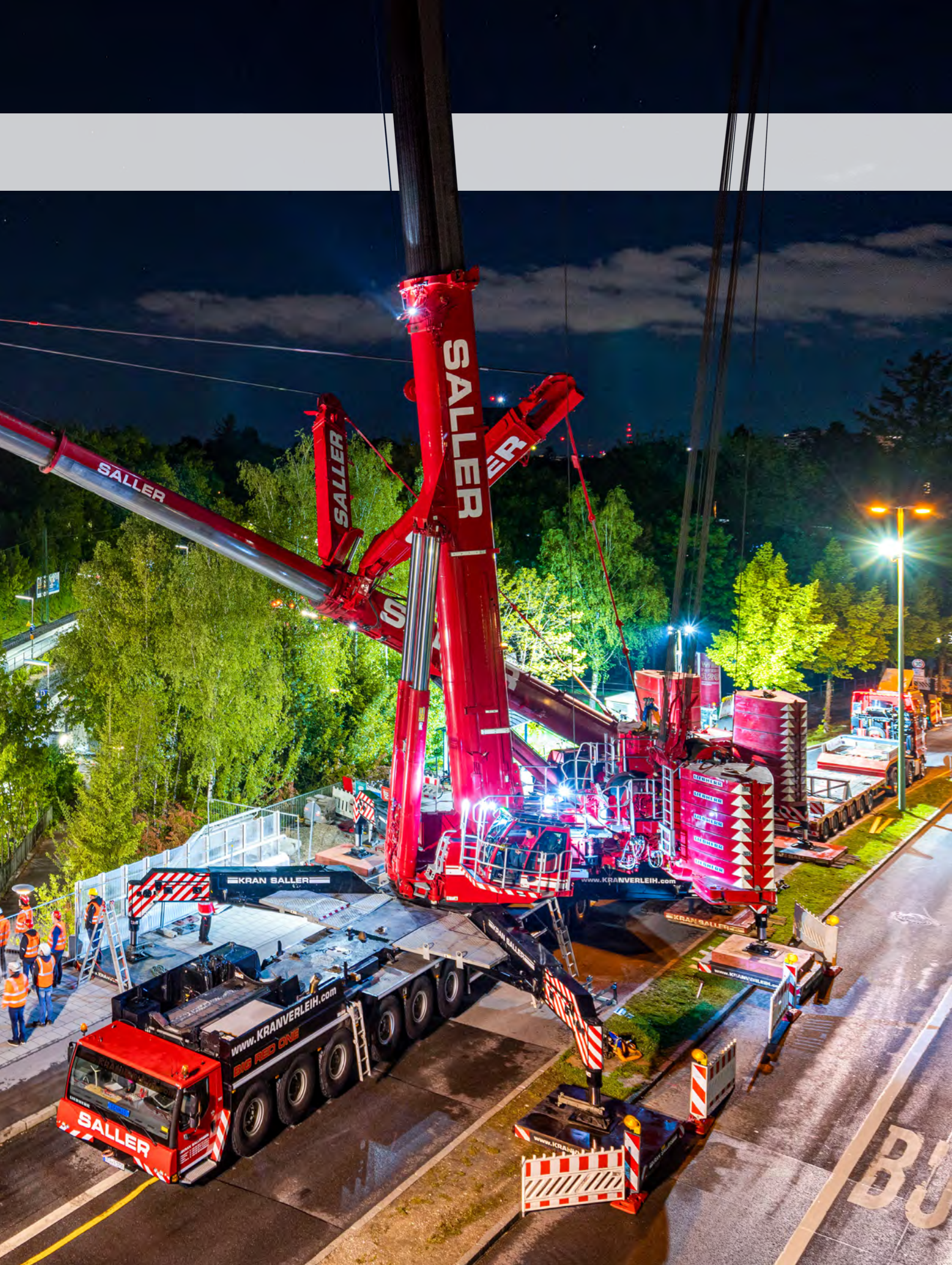


The big wheel in Hong Kong

At 60 metres in height it is not the biggest big wheel in the world. But it does offer fantastic views – both day and night. It provides an impressive outlook of the spectacular Victoria Harbour and the fascinating skyline of Hong Kong. There is always something going on there – a horde of tourists, things to see, bright lights and lots more. The big wheel has 42 gondolas and was first opened for business in 2014. Three Liebherr mobile cranes from local crane contractor Set Win were in action.

A brand new LTM 1400-7.1 completed the first major hoist, lifting a load of over 65 tonnes to erect the hub and the two ready-assembled support legs, each measuring 36 metres in length. A Liebherr 100 tonne crane and a 200 tonne model then carried out a tandem hoist to raise the two additional legs, each weighing 27 tonnes.

Mobile and crawler cranes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LIEBHERR

There's nothing more on 4!

Looking for a novelty!

It was the beginning of January when, admittedly, Germany's roads were still full of cars, trucks, low loaders, buses, tankers and articulated lorries. Encouraged by a campaign in digital media, lots of crane and machine fans were searching Germany's roads for the latest star in the Liebherr fleet – one with the same flair as a pair of American trousers. Shiny red and blue, dotted with white stars, painted with detailed images of the Statue of Liberty and the legendary Bald Eagle. They only knew what it looked like. The Liebherr team had kept all the details of the fascinating technology of the powerful vehicle to themselves for later.

However, it was clear that the red and blue giant was en route to a port, from where it was to be shipped to the Conexpo in Las Vegas. But there must have been shouts of joy from the people in many of the cars on this route. That's what we think anyway, because we have received a whole series of very moving photographs to prove they saw it.

"There's nothing more on 4". That is the slogan for the secret machine which can justifiably be described as the most powerful 4-axle mobile crane in the world. The new crane hoists an incredible load of 120 tonnes on four axles. That is one less than any of the other mobile cranes in its class. It answers to the attractive name LTM 1120-4.1 and its telescopic boom is 66 metres long. It doesn't even have to make much effort

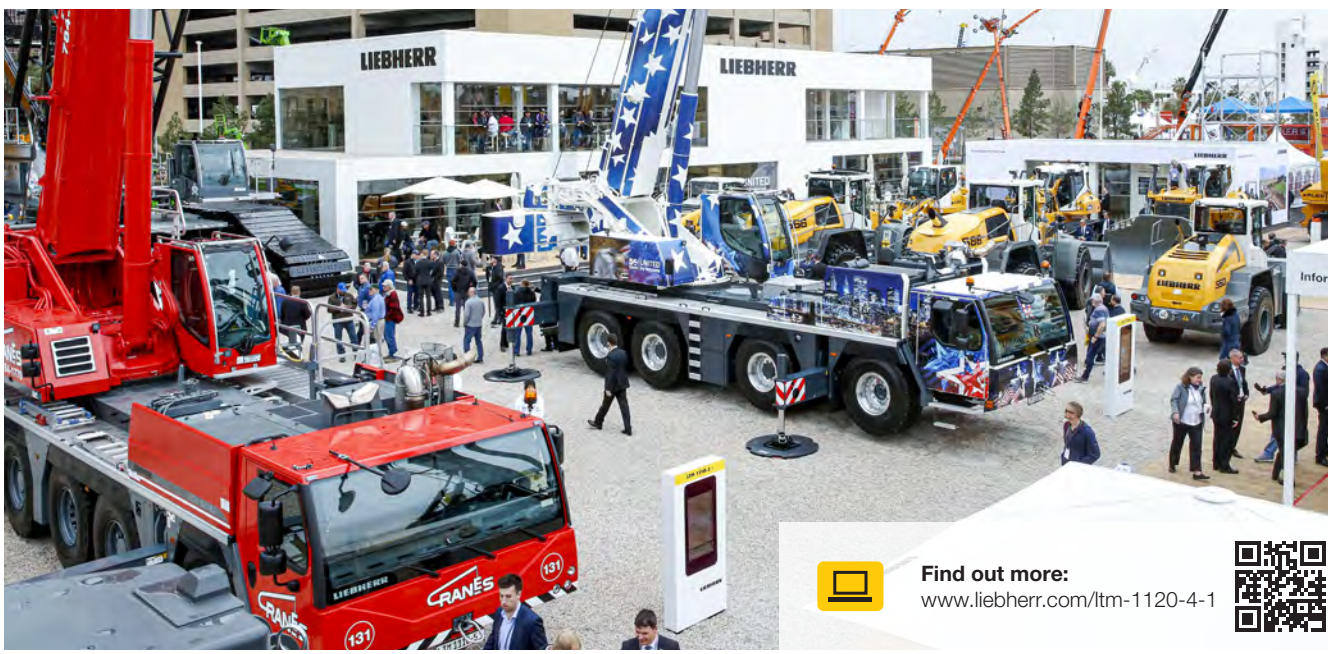
> “Never before has a four-axle crane managed to carry out jobs for a five-axle crane so perfectly.“
>
> Jan Keppler, Head of the Product Management Department, Liebherr-Werk Ehingen GmbH

to reach the same level as cranes in the 200 tonne class. If it stands on its tiptoes and stretches out its arms, the LTM 1120-4.1 can achieve hoist heights of up to 94 metres. The telescopic boom extension required for this is seven metres long, whilst the hydraulically adjustable double folding jib measures 19 metres. Both of these accessories are, of course, compatible with other Liebherr cranes.

As you would expect: suitable for various uses

In addition to the fact that we are always delighted to place lots of lifting capacity on just a few axles, this new vehicle is also unbeatably practical. “I can get a four-axle machine onto the road significantly more quickly and easily in many regions than a five-axle crane”, explains Jan Keppler, Head of the Product Management Department. He is very familiar with the wide range of different driving regulations for mobile cranes around the world. “Getting a permit from the relevant authorities quickly and easily is very important for our customers. And on constricted sites, the four-axle crane comes into its own. It is powerful but compact and can be moved into position effortlessly.”

Naturally, it also features the VarioBase® and VarioBallast® systems. They deliver additional flexibility, safety and economy. Our engineers also developed a variable ballast concept with a quick-change system for different driving situations. The engine satisfies the new stage V emissions directive and can be modified to comply with the regulations which apply in countries outside of Europe, for example Tier 4 for the USA or stage III for low regulated countries. This makes the LTM 1120-4.1 ideal for use all over the world.



Find out more:
www.liebherr.com/ltm-1120-4-1

Why has Liebherr changed the axle layout on its new four-axle cranes?

Back ground

When Liebherr unveiled the new LTM 1090-4.2 in 2017, some industry insiders were a little irritated by the appearance of the crane from the side. It looked a little unusual somehow. But what exactly was it? The chassis looked as though it had been stretched a little. Normally the axles on four-axle all-terrain cranes are fairly close together and the outriggers are positioned right at the front and right at the rear. But the situation is different on the new Liebherr 90-tonne crane: the front outriggers are between axles 1 and 2. Jan Keppler, Head of the Product Management Department, explains the benefits and why Liebherr has repeated the trick in 2020 on the LTM 1120-4.1.

“Yes, we actually have done it again. The front outrigger on the new LTM 1120-4.1 is also between the first and second axle. Admittedly, the new chassis are not quite as compact as the ones on the previous models. But the benefits of the new layout significantly outweigh this drawback.

It creates more space in the ballast storage area on the undercarriage which makes the ballast radius adjustment range much larger. This is because we are using our innovative VarioBallast® system on the new LTM 1090-4.2 and LTM 1120-4.1 four-axle cranes. The cranes can be operated with two different ballast radii – mechanically slewing ballasting cylinders are used to adjust the ballast radius quickly and easily by 94 centimetres. On the LTM 1090-4.2, the small ballast radius is actually inside the outrigger width. And on the LTM 1120-4.1 it is actually 28 centimetres smaller than on its predecessor. This solution makes the crane much easier to use in constricted conditions.

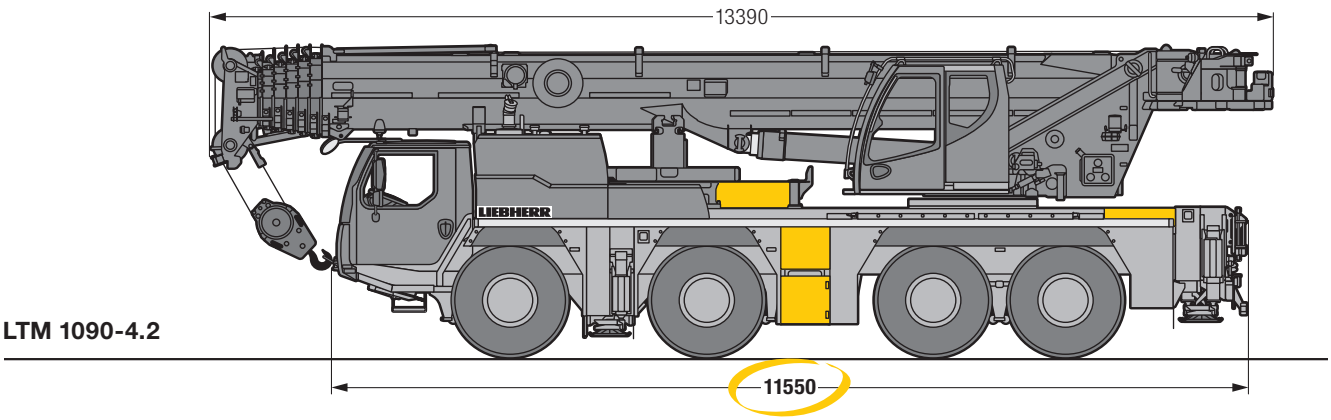
Jan Keppler, Head of Product Management

Everything stowed safely – New box near the ballast storage area.

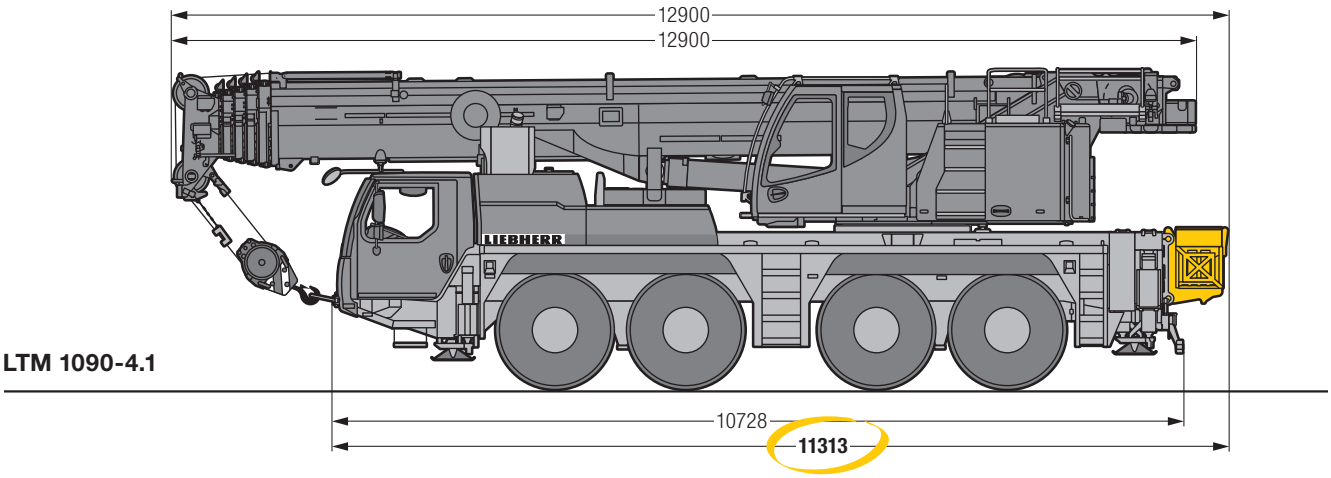
If, however, there is plenty of space on the site, the large ballast radius can be used to good effect. The significantly longer lever arm of the counterweight means that the new models require much less ballast weight – around six tonnes on the LTM 1090-4.2 and over seven tonnes on the LTM 1120-4.1.

And there is another benefit. The greater space between axles 2 and 3 is used to store support timbers. This eliminates the need for a storage box at the rear of the vehicle. In addition, the new four-axle cranes have additional storage compartments for attachments and other equipment on the crane chassis.

What is more, even if the spacing between the axles has been increased slightly, our designers have managed to retain the manoeuvrability of the new cranes at a high level.

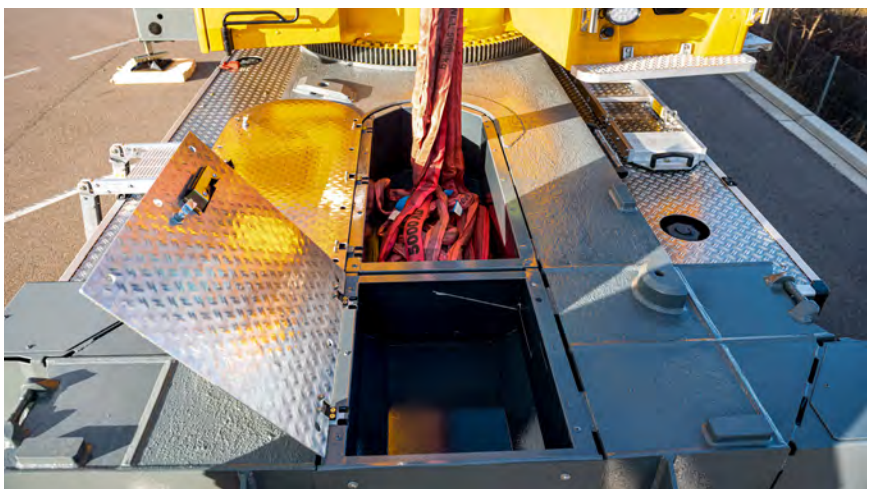


LTM 1090-4.2



LTM 1090-4.1

Finally, we have a little something for the connoisseurs among you – years ago we built a four-axle LTM crane on which the front outriggers were positioned between the first and second axle. If you know which crane model this was, write to us at upload@liebherr.com. A draw will be made from the correct answers with prizes of three 1:50 scale models of the LTM 1090-4.2. Clue: It was only available in certain markets."



The storage boxes are integrated on the new four-axle cranes. There is therefore no longer any need for a storage box at the rear of the vehicle.

The first ever LTM 1110-5.1 goes to Spain

We unveiled our new 110 tonne crane at the Bauma held in April last year in Munich with the slogan "Prepared for every task!". Since then, our Technical Testing Department has studied the prototypes in more detail, the final tweaks have been made and serial production has started. The first ever LTM 1110-5.1 was transported to Spain in May. Crane and heavy haulage contractor Grúas Roxu signed an order for two of the new 5-axle cranes before the Bauma had even finished.

José Manuel Garcia, President of the Roxu Group, explained: "I was impressed by the concept of the new crane as soon as I saw it, because its combination of mobility, lifting capacity and boom length is perfect. These features are extremely important decision-making criteria for our company."

Crane handover in Spain: from left to right: Marco García, José Manuel García, (both from Grúas Roxu), Tobias Böhler (Liebherr Ibérica, S.L.), Daniel García (Grúas Roxu).

Garcia confirmed that the Liebherr product engineers had produced a pretty good solution to the challenge set them of designing a very lightweight crane, which must nevertheless have a long telescopic boom with outstanding lifting capacity.

Our smallest 5-axle crane not only impresses with its excellent performance data, but also due to its fantastic mobility – it has a gross weight of just 48 tonnes with axle loads of less than ten tonnes. This enables the LTM 1110-5.1 to be driven on roads and at times which are simply not possible for other cranes in its class or which would normally require a time-consuming process to obtain permits.

The lightweight design of the new LTM 1110-5.1 has another benefit as well – with the standard axle load for mobile cranes of twelve tonnes, it can carry the enormous 13.4 tonnes of ballast. That enables it to carry out most of its work in the form of a fast-erecting crane. And if that is not quite enough, a total of 29 tonnes of ballast is available. Here too, our engineers made sure that the crane can carry all this ballast spread evenly around the vehicle with the axle load still remaining below 16 tonnes – ideal for countries where these high axle loads are allowed or for driving on a site with the boom lowered and therefore secure. The crane also has a trump card – its quick changing system for the ballast slabs enables the crane operator to set up the crane once it arrives at the site very quickly.

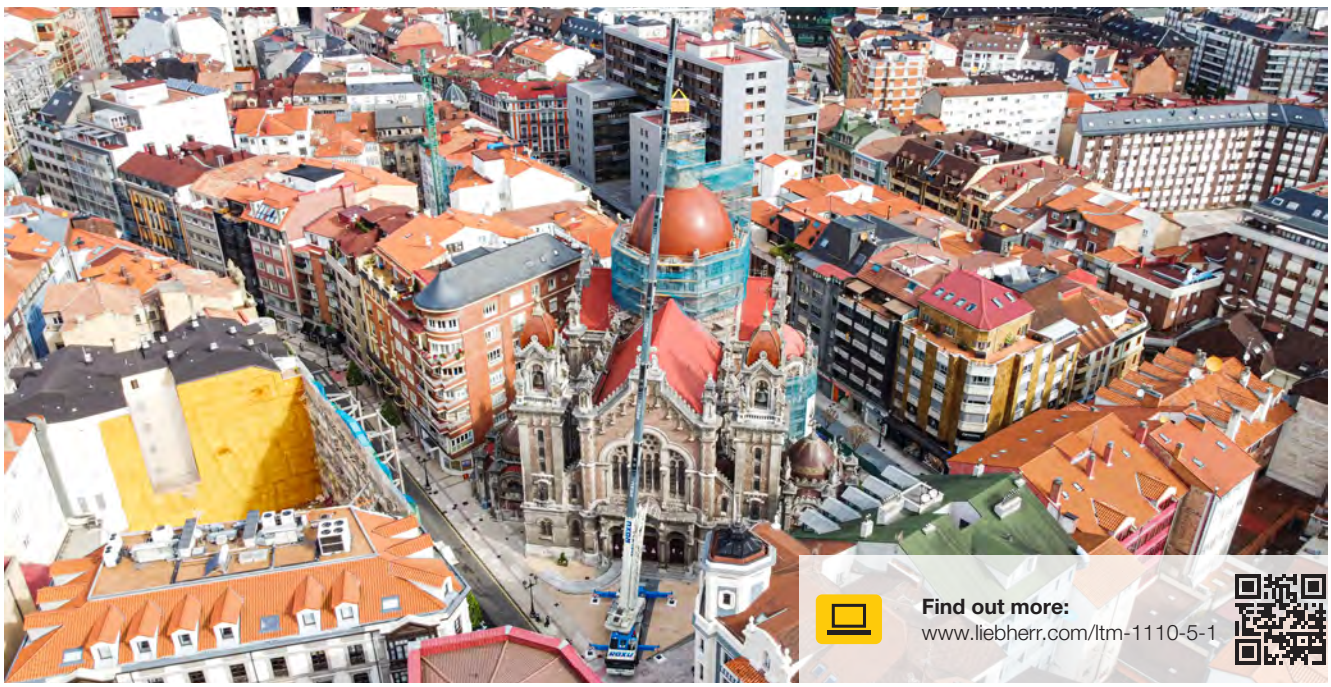
As far as hoist height is concerned, the telescopic boom on the 110 tonne crane measures 60 metres in length, making it one of the longest in its crane class. And it can also hoist more than similar cranes. If the site allows it to be positioned freely, the LTM 1110-5.1 can actually break into the next higher crane class. This is because VarioBase® Plus generates additional performance: The combination of a trapezoidal, variable support base and widened rear supports delivers particularly high lifting capacities.

"We are convinced that the LTM 1110-5.1 will quickly become established as a technical benchmark in its segment. At Grúas Roxu, we always try to purchase the best machine on the market for every different type of job. We will therefore gradually be replacing the other 5-axle mobile cranes in our fleet with the new LTM 1110-5.1", adds Garcia.

Grúas Roxu was founded in 1979 in the Principality of Asturias in north-west Spain. Its head office is in Meres, from where the company coordinates its work in Spain and throughout Europe. The Roxu Group has also had an outlet in Costa Rica since 2013 with 27 mobile cranes, all of which were supplied by Liebherr. The group's fleet currently comprises exactly 100 Liebherr mobile and crawler cranes of the most diverse models.

Asturias is not only famous for its rugged coast and mountains, but also for its religious sites and mediaeval architecture. For example, the new LTM 1110-5.1 has already shown what it can do against an historic backdrop – providing assistance with restoration work on the San Juan el Real Basilica in Oviedo.

There is one other feature to mention in this respect – the delivery of the LTM 1110-5.1 was a novelty from a logistics point of view and provided a challenge for Liebherr. This was because in the middle of travel restrictions and the emergency declared in Spain due to the COVID-19 pandemic, a way had to be found to deliver the crane promptly and get over all the logistical problems.



Find out more:
www.liebherr.com/ltm-1110-5-1

The new LTM 1110-5.1 helps out with the restoration of the San Juan el Real Basilica in Oviedo, Asturias.


Find out more:
www.liebherr.com/remotedrive-en

When centimetres count

What an innovation – the LTC 1050-3.1 is the first mobile crane in the world which can be manoeuvred by remote control from outside the cab. And Tony Gölitzer is one of the first crane operators to have used the benefits of RemoteDrive several times already in practice in very constricted site conditions. And always with extra safety and convenience.

Experienced crane operator Tony Gölitzer was given this honour because his boss, Wolfgang Salgert, Managing Director of Salgert GmbH, was the man who encouraged Liebherr to design the development. He was also one of the first people to order the new technology. “I have been looking for a way of controlling our LTC compact cranes by remote for many years. They perform 70 percent of their work in constricted industrial buildings. This means that we face situations every day where the crane operator cannot see the whole picture. RemoteDrive enables the crane operator to stand in front of the crane and manoeuvre it safely through constricted access routes”, says Salgert to explain the reasons behind his decision.

> “RemoteDrive enables me to position myself where I have the best view.”
>
> Tony Gölitzer, crane operator at Salgert

The fact that the new technology has proven its worth was shown recently at a job involving constricted conditions in a production building at a specialist aluminium die-casting company in Bad Münstereifel.

One thing quickly became clear during the initial meeting on site – it would be very tight. Several machine tools had to be relocated in a production building and others had to be installed at the automotive supply company. It was the perfect job for Gölitzer and his new LTC 1050-3.1. He commented: “The difficulty was that the machines had to be moved in a constricted, low building which already contained other machines and production could not be stopped”. RemoteDrive was worth its weight in gold for because often there were only centimetres between the crane and the existing production equipment whilst manoeuvring it. That meant that the machine relocation was completed quickly and with absolutely no problems.”

Challenges for design and testing

The discussions with many of you and your ideas at our Customer Days in 2018, when we unveiled a study of RemoteDrive, also provided us with reason enough to take demand for the system seriously and drive the development work forward quickly. In the past, it has only been possible to manage areas with difficult visibility using camera systems which supply an

image of the bottleneck to the cab. But RemoteDrive changes all this. It enables the driver to go to areas with difficult access and is therefore a much better solution, particularly when moving the crane on constricted sites and manoeuvring it inside buildings. The operator has a full view of the situation and therefore does not need a marshal.

Philipp Mang from the Control Systems Department thinks back: “Transferring all the required displays and controls for the operator from the cab to the remote control posed really some challenges to us. We wanted to make sure that the machine could be operated as intuitively as possible, and above all safely. That meant that we had to get really creative.”

Armin Geiss from our Technical Testing Department agrees. “There were lots of different versions before we finally came up with a solution for improving the intuitive control and displays. We really had to go the extra mile with our colleagues from the Control Systems Department.”

Naturally, safety was paramount during the development of RemoteDrive. Particular focus was on the travel drive, and particularly on being able to brake the vehicle safely. It was something completely new for mobile cranes. Mang explains: “We had to install an electric braking valve. In fact we had to achieve wireless braking.”

“Our aim was to be able to manoeuvre the whole vehicle particularly sensitively”, adds Geiss. “Every test we carried out meant we learned a little more. Initially we expected that manoeuvring in first gear would deliver the greatest sensitivity.

> “Some great ideas from the Testing Department were included in the design.”
>
> Philipp Mang, Control Systems, Liebherr-Werk Ehingen GmbH

Everything under control – there is hardly any space between the existing production systems.

“We wanted to make control as intuitive as possible.”
Armin Geiss, Testing, Liebherr-Werk Ehingen GmbH

But in fact we found that using a higher gear is better because the driving force is reduced as the number of gears rises. Another very important point was how to actuate the releasing of the brake and when the engine speed had to be increased.”

A risk assessment showed that restrictions also have to be defined for manoeuvring the crane by remote control to ensure safe operation at all times. Safety is the absolute priority.

Top work – the special erection jib on the LTC 1050-3.1 enables maximum hoisting height to be used in low buildings.

800-tonne power pack


COLONIA
SPEZIALFAHRZEUGE

“One hundred percent variable”

Our new LR 1800-1.0 is up and running! The first ten units of this highly flexible crawler crane, which can be modified for lots of different sectors, have already been delivered to business partners in Spain, the USA and Asia. Recently, we also delivered one of these powerful industrial cranes to Colonia Spezialfahrzeuge. The Cologne-based company mainly intends to use its new purchase in industry and plant construction as well as for bridge hoists. However, this modern crawler crane first had to tackle a job in a wind farm.

The LR 1800-1.0 is the logical development of Liebherr’s successful crawler crane technology and was first unveiled two years ago at the Customer Days in Ehingen before being proudly presented to the general public at the Bauma in 2019. “We were looking for a crawler crane at the trade show in Munich because we wanted to broaden our range of services for the future from being a large rental company, but one which only rented telescopic cranes, by entering the large crawler crane market”, says Thomas Reuther, Sales Manager at Colonia Spezialfahrzeuge. “Although the LR 1800-1.0 was advertised as an industrial crane at the Bauma, the assurance given to us by the Liebherr people that it was also ideal for wind power equipment, convinced us to buy this 800-tonne crane. We believe that a crawler crane is currently rather dependent on wind power orders.”

And in actual fact, the first job for the brand new crane was in a large wind farm in North Rhine Westphalia, around 120 kilometres to the east of the Ruhr district metropolis of Essen. Around 70 vehicles transported the components for the wind power version of the machine to the site. Four towers from system manufacturer Enercon had already been erected by a Liebherr LTM 11200-9.1 mobile crane with heights of up to 88 metres and were now ready for completion.

When the new machine was erected for the first time, the team from Colonia received active support from three service personnel from Ehingen and the Liebherr repair centre in Oberhausen. After around six days, the LR 1800-1.0 towered into the air with a 171 metre main boom and a 12 metre jib. “As we get more familiar with the machine, our aim is to erect it within four days in the future”, says Reuther. To ensure this is possible, Liebherr has added a few extra valuable features to this crane model, whose components are designed for easy erection anyway. For example, the hydraulic erection support facility, which levels the central crawler section using the outrigger cylinders before the superstructure is added, is hydraulically controlled from the turntable. This means that it does not require a special unit for this purpose. Or the quick connection facility which enables the superstructure to be bolted to the central crawler section quickly and safely.

“The detachable ballast system saves a massive amount of time.”

Slimline – the basic machine is designed to have a transport width of just three metres. Here you can see the superstructure of Colonia Spezial-fahrzeuge’s new LR 1800-1.0 arriving on site at the wind farm.

“The crane’s wind power equipment convinced us to buy it.”

Thomas Reuther, Sales Manager at Colonia

“We only required around seven hours to erect the basic machine for the first time”, says Wolfgang Winkler, showing his satisfaction with the set-up process. The handling and logical erection system for the new crawler crane impressed the crane operator from the very beginning, an important factor as he and his colleague Peter Severin are responsible for operating the new machine for Colonia. “It’s great that all the connections are bolted hydraulically during the erection process. In some cases, three of the boom packages can be slid into each other, saving us both time and a great deal of transport capacity. But above all, the detachable ballast pallet saves an enormous amount of work”, says Winkler happily. “The 400 tonnes of derrick ballast are only required to raise the main boom. After this, we simply unbolt the centre pallet, with the remaining 80 tonnes of suspended ballast, plus the central and turntable ballast being easily enough for the hoisting work. No restacking and no ballast addition or removal – that saves a massive amount of time.”

Two Liebherr mobile cranes were used for the set-up work. Here you can see the adjustment block for the derrick guying being positioned whilst the main boom is being assembled at the rear right.

Heavy duty – 400 tonnes of suspended ballast are attached to the folding frame known as the "V-Frame".

On the other hand, the two crane operators needed a great deal of time to erect the wind turbine itself. The wind and weather and the delays, which are not unusual when erecting a prototype turbine as in this case, mean that the crane operators' patience is often tested to the limit. But the hoists themselves were completed impeccably. For the heaviest components of the wind turbine, whose hub height is at an imposing 160 metres, the crane had to position gross loads of 89 tonnes at a dizzying height with absolute accuracy. The operators had to concentrate very hard and use a great deal of fingertip control. And the two men from Colonia demonstrated plenty of both in their comfortable cab. "To date, I have only ever operated telescopic cranes, so a crawler crane naturally takes a bit of getting used to and is also something of a challenge, says Wolfgang Winkler. "However, I found that operating the crane and its control system to be really very pleasant to work with. Even driving with load is such a smooth, quiet process that I sometimes had to check that it was actually working."

Winkler, his colleague Peter Severin and their new crawler crane erected a total of four turbines in the extensive wind farm. What about afterwards? Sales Manager Thomas Reuther is very optimistic for the future: "We bought the full version of the crane, and in addition to the wind power equipment, we have various main boom versions and a set-up configuration with a luffing jib available. That enables us to carry out major industrial work or hoist bridges. The crane is one hundred percent variable and can be used in many different areas." The Cologne-based company has a workforce of around 250 providing towing services, heavy haulage logistics and industrial installation work and often carries out work for customers in the petrochemical industry. In this sector, the crawler crane will significantly expand the range of services from the crane service provider in the future.

Wolfgang Winkler, who immediately volunteered to operate the new LR 1800-1.0, is extremely satisfied with his employer's new purchase. "I have been a crane operator for a long time and I used to swear by a competitor's crane", he admits. "But since I have had the Liebherr, my eyes have been opened. I am absolutely delighted with Liebherr's technology and extremely impressed."

Support from Ehingen – Steffen Kiem provided support on site during the set-up work.

A relaxed team – Wolfgang Winkler and Peter Severin take turns in the cab of their new Liebherr crawler crane.

A dizzying height – the giant Enercon wind turbine has a hub height of 160 metres, a rotor diameter of 138 metres and can generate 4.2 megawatts of electricity.

The Liebherr LR 11000 crawler crane has many faces – with a derrick system for heavy hoists or a slim main boom for wind power. We developed the SL8F2 boom system with a completely new fixed jib specially for wind power work at the suggestion of and together with American crane contractor Buckner. Other crane contractors have now also ordered it – in the photograph here, US contractor Northern Construction is erecting wind turbines using the new system.

What about a little bit more?

“Way out there” can mean a few different things for a crane: Objectives and visions. Booms and powerful jibs. Or steps in its evolution which are almost revolutionary. It is therefore very fitting that when Kevin Long heard Lord Huron’s song “Way out there” in October 2017, he was working on the future of wind turbine erection jobs for the USA in North Carolina. First of all in his own mind. Then more precisely – in talks with Liebherr’s technical sales team for crawler cranes.

One thing we ought to tell you – Kevin Long is a wind guru, job planner and is generally mad about cranes. He holds the position of “Wind Division Director” at American crane specialist Buckner. He is extremely familiar with the ever taller towers and the increasingly heavy components. At the time, Buckner already had the largest fleet of this model in the world comprising seven LR 11000 crawler cranes, primarily used to erect wind turbines.

> “The ability to discuss enhancements and upgrades openly with Liebherr, expressed a unique team approach, that will continue to improve their product, and our rental services.”
>
> Kevin Long, Wind Division Director, Buckner Heavy Lift Cranes

And everything was going very well – the Liebherr 1,000 tonne machine was able to manage the conventional wind turbines installed in the USA without a complicated derrick system – but Kevin Long wanted to improve things: “Sometimes you have to take the less well trodden path to find new ways of doing things, useful strategies or long term solutions. My thoughts were focused on a significantly stronger jib. If we want to erect the heavier systems of the future with the same efficiency, we need more powerful jibs – and quickly.”

Florian Ritzler, Technical Sales Crawler Cranes, Liebherr-Werk Ehingen

Kevin Long is extremely familiar with crawler crane boom systems – most of the LR 11000 crawler cranes only use a main boom and fixed jib to erect the wind turbines used in the USA, which is a great advantage for setting up and moving the crane. That is why he only needed a few days to present his idea to Liebherr – a jib with a lifting capacity of 220 tonnes, 40 tonnes more than in the past. The initial design with a lifting capacity calculation was scheduled to be ready in six months. The final design was due four months later, and the first use of the new system in the USA was planned for March 2019.

It must be admitted at this point that this was rather more than a sporting challenge for our designers at Ehingen. But when the butcher asks “What about a little bit more”, who can say no? However, the laws of physics have their own limits, limits which we continue to move for our customers using the very latest technologies. And one important point is that a good design and high quality production take time. Our company

founder, Hans Liebherr once said, “We are not satisfied until our customers are satisfied”. Our engineers proved that this still holds true today as they set about their calculations and drawings with enormous commitment.

Klaus Huberle, General Manager Crawler Cranes

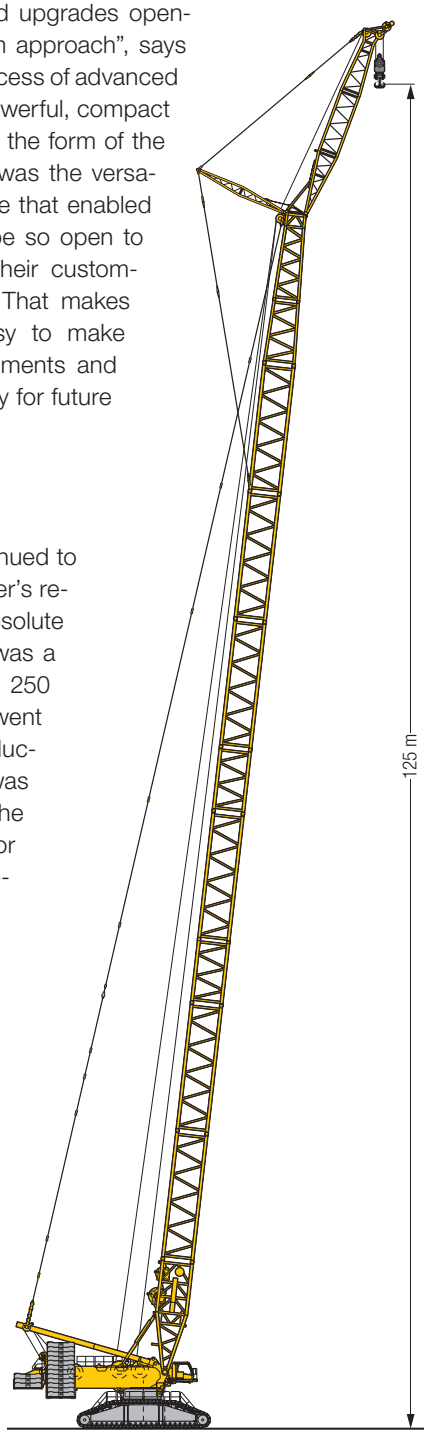
It was January 2018 when Kevin Long and his boss Doug Williams, together with Thomas Chandler from Mortensen, one of the largest energy companies in the USA, sat down round a conference table in Ehingen. Opposite them sat Klaus Huberle and Florian Ritzler from the technical sales team for crawler cranes. And today we can say that that day marked the birth of the SL8 boom system with the F2 jib.

From then we continued our development work. The Liebherr engineers started the actual design work in March. One month later, Florian Ritzler presented the concept to Mortensen and Buckner in Minneapolis. Their answer: “Almost, but not quite good enough. We need even more!” The new jib has to be able to hoist at least 230, or even better 240 tonnes.

“The ability to discuss enhancements and upgrades openly with Liebherr, expressed a unique team approach”, says Kevin Long, remembering the intensive process of advanced development. “Liebherr had built a very powerful, compact and versatile 1,000 tonne crawler crane in the form of the LR 11000. And it was the versatility of the machine that enabled the engineers to be so open to the demands of their customers and markets. That makes it fantastically easy to make advanced developments and get the crane ready for future jobs.”

And so work continued to satisfy the customer’s requirements with absolute focus. The result was a lifting capacity of 250 tonnes. The rest went very quickly: Production approval was given in October 2018, just one year after the initial idea. The first F2 jib was then ready for testing in January 2019. And the first delivery to Buckner took place in April 2019. One month later than originally requested, but with 30 tonnes more capacity.

And Kevin Long? He feels his jib is “way out there”: “The LR 11000 is the current benchmark for wind power in the USA. This crane enables us to remain absolutely at the top in changing markets.” And the figures show that he is right – Buckner now has 17 models of the LR 11000 in action, five of which feature the new SL8F2 system.



More powerful boom system with superstructure extension – SL8F2: Eighth version of the SL main boom with second version of the fixed jib

F2 jib with parallel operation and integral runner

Load sensing system

Simply **explained**

Load sensing is a term familiar to anybody who works with mobile cranes. But what does it actually mean? Jörg Gebele, Hydraulic Designer at Liebherr in Ehingen, gives us a brief insight into hydraulic systems and explains this smart system.

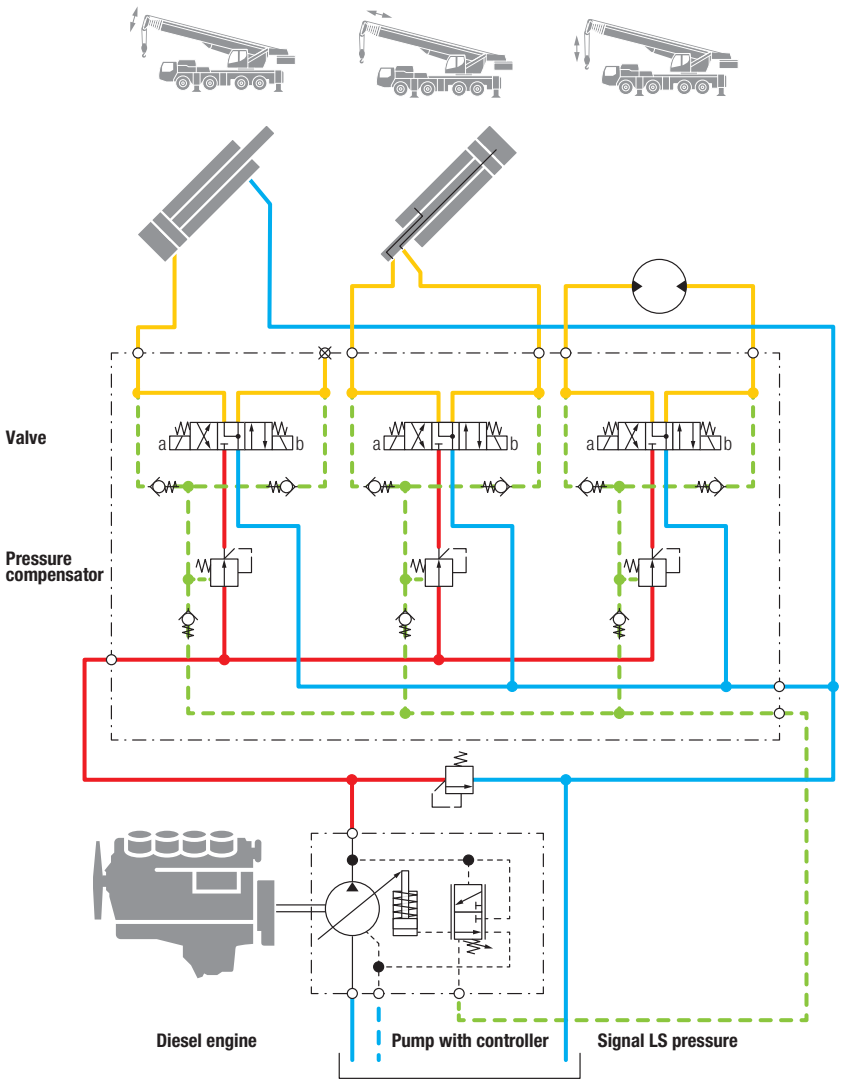
Every machine contains a drive unit whose power is transferred to one or more power units. On our mobile cranes, in crane mode the power generated by the diesel engine is transferred to the various crane units by the hydraulic system, in other words to the hoist unit, the slewing unit and the luffing and telescoping units. The hydraulic system has the task of distributing the power to the crane units as energy-efficiently as possible. None of the units must run too quickly or too slowly.

> "The hydraulic system must supply the perfect level of power for each individual crane system."
>
> Jörg Gebele, Group Leader Hydraulic Design, Liebherr-Werk Ehingen GmbH

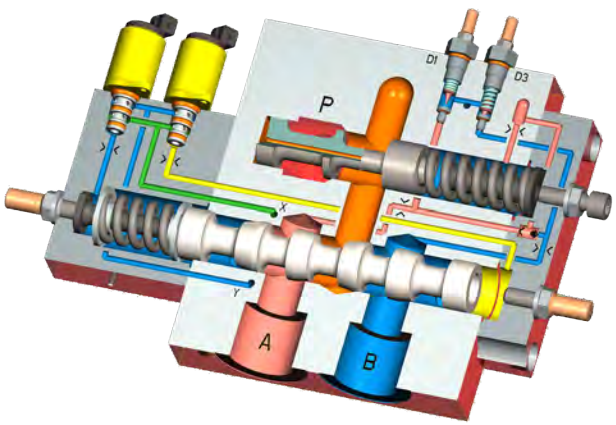
Furthermore, the hydraulic pressure must be high enough to ensure that none of the units stops. Hydraulic systems in various forms can be used for this purpose. One of them is the so-called "load sensing" hydraulic system.

Load sensing simply means feeling the load or, in other words, the load pressure. It is often abbreviated to 'LS system'. A hydraulic pump with an adjustable delivery volume is used in the LS system. The maximum operating pressure is reported to the pump's controller by all the crane units through a chain of non-return valves. This is known as the 'LS pressure'. The controller adjusts the delivery rate of the pump so that it delivers precisely the correct hydraulic pressure and precisely the correct delivery volume to achieve the speeds required by the operator. This satisfies the main objective of not generating excess hydraulic energy which then simply has to be throttled back. The LS system is therefore also a major help in reducing fuel consumption.

However, if there is more than one crane unit being actuated, there is another difficulty. Unless additional precautions are taken in the LS system, the majority of the oil from the pump would be discharged through the path of least resistance to the crane unit with the lowest operating pressure. This crane unit would then operate excessively quickly whilst the unit with the highest load pressure could initially actually stop. The speeds of the various systems would then affect each other. However, that is not what the crane operator has set the crane to do and is undesirable.



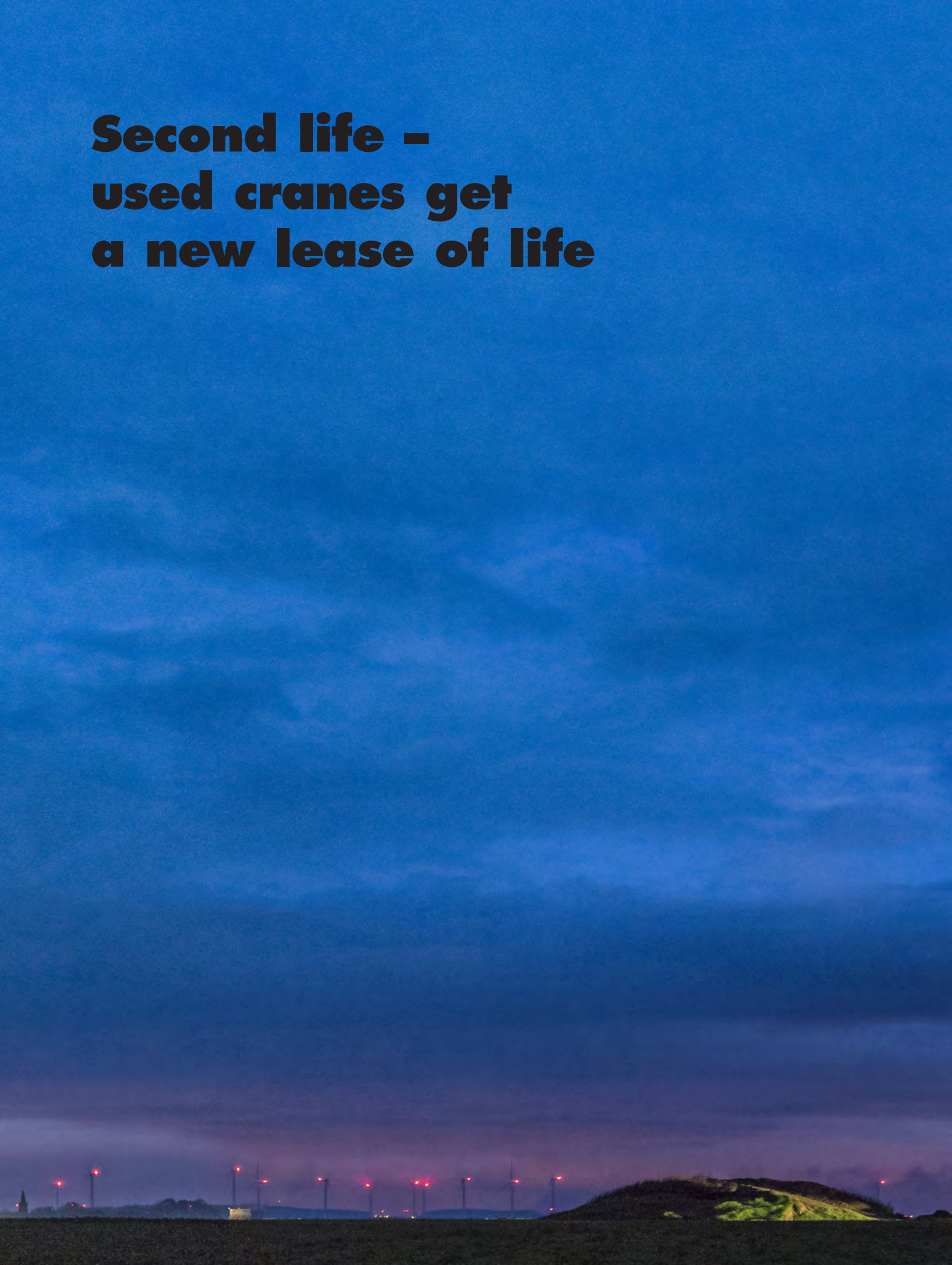
To ensure that the speeds are as required by the operator, an additional hydraulic element must be positioned upstream of each valve – a so-called pressure compensating valve. By closing as the pump pressure increases and opening as the pump pressure falls, this compensates pressure differences like a scale and prevents any of the crane units having a negative effect on any of the others.



3-D section drawing of a load sensing valve with a pressure compensater

There are various types of LS systems. For example, the LS pressure is signalled in our cranes using pressure sensors by electricity and not by hydraulics, as was the case in the past. This means that it is an electrical, not a hydraulic LS system. Furthermore, in addition to the “closed centre” LS system with an adjustment pump described above, there are also “open centre” LS systems with a constant pump and a pressure compensating valve with an additional tank connector through which the surplus oil can be discharged. As a consumer, the slewing unit often takes the form of an open centre LS system. Moreover, not only can the pressure compensating valves be installed upstream of the valves, but also downstream of them.

Second life – used cranes get a new lease of life




LG 1750

First class, second hand: Liebherr used cranes deliver excellent performance

It was February 1969 when Hans Liebherr laid the foundation stone for our crane factory. Today we have the most modern plant for mobile and crawler cranes in the world – and our claims about our own quality and sustainability are still just as high. To connect one with the other, we have been buying back used cranes from our customers since the seventies and reselling them as second hand. This business sector is so strategically important to us that for the last 40 years it has been managed by a dedicated department established specifically for the purpose. The used crane sales team celebrated its own anniversary in summer 2019 – namely on the day when the ten thousandth used crane was handed over to a customer. Top class!

Sparkling – S.E. Levage's eight-year-old LG 1750 sparkles in its new paintwork during its first job on a wind farm site in the north of France. Here you can see the crane placing a 72 tonne gondola on a turbine tower. In its first life, the lattice boom crane was permanently stationed at a Scottish port.

In addition to quality and sustainability, there are several other good reasons for our customers to buy a second hand crane. "Of course the significantly lower finance involved is one aspect", says Bernd Rechtsteiner, who has managed the department since 2012. "But waiting time can also be a major factor", says the management graduate. After all, speed is of the essence on construction sites – when a crane contractor wins an order for a major project such as a wind farm, the normal lead time for a brand new crane could be a problem. "Recently we had an enquiry from a customer in Africa asking for the urgent delivery of an LG 1750. A new crane? Nine months. A used crane? Eight weeks!" In cases such as this, Bernd Rechtsteiner and his team are proud and happy to be able to offer the customer a first class crane from the second hand pool – and the customer is delighted to take it.

France is another important, large market for Liebherr used cranes. At the end of 2019, S.E Levage placed an order for a third large crane for its fleet. In fact, the LTM 11200-9.1 built in 2016 meant that the company, based near the Swiss border, had acquired the most powerful crane in the country to date. "The crane was like new when we took delivery at the Liebherr plant in Ehingen", remembers the operator at the time, Christophe Thenery. At S.E Levage's request, all the cranes had undergone factory refurbishment and had been resprayed. They were also supplied with a six-month warranty. In its everyday work, the company can now tackle wind farms using this powerful fleet, thus helping achieve the French strategy of increasing the use of renewable energy. By the end of 2019, all three large cranes were in action erecting wind turbines.

The company's French competitor Mediaco also uses the pool of used cranes at Ehingen to expand its fleet with top quality machines. Last year, Mediaco, the largest crane and heavy haulage logistics contractor in the country, took delivery of both an LG 1750 and an LR 1600/2 crawler crane. Mediaco also decided on a complete refurbishment and respray in the company's corporate livery. However, this additional work is not compulsory. "Customers can decide on the condition of the crane when they take delivery of it", says Bernd Rechtsteiner.

"Whether it is bought as seen, together with a brief inspection or after extensive factory refurbishment with technology upgrade and warranty – the customer is free to decide."

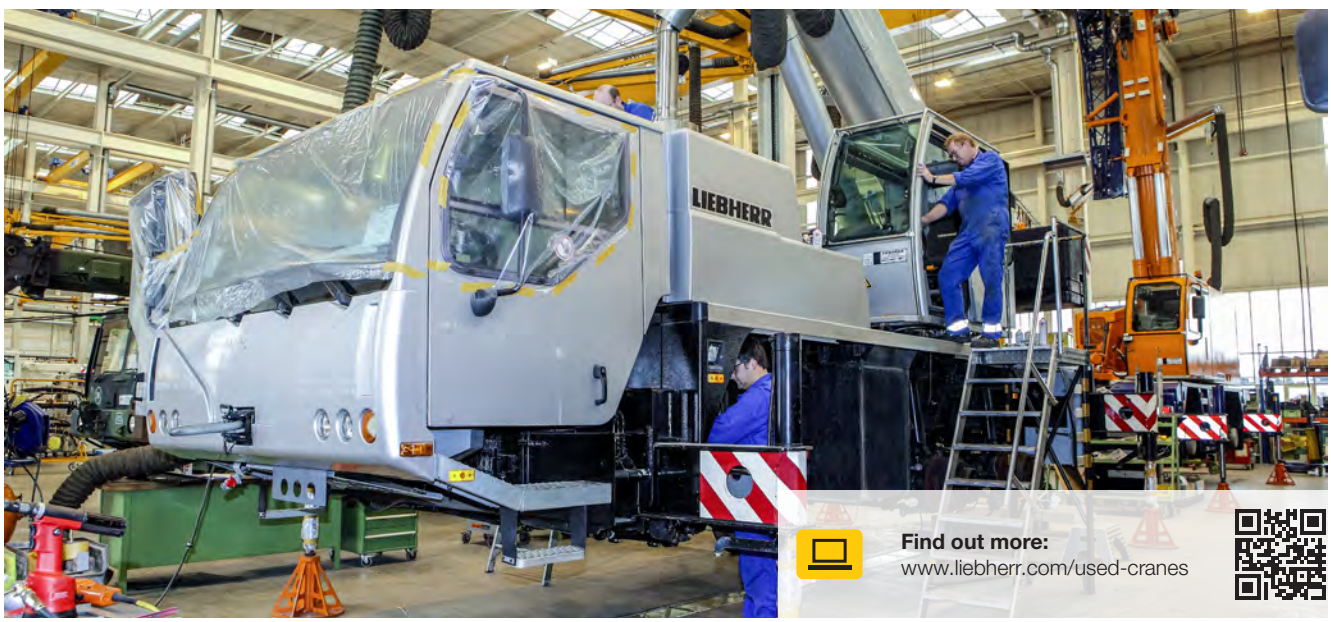
From continent to continent if necessary

When Liebherr buys back mobile and crawler cranes in Germany, their first port of call is Ehingen or the repair centres in Alt Bork (near Berlin) and Oberhausen. In other countries, the cranes are stored in local branches or tested on site and then transported straight to the new owner. They may also be transported between continents if necessary. An LR 11350 crawler crane underwent one of the longest journeys of all – the only place that one of these models was available quickly was on the border between the USA and Canada. The giant crane was therefore shipped from Huston via Genoa to Novorossiysk in Russia "quickly" (and of course with the appropriate care). Mission accomplished, customer happy, project rescued. The vast majority of cranes are located in Europe, however, from where they are shipped to Eastern Europe where most buyers of used cranes can be found.

"Recently a customer in Africa asked for the urgent delivery of an LG 1750. A new crane? Nine months. A used crane? Eight weeks!"

Bernd Rechtsteiner, Head of the Used Cranes Sales Department

It should also be mentioned that we at Liebherr are not only the only crane manufacturer that sells second hand machines, but we are also the largest dealer of used cranes in the world. Bernd Rechtsteiner and his team sell around 250 cranes every year – from small two-axle machines to massive crawler cranes. The Liebherr homepage generally only features around 30 used cranes available to buy at any one time, however. "But



Find out more:
www.liebherr.com/used-cranes

5,800 m^2 repair centre at the Liebherr plant in Ehingen

not because we only have so few available", says Department Manager Rechtsteiner. "Instead, the fact is that we often know long in advance when a crane will be coming back and who is looking for that model. That means that we can react very quickly and precisely to specific customer enquiries."

The second hand trade is also strategically important due to its role as a door-opener. In regions with upward-trending economies such as South Africa and Australia at the current time, the value for money used machines provide us with a method of opening up new markets and customers. "We are renowned for quality and value retention there as well", says Rechtsteiner. "Our mobile cranes can easily get to 25 years old or more, whilst lattice boom cranes last even longer. Together with our efficient, worldwide service network, our good customer relations and lower capital commitment, these are very telling arguments in favour of our low cost cranes."

Upgrade with new technology and the latest features

The wide range of possible additions is another aspect which should not be forgotten. Naturally, Liebherr also offers its customers the option of upgrading the used cranes with new technical features, where possible, or enhancing their equipment packages. For example, Mediaco ordered a second winch and modifications to the ballasting system on its LG 1750. The derrick systems on both the large cranes were also fitted with the practical "VarioTray" split ballast system. This meant that Mediaco received two state of the art cranes. Making old into new – and a machine which is absolutely equivalent to a brand new one. In other words, genuine first class, second hand!

Bridge building in Finland – Helaakoski's "new" LTM 1750-9.1 also came from Liebherr's pool of used cranes. The freshly resprayed nine-axle machine has been in action for several months – and is actually the most powerful mobile crane in the country.

Job near Grenoble – Crane contractor S.E Levage only had to wait around five months for this LTM 1750-9.1 to undergo full factory refurbishment and a complete respray. The lead time for a new model of this in demand crane can be up to 18 months.

Digitalisation – with the focus on the customer

Totally digital

Did you know? Originally, digitalisation was the word used to describe the treatment of a person or other warm-blooded animal with digitalis. Digitalis, by the way, is the Latin name for foxgloves. Digitalisation is perhaps one of the most commonly used buzzwords of the last few decades. As a crane manufacturer, we also offer a wide range of digital solutions to make your life easier. A look back at the history of digitalisation and the improvement and the improvements it brings which we can offer you.

Treatment with digitalis, foxgloves, was regarded as medication for various cardiac arrhythmias. However, in high dosages, the medication was actually a poison. This is a comparison which can also be used for the current use of the term – digitalisation is a medication, but in excessive dosages it can also do harm. Perhaps we should consider this the next time we are glued to our mobile phone to find out whether a new message has arrived or start to become nervous when the battery is getting low. Many brain researchers also warn about the uncontrolled use of digital devices, particularly by children.

The history of digitalisation

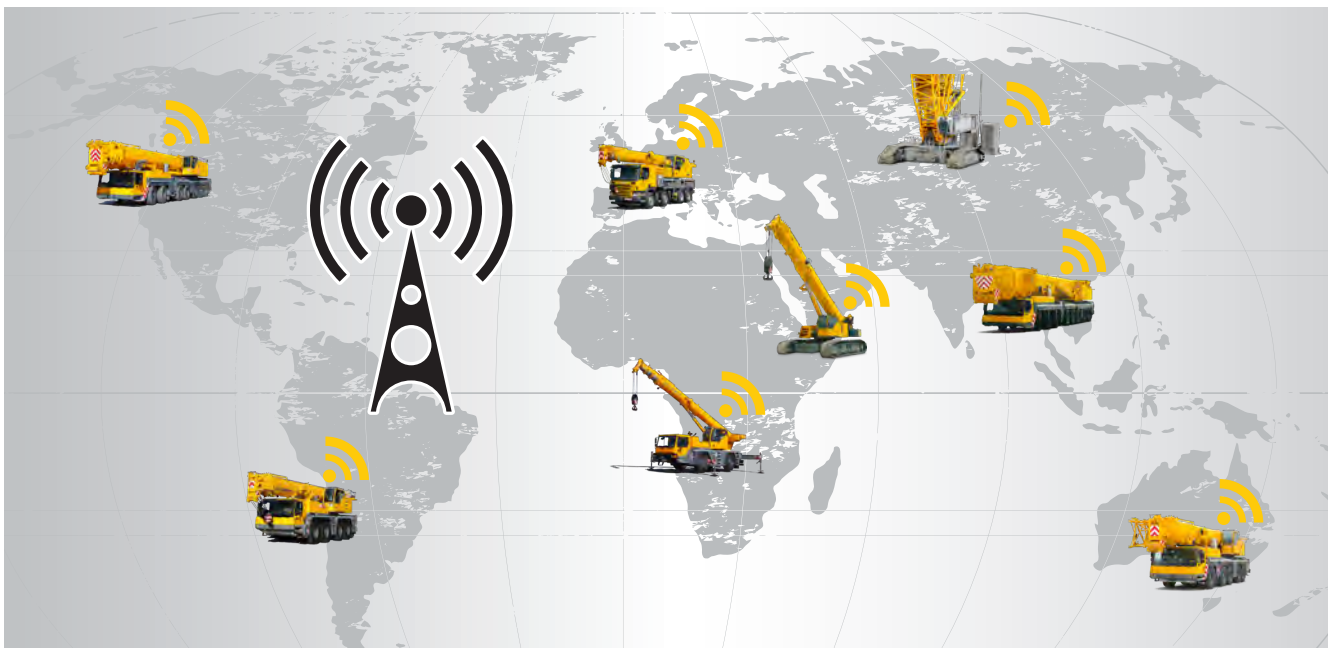
However, hardly anybody now thinks about foxgloves when they hear the term digitalisation. Since the 70s, the word has been used to describe the conversion of analogue values into digital formats. This development was pioneering. It made the storage and reproduction of information fast and easy. Today, we think nothing of photographing a document and sending it off quickly by email or WhatsApp. And what a blessing that we no longer have to file old slides in boxes or place them in a projector, and instead all we have to do is open a notebook, where we can not only look at them, but also edit them using Photoshop. Those are the positive aspects of digitalisation.

But there is a great deal more involved. Today we talk about the digital revolution and digital transformation in industry, general society as well as in our working and private lives. It is a curse and a blessing in one – breaches of privacy, hacker attacks and cyber bullying on one side, the unlimited availability of information, a home office and digital education on the other, to name but a few. The current Corona pandemic has shown us all the positives and opportunities presented by digitalisation.

And we can now bring in another current buzzword. “Industry 4.0” means the comprehensive digitalisation of industrial production. Man, machine, systems and logistics – everything networked, including the life cycles of products, from the cradle to the grave. There is currently no end in sight to digital developments.

Dialogue with our customers is important to us

When we, a crane manufacturer, talk

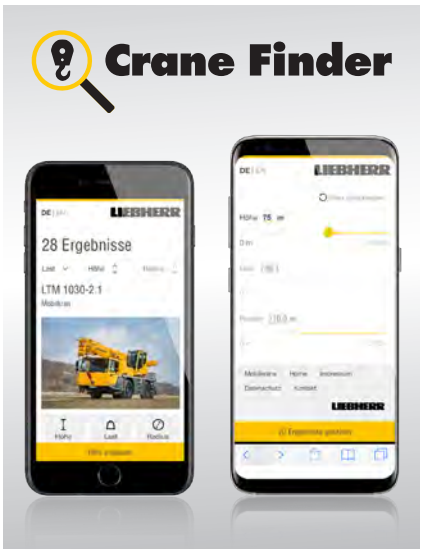


about digitalisation, we are less interested in the fact that 3-D design has replaced the drawing board and the computer has made the typewriter a thing of the past. Those are technical developments to make work easier and better, just like the software which supports our processes in almost every area of our company.

But the main question for us on the subject of digitalisation is what do our customers gain from it? And it is all about you – from crane operators, dispatchers and workshop managers to company owners. Our focus is on your requirements and wishes. What has digitalisation done for you and us to date? Let's look at a few examples.

The mobile crane is a highly digitalised machine, which permanently monitors itself. For several decades, digitalisation has provided the basis for booms becoming longer and more powerful, crane work being safer and more convenient and after-sales service being able to provide ever more efficient support.

We are all interested in protecting the environment and sustainability. The



nitrogen oxides and particulates in the exhaust emissions from diesel engines in our mobile and crawler cranes have been steadily reduced over the last 20 years by more than 96 percent, partly due to software developments – something that would not be even conceivable without digitalisation! This has been supplemented during the last few years by ECOmode and ECOdrive to reduce fuel consumption and noise.

Do you want to prepare your crane jobs perfectly and ensure you have the right equipment for them? The LICCON work planner has been providing support for this since 1994, using the same crane data on the PC and in the LICCON control system. This was a milestone that we have now improved – Crane Planner 2.0 will become the central component for planning jobs using Liebherr cranes. Detailed 3-D site planning in a matter of minutes without a complicated CAD program. We are currently working on ensuring that all our machines can work with the system. And to prepare for this, we now have the Crane Finder – select the right crane for the job quickly and easily using very little data – you can then plan the actual job using Crane Planner 2.0.

Training is essential for safe crane jobs. Our range of digital services includes the ability to acquire a mobile crane operators licence whenever and wherever you wish – using e-learning.

Fleet management, spare parts process and preventive maintenance – we already have plenty of good ideas and partial solutions, but digitalisation certainly offers an immense amount of potential in these areas. And it is these areas, in particular, that we would like to discuss further with you. We believe that all the points listed above will be included in our MyLiebherr customer profile over the next few years. MyLiebherr will therefore become the digital home of the complete world of mobile and crawler cranes.

We want to intensify the direct, great communication that we have had with you over the last few decades. In addition to personal contacts in our Sales and After-Sales Service Departments, our UpLoad customer magazine will play an important role in this respect. We have created the email address upload@liebherr.com specifically for this purpose. You are very welcome to use this to send us your ideas and suggestions for digitalising the crane industry.

Let's take a closer look at the topic of digitalisation together in the next few editions of UpLoad. We are talking about expert articles on various subjects, reports on the experiences of our customers and, of course, suggestions for improvement as well as completely new ideas from you. We look forward to our discussions with you.

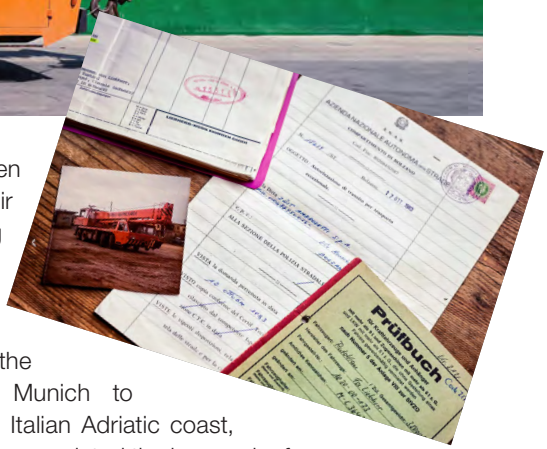
In focus


LIEBHERR

Kings of the island

It's either Marnelakis or nobody!

Temples, altars and holy places – the ancient Greeks are regarded as the greatest builders of their age. Despite their lack of technical equipment, even all those centuries ago they built majestic structures which are still magnificent icons – the Acropolis in Athens, the Colossus of Rhodes and the Palace of Knossos on Crete are just three of the 18 UNESCO World Heritage Sites in Greece. Today construction is still taking place, albeit on a slightly different scale – Greece has been heavily reliant on wind energy for ten years. One of the main players in the industry is a small Greek family run company. Welcome to the Marnelakis home on Crete.



Starting is always difficult

When brothers Manolis and Spiros Marnelakis set out to make their dream come true, all they had in their pockets was a small amount of seed capital. But in their heads they had a great vision – to become Crete's largest heavy haulage contractor. There were plenty of doubters, but the brothers were convinced by their plan.

"You must be mad!", Manolis Marnelakis was told when he decided to bring a used Liebherr crane to Crete around 35 years ago. But at the time, the critics were the least of his problems. In fact, he had no idea how to transport a vehicle weighing several tonnes from Ehingen to the Greek island. Manolis did not waste much time deliberating, he simply hired a driver who was actually in charge of refrigerated transport, and promptly drove the 2,600 km to Crete with him.

This adventurous journey resulted in Manolis and the driver, Georgos, becoming firm friends. They are still good friends today and often talk about their nerve-racking journey over a coffee.

They drove the LT 1030 via Munich to Ancona on the Italian Adriatic coast, from where they completed the journey by ferry. Manolis' brother Spiros coordinated the journey and took delivery of the crane at the port of Souda. The last few kilometres to the company's office in Chania on Crete were then child's play for all of them.

Happily ever after?

But the nerve-racking journey by the men did not have an immediate happy ending once they got back to Crete. Nobody on the island had ever seen such a massive machine and the

brothers initially did not receive any orders. Spiros remembers: “The people asked me what I was planning to do with such a monster.” His confident response to the island’s residents was then: “I plan to hoist houses with it and transport them from one place to another.” Their reaction was to laugh in his face.

In reality, the brothers’ business started slowly, however, as they simply lacked any experience with the new crane. But once the news about the enormous machine had spread around the island, the orders started coming, and ensured the brothers gained all the expertise they needed. Today the company has five Liebherr telescopic mobile cranes and seven truck loading cranes with a workforce of twelve.

And the brothers’ mobile phones are seldom silent. The core of their business is maintenance work on wind turbines on Crete, other islands and the Greek mainland. The fleet has also been used to help with the expansion of the motorway network and at the local port – often on a fairly spontaneous basis. There is sometimes only a matter of minutes between a phone call and the job being started. And Manolis’ sons Babis, Nikos and Theo are now also part of the family business, having practically learn to operate cranes whilst they were still in nappies.

The new crane

As the next generation joined the family company, so did a new crane – the LTM 1230-5.1. Spiros travelled specially to Ehingen with his 14-year-old son Jorgis, to select the new crane. It should be noted that at the time, the LTM 1230-5.1 he wanted only existed on paper. But this paper was a symbol of

Manolis Marnelakis

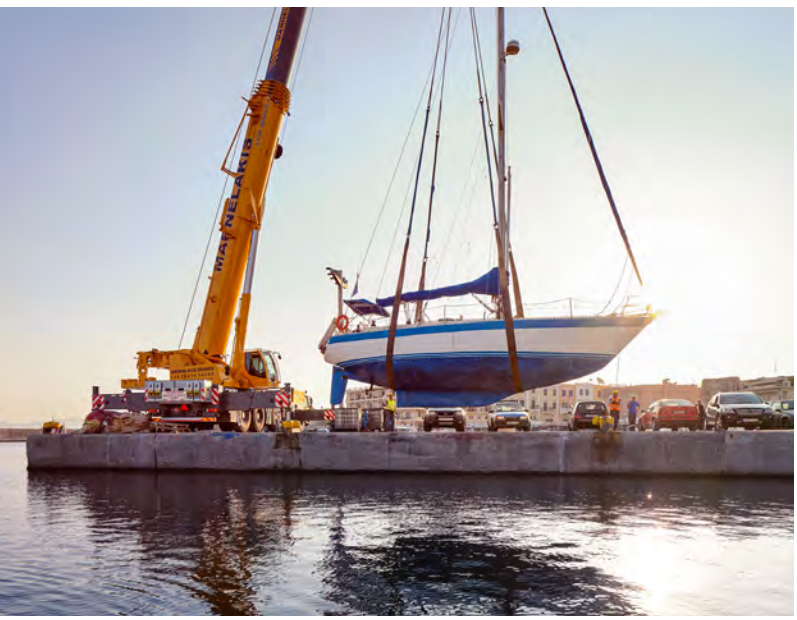
the total trust between the Greek company and the German designers. And together with the excellent properties and the crane's main data, this trust was the enough for the Marnelakis

Jorgis and Spiros Marnelakis

brothers and their sons to make their decision. They had no doubt whatsoever that the mobile crane would be the perfect replacement for the LT 1030, which was starting to show its age.

A crane for all seasons

Liebherr shipped the LTM 1230-5.1 to Crete, one of the very first deliveries of the model in the world. The family awaited its arrival, knowing that it would have to tackle some extreme conditions – narrow olive groves, precipitous vineyards, deep gorges and rocky plateaus. The roads are steep and narrow, whilst some of the bridges are old and ramshackle. In summer, there is also tourism which makes travelling on Crete's roads even more difficult – making a high level of mobility essential.



"As a result of its size, compact dimensions and manoeuvrability, the LTM 1230-5.1 is absolutely perfect for our island". For Babis Marnelakis this was just one of many reasons why the family once again decided on a Liebherr crane.

As far as Nikos Marnelakis, Manolis' youngest son and driver of the crane, is concerned, the manoeuvrability of the LTM 1230-5.1 is critical: "Thanks to the five axles and differentials, I have absolutely no worries about where I have to drive or what conditions I will find there. The VarioBase® variable support base makes us totally flexible on the site." And when was the first time that Nikos sat in a crane? "I must have been six or seven", he says, thinking back. That was the legendary LT 1030, which his father once drove thousands of kilometres across Europe.

Babis and Nikos Marnelakis together with Yannis Liakopoulos

Another person who has been on board from almost the beginning is Yannis Liakopoulos. He is the Liebherr service partner and is almost part of the family. Available 24 hours a day, Yannis sources every spare part the company needs within 48 hours – and the fact that they are on an island makes no difference whatsoever! For Spiros Marnelakis, this reliable service is one of the main reasons behind Liebherr's success. "With Yannis we have more than just a business relationship. When he's on the island we often spend the evening together in the taverna." "I refuse to miss out because the culinary delights here on Crete are pretty much perfect for the job", says Yannis with a wink. Yannis Liakopoulos was also heavily involved in the purchase of the LTM 1230-5.1. From the first "inspection" on paper in Ehingen to its delivery at the port

Yannis Liakopoulos, Liebherr service partner

on Crete. One very important point is that all drivers receive training, regardless of whether the crane is brand new or used. A trainer was sent to Crete specially for this purpose and taught Nikos and his brothers everything they needed to know about the new crane.

The secret of success

Yannis is delighted that the next generation is just as keen on Liebherr and that his work is bearing fruit. When asked about the secret of their success, the Marnelakis brothers think for a little while. “People say that if the Marnelakis can’t do it, nobody can!”, says Spiros with more than a little pride.

Find out more:
www.liebherr.com/kings-of-the-island


JOHNSON
JOHNSON

Fantastic view

A legend in its own lifetime

“This is the best crane in the world”, is how Uwe Langer described the LTM 1500-8.1, when he took delivery of the 500th crane of this model in March 2016 at the Liebherr plant in Ehingen. And there is every reason to believe that the Managing Director of crane and heavy haulage contractor Riga Mainz GmbH & Co. KG is absolutely correct. After all, he has decades of experience in the crane industry and already had several LTM 1500-8.1 units in his fleet. The success story of this Liebherr 500-tonne crane has carried on. Just four years later, in March this year, we handed over number 600 to its new owner. The crane was delivered to Korean crane contractor Crane Korea Co. Ltd.

There is no dispute that the LTM 1500-8.1 is the most successful large crane of all time. But, in fact, its predecessor was also a best seller – from 1988 to 1999, we delivered 140 LTM 1400 cranes. At the time, it set the bar high for eight-axle mobile cranes.

Twenty years later, we wanted to take a look back at crane history with some of the people behind its success. We talked to Yggve Richter, who dedicated several years of his life as a structural engineer to the LTM 1500*, Joachim Henkel, Head of the Structural Engineering Department, Norbert Leuze from the boom design team and Hans-Joachim Wenger from the Crane Control System Department.

Did you have any idea at the time that we would deliver over 600 cranes?
Joachim Henkel: No, we had absolutely no idea that that would be the outcome. Although the LTM 1500-8.1 had everything going for it – the variability of two telescopic booms, measuring 50 and 84 metres in length, was a unique selling point for the new crane. But right at the start of the development work, we were not really very pleased with the lifting capacity values in telescope mode. The increase compared to the LTM 1400 was rather disappointing.

Yggve Richter: At the time we were using a new calculation program which was significantly easier to use than the previous software package. Because of it, I was really motivated to do my absolute best. But I can remember something that our Technical Director, Dr. Hamme, said when I showed him the first tables at the time: “Yes, but the lifting capacities are not exactly impressive …”. That sent me back to my desk to improve the whole thing again!

What were your demands and expectations?
Joachim Henkel: The LTM 1500 was planned to be the successor to the LTM 1400. With a 50 m telescopic boom and classic TA guying, at the time this was the benchmark and until then it was the best-selling 8-axle crane in the world. Naturally, we wanted to do even more with the new LTM 1500 to make it the best crane on the market in the 8-axle class.

Joachim Henkel, Head of Structural Engineering

The product management specification at the time said that the average annual sales would be around 15. We really did not expect to exceed this target so massively.

What were the challenges for the new 8-axle crane at the time?
Joachim Henkel: As I mentioned above, the two telescopic boom lengths were something special – 50 and 84 metres. And 84 metres at the time was a world record for a telescopic mobile crane! However, it was only possible because of the development of the new ovaloid boom concept. The predecessor LTM 1400 had a conventional rectangular cross-section with all sorts of buckling stiffeners in the boom to provide extra rigidity.

** The LTM 1500 was renamed the LTM 1500-8.1 in 2004 when Liebherr started to include the number of axles and the version in the model name of all LTM cranes.*

But buckling stiffeners require space and therefore prevent being able to retract lots of telescopic sections of adequate width into each other. The cross-sections of the telescopic sections in the LTM 1500 then required almost no buckling stiffeners. And it was this that meant we could build a 6-section boom with this enormous boom length, which also had good rigidity, particularly sideways.

However, we had no practical experience with this new type of telescopic boom. At the time we conducted an enormous number of FEM simulations to enable us to assess the boom's strength. One FEM strength calculation for one telescopic boom section with one load case took around 18 hours, nowadays the computer does the same thing in 5 minutes.

Hans-Joachim Wenger: For the control system, too, the option of installing two different booms presented a whole new challenge. It meant that the control system, depending on which boom was installed, had to extend the 4 or 7-section boom to the required telescope length as effectively as possible and in the shortest possible time. The control options and visualisation then had to be included in the existing LICCON monitor to act as an interface to the crane operator.

Yggve Richter: In addition to mastering the lifting capacity calculation using the Y guying, the development of a calculation

LTM 1500-8.1 with classic TA guying in Hong Kong

Hans-Joachim Wenger, Control Systems

method for the strength assessment for the various telescopic sections proved to be the biggest challenge. The 6-section boom would have enabled 4,096 theoretical extension state combinations. Even with the new software package, we quickly reached the limits of what we could do.

Hans-Joachim Wenger: This enormous number of possible extension states, combined with the various possible accessories (luffing jib, fixed jib, hydraulic luffing fixed jib, guying with eccentric and spacer) meant that the number of tables required for the whole thing increased exponentially. This posed some major challenges to our colleagues at LML Development relating to storage capacity, management and processing for limiting the load moment.

Initially, we used the TA telescopic boom guying system which had been commonly used until then. Then came the spatial Y-guying. When exactly did that happen?
Yggve Richter: My first table is dated 27 September 2001.

Joachim Henkel: The LTM 1500 actually did not really take off until after we had developed the Y guying system. This enabled the lifting capacities to be increased dramatically even with high boom lengths, particularly when combined with lattice sections.

What was new about the Y-guying system?
Norbert Leuze: The TA guying system could only support loads in the longitudinal direction, so it prevented the boom buckling forwards. The Y-guying system also supports side loads, so it also prevents buckling to the side and can therefore hoist heavier loads.

The lateral adjustment of the Y-guying supports enables the ideal guying angle to be achieved for the boom length and crane set-up.

Norbert Leuze, Design

What was the design challenge?
Norbert Leuze: Like TA-guying, it had to be possible to install the new system on the boom with as few hoists as possible. Furthermore, it must not exceed the vehicle width since in some countries the guying is carried on the crane when travelling on the road.

And just like the old system, the guying had to be mechanically locked after it had been tensioned. This was achieved using teeth on the guard plate on the winch.

However, there was also the fact that it still had to be possible to slew the guying supports sideways. These studies took an immense amount of time. Since we had to check everything in spatial terms, it would have been almost impossible without 3-D CAD.

What does the new system mean for the control system and sensors?
Hans-Joachim Wenger: The new guying principle developed at the time, with a tensioning winch on each side of the boom and hydraulically controlled pawl and lowering cylinders required a massive number of sensors and actors. As automatic functions were now required for opening the pawl and for the actual lowering process, we had to place as many of the controls as possible in the LICCON. We managed to implement the controls and visualisation on the second LICCON monitor in the crane operator's cab.

That was a really exciting time for me. In addition to the general crane controls, I was also responsible for programming the displays and controls in the LICCON monitor and PLC control system for the remote control lowering system. The collaboration between departments was absolutely fantastic.

This guying system also provided the basis for future, ever more refined guying methods for our current large telescopic cranes.

How complicated were the new structural calculations?
Yggve Richter: We first had to gain some experience with the new guying system. That meant that we conducted an enormous number of measurements on the test site. The preload forces with specific loads were measured and compared to the forces that we had calculated. It quickly became apparent that some of the differences were significant. As a result of this, we had to introduce tolerances, which meant that we had to calculate the boom strength four times. That took four times as long.

What other new features were created during the crane's service life which related to the structural engineering?
Yggve Richter: The launch of the Spacer from 2002 gave the Y guying in TYN mode, in other words with a luffing jib and lowered boom, a real boost!

Norbert Leuze: In 2004 we also developed an Eccentric specially for TYF mode, in other words with a fixed jib and guying, to increase the lifting capacities even further.

Joachim Henkel: A combination of both systems has been standard on all Liebherr cranes with Y guying ever since. That meant the LTM 1500-8.1 was a real technology pioneer and we learnt an enormous amount.

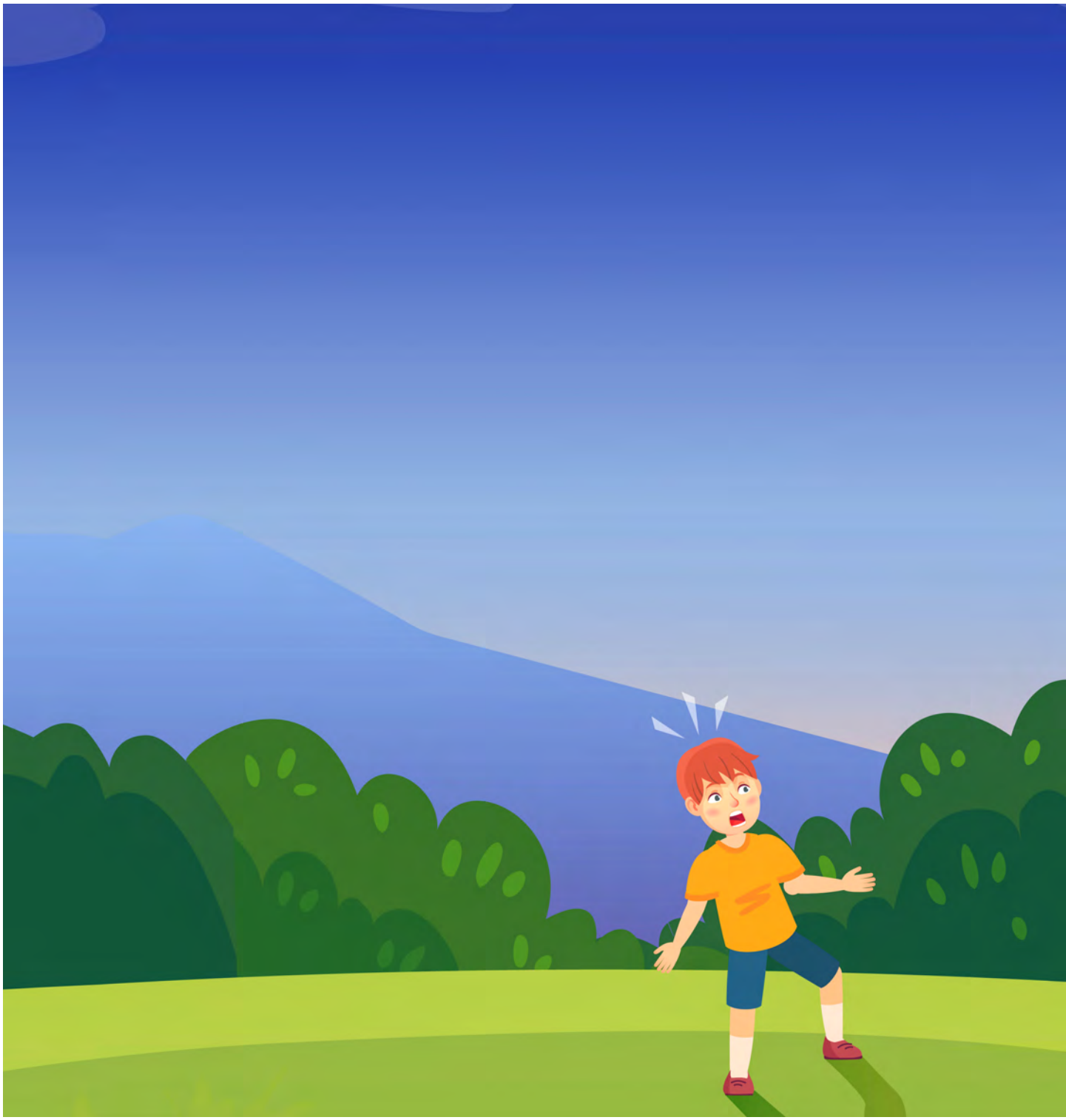
Yggve Richter, Structural Engineering

Mr Richter, can you estimate how many hours of your life you spent working on the LTM 1500?
Yggve Richter laughs: No, I can't. There were other projects as well of course. But every so often I found myself creating special tables for the 1500. That meant I was working on it full-time for five or six years.

Are you currently still working on the LTM 1500-8.1?
Yes, I am still doing between two and three hours a week on it. That mainly involves "wind enquiries". Customers want to hoist loads with large areas exposed to the wind, which would result in very low maximum wind speeds being possible on the basis of the standard conversion which customers can do for themselves. If we enter the special cases into our program, we can generally enable them to operate in significantly higher maximum wind speeds. I have answered more than 1,200 enquiries of this type since 2000.

After more than 20 years, the LTM 1500-8.1 is to be replaced by the new LTM 1650-8.1. Why do you believe the LTM 1500-8.1 was so successful and what goes through your head at the end of the life of such a successful crane?
Joachim Henkel: The first thing, of course, is the crane's performance data and also its flexibility and mobility. But the very important thing is that we were constantly developing it, driven in particular by the boom in the wind industry. And we also managed to satisfy some exotic customer wishes, which over time became selling points for other customers. We did almost nothing wrong with this crane.

LTM 1500-8.1 erected tower cranes on the Sagrada Familia in Barcelona using Y-guying



Best-seller, eye-catcher, children's book hero

The LTM 1500-8.1 is the best-selling crane on eight axles on the market with 600 of them in action around the world. It is always an eye-catcher when it is fully set up. Sometimes it even becomes an attraction – particularly if there are lots of passers-by who can watch the crane operating. One LTM 1500-8.1 has now even become famous. May I introduce ... Steve, the hero of a children's book.

A crane named Steve

In Northern Virginia, right near Manassas,
Traffic moved just like molasses,

Dad was complaining every day
“This is the year we’ll move away!”

“No” I cried. “This is our home,
If you leave, I’ll stay here – alone!”

Running out of the house, above the ridge
Between the highway and down by the bridge

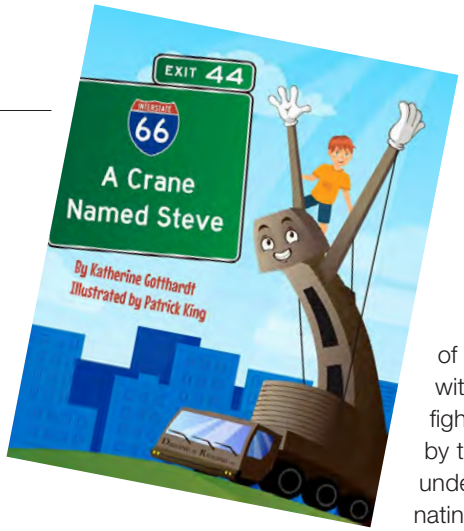
Stood this… a thing with a hook
Arms of steel and a strange look

It smiled and said: You are a child, I believe,
Pleased to meet you - just call me Steve!

That is exactly how the story starts in which a small boy meets his new best friend – Steve the Crane. Steve tells a boy about his family and the work that they all do – in wind farms and building motorways and bridges. Finally, the boy is lifted back into his bed by Steve where he can finally relax and go to sleep. That is because he now knows that Steve will soon end his work and the traffic will then be able to move freely again. And then his father will be able to drive to work again with no traffic jams and the family will not have to move house.

Having a crane as a friend sounds like a great children’s story. And it really is. Nevertheless, the story is based on reality – in parts at least. The LTM 1500-8.1, which is the hero of the story, belongs to the American contractor Digging & Rigging, Inc. This family-run company is based in Maryland and serves the East Coast region from its six outlets. Digging & Rigging uses the very latest technology in superbly maintained cranes. It currently operates over 30 Liebherr cranes. And Steve is one of them.

Vice President of Digging & Rigging, Jim Gregory Junior, was the person who won the order for bridge building work on the Interstate 66, which he thought would be a routine job on the main traffic route between Virginia and Washington DC. The plan was to work at night to avoid traffic jams whilst the fully equipped crane with Y guying would then be shut down during the day. It was a good plan, but it did not quite work out that way – which meant that every day commuters from North Virginia found themselves at a standstill in traffic jams.



However, they accepted the situation with humour, photographing the crane and posting their pictures of it in a Facebook group "Western Prince William Chatter". When they christened it with the name "Steve", the Digging & Rigging crew actually added a name plate.
And of course the media soon picked up on the situation. The crane caused much amusement and from within the commuter community although all of them suffered due to the daily traffic situation.

This whole thing gave Katherine Gotthardt, prize-winning author and educator, the idea of writing a children's book about Steve. "When I saw the memes, the sheer creativity and the fun, I was enthralled. Who would have thought that a crane could bring us together, particularly in traffic? Then I thought that Steve would be the perfect character as a star in a children's book. So I contacted Patrick King from imagine, a design company in Manassas. He liked the idea and agreed to do the illustrations.

What is the story about? Well. We live in a transitory area with lots of military families and people from all over the world. Lots of them have to move frequently and put up with traffic problems. So in my book the family fights against both and the child is also affected by them. Steve then comes to the rescue – an understanding new friend who is also a fascinating crane with a story all of his own.

Katherine Gotthardt, author

When I was writing the story, I did not know how personal it would become. I didn't find that out until a book signing session which was attended by the crew's family members. A boy came up to me with his mother and said

it was as if I had written his story. This touched me a great deal and I felt blessed because my work had a meaning for people."

On the day that Katherine Gotthardt told Digging & Rigging about her plans, Jim Jr. was initially surprised. "But I immediately understood the idea. And as we knew a few stories about our 500-tonne crane "Steve", we wanted to help. We also decided to give a little back to the community here is the locals had actually created the story. So we agreed with Katherine that the proceeds from sales of the book will be donated to local charitable organisations."

The book is available in the internet in English in paperback form or e-book (A crane named Steve, ISBN 9781707812257).

We hope you enjoy reading it.

Woman power in the construction world

In the past, construction has always been dominated by men. But nowadays, it is not just men's hearts which beat faster when they see an impressive construction or heavy haulage machine. Today, women are playing an increasingly important role in the construction sector – from crane operators to company owners.

American crane and heavy haulage contractor, Stevenson Crane Service Inc. from Illinois is a shining example of this. Not only is it one hundred percent woman owned, it is also managed by women. Donna Stevenson is President and owner of the company and has been a Liebherr customer for many years. For this LinkedIn article, we chatted to her not only about the next delivery, but also about courage, motivation and success.

Mrs Stevenson, tell us a little about the history of your company. When and how did everything start?
We have been in business since 1989, with one 35 ton crane parked in our driveway. At that time, my house was worth 60,000 dollars and my house payment 250 dollars per month. The first crane cost 273,000 dollars and the payments were 3,472 dollars per month. As we had no credit for a purchase like this, we had to put the house as collateral and pay 12.5 percent interest. Needless to say, there were many sleepless nights.

Stevenson Crane, Rigging & Heavy Haul
3,091 followers

Not only are we woman-owned, but we are also women managed! A Salute to our Women in Construction!

From top left clockwise:
Elena Stevenson – Aerial lift Organizer
Stefani Angone – Project Account Manager
Julie White – Director of Human Resources
Kristi Stevenson – Director of Rigging & Heavy Haul
Christine Ashley – Corporate Director of Parts & Service
Joanna Stevenson – Project Account Manager
Nicole Miller – Project Account Manager
Lisa Clusserath – Project Account Manger
Malissa Hoffman – Senior Receivables Manager
Kris Laib – Project Account Manager
Donna Stevenson – President
Jackie Kruse – Senior Payable Manager
Rosie Shapiro – Director of Equipment Dispatch
Jaime Mahoney – Executive Administrator, Parts & Service
Paula Slipke – Office Manager (not pictured)
Kristina Basarich – Receptionist (not pictured)
Katy Vodicka – Director of Social Marketing (not pictured)

284 · 18 Comments

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Currently, we have over 1,100 pieces of equipment, with our fleet centered around our Liebherr cranes. We have added a rigging division with a complete line of machinery moving equipment, as well as an in-house engineering/project management team and a heavy haul division with multiple SPMT units. And yes, there are still many sleepless nights!

How many Liebherr cranes do you have in your fleet?
We own 25 Liebherr cranes from our LTC 1050-3.1 up to our LTM 1500-8.1.

What types of crane work do you and your team take on?
Steel mills, petrochemical, transmission, utilities, infrastructure and the "daily rentals" such as HVAC, transformers, setting bar joist, steel, etc. We try to keep our market varied. With the addition of our rigging and heavy haul services, a licensed engineering staff, and SPMT's, we have become a "turn key" contractor.

How many people do you employ in your company?
We have 66 working in the office, sales and the workshop and 22 in the warehouse. We also have 140 unionised employees who are members of the "International Union of Operating Engineers and International Association of Riggers, Machinery Movers & Machinery Erectors".

And what proportion of women do you have in your company?
We currently have 46 staff in our administration department and 23 of them are women. Our women hold management position such as Lead Dispatcher & Field Coordinator, Director of Accounting, Director of Rigging Operations, Human Resources Officer, Director of Finance, Office Manager – one at each location-, Corporate Director of Parts & Service, Purchasing Manager ... and of course I am the President. We also have eight female crane operators on our workforce.

Are women superior to their male colleagues in some respects?
Definitely. I have found that women have a good eye for detail. They notice fine elements that would otherwise be overlooked. Women also seem to have an infinite skillset for leadership, efficiency and compassion. Perhaps our upbringing to nurture, be organized and be caregivers is exactly what makes women great business people.

Donna Stevenson,
President and owner of Stevenson Crane Service Inc.

What challenges have you and your female colleague been faced with in a crane industry dominated by men?
When I started my company 31 years ago, it was the first crane company to be fully woman owned and operated. Whilst we were not accepted by everybody at the start, people around us soon got used to having women on site.

How were you able to change these attitudes?
We invest a great deal in training. Our workforce are all well trained and receive good induction training as well, including crane work, rigging and heavy haulage. That enabled us to establish a good reputation.

Do women benefit from men wanting to be "gentlemen"?
I don't see that. Our colleagues on site are real professionals who know their job and long ago threw off the old stereotypes of building workers. They are courteous and respectful – as long as the people they are dealing with are also competent.

Entertaining and amicable – a perfect description of our chat with Donna Stevenson in Illinois. We also appreciate women in engineering, quality assurance, sales and administration. And the best thing about it – they are increasing all the time.

Fascinated by cranes, inventive and courageous

How a letter from a 12-year old led to a telephone call with our Technical Director:
Our cranes encourage technically minded inventive people from all over the world to send us letters and ideas. And, with all Swabian humility, we are delighted to receive them. We received a very special letter and drawing a few weeks ago from Switzerland.

My name is Tim Neuenschwander, I am 12 years old and live in Utzenstorf. My uncle works at Toggenburger and I am often allowed to go with him to work with his crane. This experience has made me fascinated with mobile cranes. As I like drawing and designing, I decided to develop my own mobile crane. I worked on it for a long time and now it is ready. I had the idea that the cab and arm of the crane could be stowed inside the vehicle. This design would reduce the height of the vehicle and the crane would then be able to drive through low underpasses. I hope that my idea will help you to make Liebherr cranes, which are already good, even better.

Best regards,
Tim Neuenschwander

We really liked the letter and it contained a revolutionary idea – lowering the telescopic boom and the cab into the crane chassis. In other words, it was not just another cosmetic facelift, but a genuinely new concept. And you know what? These are exactly the people we need – fascinated with cranes, inventive and courageous enough to present completely new ideas.

Crane designs are a thing for the boss

So it will not come as a massive surprise that we decided we had to meet this young man. And since crane designs are a thing for the boss at Liebherr, our Technical Director, Dr Ulrich Hamme, decided to discuss it personally with Tim – on Skype to maintain the social distancing required in these strange times of the coronavirus.

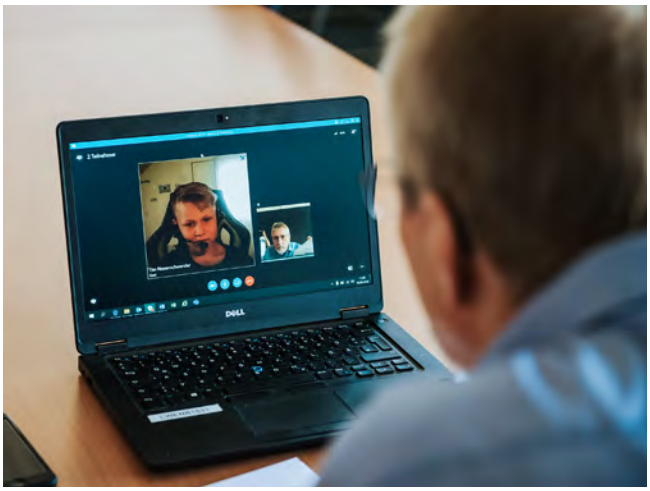
Tim the crane fan was clearly delighted to receive a call from Ehingen. In fact, Tim knows a great deal about mobile cranes and accurately identified that compact dimensions are extremely important in practice. Dr Hamme confirmed this to him during their conversation. But he also told Tim: “Your idea presents our design team with some very big challenges. The chassis is full of essential components such as the engine, gearbox, outriggers and, of course, the structural steel components. What is more, the slewing ring, which guides the forces from the boom and turntable into the chassis, is right in the way.”

So it appears that it is, as yet, impossible to turn Tim’s crane concept into reality. But we would never say never. And there have always been people who have had ideas which were ahead of their time.

“Tim, we need advisers like you who always think about what could be done better. And who are not afraid of suggesting something which in practice might not be possible. Keep doing it and also keep asking your uncle how we could make his workplace better. Sometimes it is the little things that make a big difference”, is how Dr Hamme encouraged the young crane designer.

A passionate fan of Liebherr cranes: Tim Neuenschwander

And what does he want to be when he grows up? “Car designer, logistician or perhaps a policeman!” Well, this is one versatile young man who has plenty of time to make a decision. However, we already hope that he decides on the crane industry and comes up with plenty more courageous ideas. All the best Tim!



A meeting of minds: Dr Ulrich Hamme and Tim Neuenschwander deep in conversation.

Much more than just a drawing: Tim’s thoughts on the crane of the future.

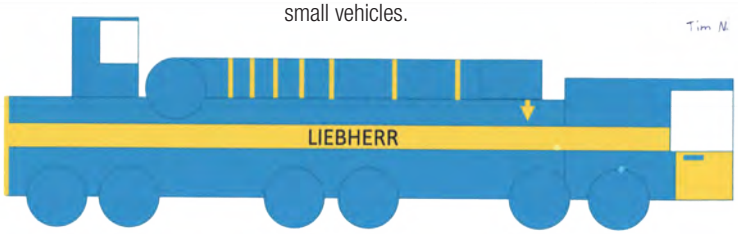
- The arm and cab are lowered into the space and when the arm and cab are raised again, it looks like a normal crane.
- It is all operated using a remote control.
- Drive engine: 8-cylinder engine
- Performance: 450 kW
- Top speed: 85 km/h

Front

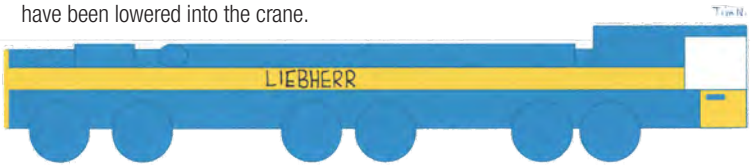
Rear

It’s a Liebherr crane

There’s also a ramp at the rear which enables it to transport small vehicles.



And this is what the crane looks like when the cab and arm have been lowered into the crane.



Singapore – high tech in the glittering metropolis

Cranes in the land of superlatives

During the 1980s, the Liebherr Plant in Ehingen took its first major steps in the process to transform itself from a reasonably sized crane factory to a global player with pioneering mobile crane technology. During the same decade, the smallest of the four so-called Tiger economies, Singapore, took a massive leap forwards and became a significant financial centre for world trade. In summer 1989, our dispatch department placed a sheet with the shipping mark "Singapore" behind the windscreen of a mobile crane for the very first time. Today, more than three decades later, the ports in this modern trading metropolis are an important handling station for sales of our cranes in Asia.

The delivery of a used LT 1300 mobile crane 31 years ago marked the start of a thriving business relationship with Singapore, a city state in South-East Asia, which may be small geographically, but is nevertheless a very important financial centre. At the same time, this transaction also marked the start of a trading route for Liebherr cranes being exported to Asia, which has become an extremely busy one. That LT 1300, which by today's standards had a rather angular design, featured eight axles with a lifting capacity of 300 tonnes and was shipped to Singapore from the port of Hamburg. Goldbell Engineering, the buyer at the time, is actually still active in the commercial and industrial vehicle market.

The most powerful Liebherr mobile crane in Singapore too – massive reinforced concrete beams on the hook of the Hiap Tong Corporation's LTM 11200-9.1.

Seven years later, an LTM 1160/2 was the first brand new crane to be delivered to Singapore. Since that time, Liebherr has acquired a whole host of new customers. In total there are currently around 150 mobile cranes, including the LTM 11200-9.1, from Swabia driving around the deep urban canyons of the metropolis.

Lots going on in a small area

The island and city state of Singapore, located to the south of the Malayan Peninsula and to the east of Sumatra, is just less than half the size of the city of London, measuring a little over 700 square kilometres in area. The Republic consists of a peninsular and around 60 small islands with a population of around 8,000 per square kilometre, making it one of the most densely populated countries on Earth. Perhaps the following, almost incredible, comparison demonstrates just how dense the population is – the country is around four times the area of

Elegant industrial structure – Bok Seng Logistics' fleet also includes the LTM 1750-9.1.

Night shift – an LTM 1750-9.1 setting up a site for a massive tunnel project in the mega city, which is designed to collect the rainwater from the metropolis at a depth of 60 metres. Peck Tiong Choon Leasing operates 16 Liebherr cranes in Singapore.

Ehingen's 180 square kilometres but has a quite astonishing population of 5.7 million people.

The importance of Singapore for global trade became apparent in the mid-19th century, under the colonial rule of Great Britain, as a result of its strategic location on the shipping routes between China and Europe. With one thousand berths and several thousand anchorages, the island is one of the busiest ports in the world in terms of tonnage and goods handling. The South-East Asian country handles more goods in sea ports than anywhere else on Earth.

"Although it is a small country, it is extremely important to us from a logistics point of view", says Marcel Beck, who is responsible for sales of mobile cranes to the Asian market from his Ehingen base. "Around half a dozen machines are sold direct to Singapore every year" says Beck, "but we also send the majority of shipments to the South-East Asian market via the hub that is Singapore. Over the last fifteen months we have transferred 21 machines to Thailand alone through Singapore". Whilst the first LT 1300, as mentioned above, was shipped from Hamburg, today mobile cranes start their sea journey from the North German port of Bremerhaven. And they are then unloaded around four weeks later – almost exactly 10,200 kilometres from Ehingen as the crow flies.

Marcel Beck supports sales of mobile cranes in Asia.

Fantastic view – an LTM 1100-4.2 the ready to install an external staircase on the flat roof of the building. The green crane belongs to Kim Soon Lee.

Liebherr Singapore – hub, service centre & spare parts warehouse

Lots of transport and logistics service providers also require local personnel and expertise. Liebherr-Singapore Pte Ltd (“LSI” for short), a sales and service centre, is located in the west of the city. A total of 240 personnel from almost all Liebherr Divisions are grouped together in separate organisations under the LSI banner, taking care of sales and service for ASEAN territories. They provide services for a large number of business partners and support for customers looking for complex solutions to their project problems. Furthermore, our outlet is used as a customer service centre with an adjoining spare parts warehouse. Service deployments in the region are coordinated from Singapore with the support of engineers from the Liebherr service outlet and partners in the local countries.

Modern metropolis – the LTM 1750-9.1 from Moh Seng Cranes hoists air conditioning units onto an industrial building.

The images shown here provide a short optical foray into the scenario and to the jobs carried out by our cranes in Singapore. They were taken for us by Eric Konijn, a young man from the Netherlands. Even as a child, he was interested in heavy haulage, special construction machines and mobile and crawler cranes of all types. “The whole thing started for me at the age of nine”, he remembers. When he was a teenager, Eric often sent us his fantastic crane photographs from the Netherlands. Some of them were even used on our large wall calendars. He is a mechanical engineering graduate, still obsessed by construction sites, and has been living in this small Asian country for around a year, working as a project manager. This gives the passionate crane spotter plenty of opportunities to put a crane in front of his camera lens whilst he is at work. “And often”, he says, “they are from Ehingen.”

Crane spotter – Eric Konijn, a Dutch mechanical engineer, has photographed Liebherr cranes for us on Singapore’s building sites. Thank you very much!

Safe to use even in high winds – new lifting capacity tables reduce downtime

MyTip

The Structural Engineering Department at Liebherr has a leading role to play. A 10-strong team led by Joachim Henkel work on finding the perfect steel structure for Liebherr cranes. They also develop ideas and methods to make crane jobs safer and more efficient. Joachim Henkel has been working on design and development at Liebherr in Ehingen for almost 30 years. He was made head of the Structural Engineering Department in 2011.

"We cannot direct the wind but we can adjust the sails ." When Greek philosopher and nature researcher Aristotle said this in the 4th century BC, it is doubtful that he was thinking about cranes. However, there were actually simple machines around at the time which could hoist loads using pulleys. But the wind was certainly not the greatest challenge they faced.

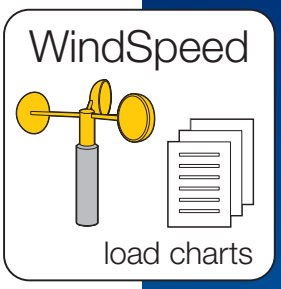
The wind is now a major factor for crane jobs as hoist heights and the areas on loads exposed to the wind have increased. The wind can be both a blessing and a curse when erecting wind turbines at high altitudes and in stormy areas – although it drives the turbines, it makes their erection and maintenance much more difficult.

> "The new, additional lifting capacity tables enable you to use your crane times."
>
> Joachim Henkel, Head of Structural Engineering

But if we cannot direct the wind, we must make our machines ready and stable for stormy days. We have managed to do this by preparing new lifting capacity tables involving higher maximum wind speeds. To date, these tables have been used with some of our lattice boom cranes. But now they can also be helpful with some of the more recent LTM models. And you benefit by reducing downtime and increasing profitability, planning reliability and safety.

The lifting capacity tables for cranes generally apply in gust speeds of up to 9 m/s (20 mph) at the top of the boom head with an area exposed to the wind (including cw value) on the load of 1.2 m^2 per tonne. This is the specification set out in the standard with which all our competitors also have to comply. The calculated wind load from these figures is 50 Newtons per square metre – which corresponds to a windy day with swaying treetops and some foam forming on the sea.

To ensure that you can continue to work safely in even higher wind speeds, we have calculated the lifting capacity tables for additional maximum wind speeds and programmed them in the crane control system. For the LTM 1450-8.1 and LTM 1650-8.1, it is 11.2 m/s (25 mph) and 13.4 m/s (30 mph) if lattice equipment is being used. In pure T mode, the tables even allow for a speed of 15.6 m/s (35 mph). In other words, our additional lifting capacity tables enable our cranes to stand firm like a rock in the surf even when the sea has a reasonable swell.



If the wind speed measured on the crane's boom during a job exceeds the set table wind speed, the crane operator can simply switch to a lifting capacity table with a higher maximum wind speed so that ideally he can continue the crane work.

In fact, higher wind speeds do not always mean that lifting capacity has to be reduced. As many factors are involved, our structural engineers produce precise calculations.

You, the customer, benefit by having the maximum performance of your crane available to you at all times.

And, in fact, there is another benefit provided by lifting capacity tables with a higher maximum wind speed – as mentioned above, the wind speed set out in the lifting capacity tables applies to a load area exposed to the wind of up to 1.2 m^2/tonne. If the load area is greater than this, the wind speed must be reduced. The wind speed calculator in the LICCON job planner will complete this calculation. And as the wind speed specified in the lifting capacity table is used in the calculation, there are benefits by selecting it as high as possible so that the job can be completed.

So with that in mind, we wish you safe standing always.

Stormy greetings from the Structural Engineering Department!

An LTM 1450-8.1 is installing cables for a concrete tower at a hook height of 100 metres.

The world with Liebherr

“We certainly don’t want growth at any price.”

Dr. h.c. Isolde Liebherr, Dr. h.c. Willi Liebherr, Stéfanie Wohlfarth and Jan Liebherr look back at a successful financial year. In an interview, the family shareholders provide an insight into how business is going, important milestones and challenges for the company.

From left to right: Jan Liebherr, Stéfanie Wohlfarth, Isolde Liebherr and Willi Liebherr

Mrs Liebherr, you and your brother usually review the previous financial year. Today, for the first time, the four of you are here to answer our questions. How did this come about and what signal are you hoping to convey?
Isolde Liebherr: The Liebherr Group has been led by the second and third generation of our family for many years. Some of our children, nieces and nephews have been members of the administrative board of Liebherr-International AG since 2013. All fundamental issues regarding the management of the business are decided on jointly. This is why we agreed to also officially review the company’s performance together. This year, Jan and Stéfanie represent the third generation, so that’s why there are four of us.

Shall we now take a look at the previous financial year? In 2019, the Group achieved turnovers of € 11,750 million, breaking the record for the third year in a row. How do you view this performance?
Jan Liebherr: Turnover increased by 11.4% last year. Diversification has been one of the key factors behind our dynamic growth. It shows that our versatile product portfolio has put us in a strong position because it ensures that we do not rely on the performance of individual business divisions. What’s more, it shows that our customers are satisfied with our products and services. After all, our core objective is to ensure our solutions provide genuine added value.

This kind of growth would never have been possible without our customers. We are particularly pleased that turnover has increased across all divisions.

How have the individual regions performed?
Stéfanie Wohlfarth: We experienced significant growth in Western Europe and North America. Sales growth was particularly strong in established industrialised nations, such as Germany, the USA and Canada.

Jan Liebherr: We are also seeing growth in the large emerging economies. For instance, turnover rose in Brazil, India, China and Russia. Brazil's economy is continuing to recover. The refrigerator and freezer factory we opened in India in 2018 is proving to be another driver of growth. China's national economy has now become more stable and mature. As a high-quality manufacturer, this presents us with more opportunities than ever before, which is why we are continuing to invest there. And of course, Russia has traditionally been a very important market for us.

What are your views on the operating result?
Isolde Liebherr: We are pleased on the whole. However, we anticipate that the large investments we have made over recent years will be more clearly reflected in our future results.

What were your highlights and key milestones during 2019?
Jan Liebherr: It has to be Bauma, the world's leading trade show for construction machinery. I am still receiving a lot of positive feedback about Liebherr's presence at the show and the product innovations we showcased there. For example, our generation 8 crawler excavator, our ETM series electric truck mixer and the LB 16 unplugged, the world's first battery-powered rotary drilling rig. I think our products left a lasting impression on our visitors.

Stéfanie Wohlfarth: Seventy years ago, my grandfather Hans Liebherr filed a patent application for the TK 10, the first mobile tower crane. We marked the anniversary of this event shortly after Bauma 2019. It felt very emotional at Bauma to see all the things that have been developed in the seventy years following his first invention. Our tower crane division achieved an important milestone with our new fibre rope which is an excellent alternative to conventional steel rope. It weighs less, so it can lift heavier loads and it is also more durable.

Isolde Liebherr: Bauma is naturally a standout event for all of us. However, the commissioning of the TCC 78000 heavy-duty gantry crane in the Port of Rostock was also a special highlight for me. This 164-metre crane has become a real landmark for the city. The Port Equipment business has been performing very well overall in recent years. We are market leaders for mobile harbour cranes and there is high demand for our container cranes produced in our factory in Killarney.

Our factory in Nenzing can also look back on a successful year of business. Sales of hydraulic rope excavators and deep foundation machines were particularly pleasing. The specialist expertise we have developed in the attachment tools business is also being very well received in the marketplace.

Willi Liebherr: I was also very inspired during my visit to the Paris Air Show, which is the world's largest aerospace exhibition. We received a number of awards in Paris, including some from Airbus and Embraer. Our systems for the Boeing 777X were on show during the event. We also showcased the Celsineo cooling system for semi-trailers which we have recently developed with our partner Krone. This is a great innovation for temperature-controlled road freight transport.

Our latest innovations from our Mining division were another highlight for me. We have invested a great deal in the electrification of our products, with the R 9200 E electric mining excavator and the T 236 diesel-electric mining truck being notable examples. These machines are driving forward our efforts to achieve the 'zero emissions mine'.

I would also like to mention mobile cranes as we have also set a new sales record in this division. However, I believe our latest innovations are even more noteworthy, such as the prototype of the new LTM 1650-8.1 heavy-duty crane or our other solutions, which enhance work safety. This includes our numerous assistance systems and a remote control system that makes it possible to control a mobile crane from outside the vehicle.

Jan Liebherr: Our Components division has performed very well and third-party business has also grown. This shows that the investments we have made over the past few years are starting to pay off. We have continually developed our diesel engines and injection systems in recent years and are now offering new models. In addition, we are working on developing even lighter components. The development of a cylinder partially made from CFRP has laid solid foundations for our research. We are now field testing the first prototypes and are very proud of our efforts.

Stéfanie Wohlfarth: We have also achieved good results in our refrigeration and freezing segment. We exceeded the one billion euro mark for gross sales for the first time. Another important milestone was the opening of our customer centre in Ochsenhausen. For Gear Technology both the EMO Hannover, the leading industry trade show, as well as integrating gear measurement technology into our portfolio were certainly real highlights. The division will be able to offer comprehensive processing solutions for gearing in the future.

What were the challenges last year?

Stéfanie Wohlfarth: A group of companies offering such a diverse product portfolio faces a multitude of challenges. We had to engage with the issue of materials procurement across all divisions. This wasn't easy, especially in view of our rate of

growth. We discussed the matter at length with our suppliers, had to streamline deliveries more tightly and coordinate operations even more efficiently.

Willi Liebherr: Issues such as Brexit and the trade war between China and the USA received a great deal of media coverage during the year and have caused uncertainty. However, we have still managed to grow by nearly 12% in spite of this. This proves to me that we are generally able to withstand these kinds of events relatively well.

Which challenges do you think are going to arise over the long term for the Group?

Jan Liebherr: We need to ensure that we continue to be a driver of innovation. The Liebherr name is synonymous with cutting-edge technology and this should remain the case in our ever rapidly changing world. Our technologies are extremely diversified. We have an incredible amount of expertise and we are able to establish trends. It's important that we maintain this position. Our challenge will be to coordinate our activities across the different areas centrally and to leverage greater synergies than before.

Stéfanie Wohlfarth: With all this in mind, it's important that we continue to focus on our customers. We need to continually ask ourselves who our customers are, what they need and which markets they are operating in. In turn, we need to always have the right answers to these questions. This is a huge challenge in terms of the many industries and countries we operate in. The pace of change and volatility which characterise today's markets may tempt us to make quick, ad-hoc decisions. However, it's important to maintain a broad perspective and to proceed with a steady hand. We aim to continue managing the business in a sustainable and balanced way and to support steady growth. We don't believe in growth at any cost.

Finally, please could you provide us with your outlook for the current financial year?

Willi Liebherr: Before the occurrence of the corona virus, we assumed stable turnover for the 2020 financial year. In the meantime, we have to expect a decline in turnover due to the pandemic. We are able to rely on our key strengths at this time, which include our financial autonomy, decentralised corporate structure and broad product portfolio that is structured according to country and market. The Liebherr Group is well positioned to overcome the challenges we will face during and after the coronavirus pandemic.

Find out more:
www.liebherr.com/annual-report

“E” makes all the difference

For two years, the engineers and developers at Liebherr-Mischtechnik GmbH have been tinkering around to help create the emissions-free construction site of the future. At Bauma, they did not only showcase the first electrically-powered truck mixer that is comparable in performance to a diesel one, but also presented solutions that had previously been regarded as impossible.

The central console in the driver’s cabin is a complete mess. There are cables lying all over the place, tiny lights flashing and jacks waiting to be connected to laptops and other mobile computing devices. The whole thing is more reminiscent of a server room than the workspace in a truck mixer.

Tinkering in the test hall: Alexander Pifko, E-Mobility Project Leader, and Andreas Scherzinger, Mobile Electronics Developer

At the test hall at Liebherr-Mischtechnik GmbH in Bad Schussenried, there is a high demand for complex electronic measurement technology – all the more so when it comes to designing innovative construction machinery for use in high-emission city centres and giving it emission-free status. The innovation in question? The electric truck mixer.

For more than two years, a team of developers lead by Gerhard Zenner, the Head of Engineering and Development at Liebherr-Mischtechnik GmbH, has been refining the new ETM production series “It certainly wasn’t easy,” recalls Gerhard. “Unlike the car industry, applying electronic technology in construction site vehicles is completely uncharted waters – our work is really pioneering.”

At this point, it’s worth thinking back to how we got here. Gerhard’s team was given the task of combining the advantages of two driving technologies – and to work out how to fit them into the same amount of space, with the same axle load distribution. “These types of products aren’t already out there, waiting to be used”, says Alexander Pifko, the e-Mobility project leader in Gerhard Zenne’s team. “And what’s more, many devices that function in an indoor industrial setting cannot cope with tough outdoor working conditions, where the power electronics are constantly exposed to adverse temperatures and weather.” Given the challenging outdoor requirements, some e-pioneers were hesistant when it came to collaborating on a project like this.

Eventually, the engine technology and chassis construction experts from ZF Friedrichshafen came on board for this demanding project, despite all its unknowns. “It was actually a stroke of luck for both parties,” Gerhard assures us. Their joint objective was to build a plug-in hybrid with an electric drum motor, generator and battery – with the right power conversion technology and hot and cold temperature management for the battery. Furthermore, it was only possible to add approximately 750 kilograms of extra weight, so that the whole vehicle including its lightweight drum would have a total weight of 4.1 tonnes.

Gerhard Zenne, Head of Construction and Development of Mixer and Truck Mixer Technology at Liebherr-Mischtechnik GmbH

“During the development process we learned a lot from each other in a relatively short amount of time, both individually and as a team. And now we are ready to present our ETM as a production-ready model at Bauma,” says Gerhard, proudly. One particular challenge was to make the battery the right

size. “We needed special temperature management. To deliver power immediately, at any time, for example in the depths of winter, the battery has to be at its operating temperature, which can only be done if it is kept at a constant temperature. We even found a solution for that,” explains Andreas Scherzinger, a mobile electronics developer at Liebherr.

To keep the truck mixer agile and manoeuvrable on the roads with suitably short wheelbases, the constructors managed to integrate the battery behind the rear drum support unit. This also provided the 32-tonne vehicle with an optimal axle load.

There are lots of benefits to having an electric motor when using the truck mixer. “Noise pollution and harmful emissions are significantly reduced. And unlike hydraulic systems, an electric motor can achieve a minimal rate of rotations which reduces wear on the components.” Apparently, it can even transport and mix stiff category F1 and F2 concretes without any trouble.

As a plug-in hybrid, the battery can be charged either by the diesel-powered generator or by plugging it in to an electrical outlet. “During a typical 30-minute drive to a construction site, the diesel-powered generator charges the battery. When the drum is being filled at the concrete factory, power is supplied by plugging it into an electrical outlet, either at 22 kW or a supercharged 50 kW,” explains the project leader Alexander. Thus, with an average of six journeys from the mixing factory to the construction site and back, there are a total of 12 charging cycles. “That’s an optimal charging system which supplies permanent power”. And since Liebherr has already agreed a system voltage of 650V/DC with the vehicle manufacturers, it is already future-proof.

For fleet managers, operating costs are just as important a consideration. “Despite a slight increase in diesel consumption by the generator, the e-truck mixer boasts overall fuel savings of about 30 percent,” calculates Gerhard Zenne. After all, there is no longer a need for a diesel motor to rotate

the mixing drum at the mixing unit or the construction site, as the energy is supplied entirely by the battery. “It’s a fantastic base to build on for the future.”

Since its premiere at Bauma, the ETM has successfully completed a number of assignments on construction sites. In addition, the first electrically-powered truck mixer with an e-chassis from Futuricum is to be used in Switzerland in autumn 2020.

Find out more:
www.liebherr.com/
e-truck-mixer

Cheers – 50 years of Liebherr in the USA

Put the champagne on ice – this year Liebherr is celebrating its 50th anniversary of opening for business in the USA! Since the foundation stone was laid in 1970 in Newport News, a strong company with 14 outlets has developed, a production site for the legendary giant mining trucks and a total workforce of over 1,300. Here's to the next 50 years!

In 1970, Hans Liebherr took the plunge to expand overseas and had two production halls for hydraulic excavators built in Newport News, each with a floor area of around 28,000 square metres, as well as an office building. Demand was higher than expected – the first full year of production saw 145 excavators being completed. During the 80s, Liebherr invested in additional sites. Other divisions followed – Maritime Cranes, Mining, Concrete Technology, Components and Aerospace all conquered the United States of America. The Gear Technology and Automation Systems division opened for business at Saline in 1986. A few years later, Liebherr Aerospace also moved to this location and developed into the largest repair business in the Liebherr Aerospace world. Liebherr Mining Equipment is now building the largest and most powerful mining trucks in the world at Newport News for the global mining industry.

In 1971, Liebherr-America opened with hydraulic excavators, crawler tractors and tower cranes in its product range.

Two LR 1300 crawler cranes were the first cranes from Ehingen to reach American soil in 1978. These power packs were the very first crawler cranes built in Ehingen and were the largest cranes on the market at the time. They enabled the Mobile and Crawler Crane Division to gain a foothold

Prototypes and special products are developed and manufactured in Newport News

in the USA. In 2016, Liebherr consolidated its various companies by forming a new sales and service company – Liebherr USA, Co. which is responsible for the sales and service of nine product lines – Earthmoving, Mining, Deep Foundation Equipment, Mobile Cranes, Tower Cranes, Concrete Technology, Maritime Cranes, Components and Domestic Appliances.

The anniversary year of 2020 had a great start. The USA is now the largest export market in terms of revenues from Ehingen! In the USA, Liebherr USA, Co. marked a milestone this April – the company formally moved in to a newly expanded campus. The facilities house employees who work in administration, finance, human resources, sales, information technology, marketing, product support and distribution for the nine different product units. The $60 million project adds more than 23,000 square metres to company's existing campus and includes state of the art office building, warehouse and equipment repair and maintenance workshop. The most important construction machinery trade show this year, the Conexpo show in Las Vegas, started at the beginning of March with Liebherr's slogan "50 years – UNITED by success". Despite the COVID-19 pandemic, the rain on the first day of the show, and the last day being cancelled, traffic remained strong and our Liebherr team greeted over 80,000 attendees throughout the four days of the show. We will nevertheless be flying the flag and maintain our presence as a strong company for our customers and partners in the USA.

Liebherr company site in Newport News

The original crawler crane from Liebherr

The Liebherr Group supplies a wide range of high quality products and services. Company founder Hans Liebherr laid the foundations for this successful concept by diversifying his company at an early stage. The start of each product line was marked by courage, creative spirit, confidence – and a concrete idea. The idea of the crawler crane is now more than 40 years old.

At the time, the largest energy generation company in America, the Tennessee Valley Authority (TVA), was looking for two crawler cranes to build nuclear power plants. The Liebherr plant in Ehingen was still in its infancy at the time and did not include crawler cranes in its product range. However, the two companies were very interested in working together. Rudolf Becker, the Managing Director in Ehingen at the time, decided to travel to the USA in person. Demonstrating a great deal of commitment and expertise, he convinced TVA to purchase its crawler cranes from Liebherr, even though there were no such things at the time! His vision was to develop a new crawler travel gear and modify the superstructure from the existing LG 1300 lattice boom mobile crane and build on it.

The engineers at Liebherr went to the drawing board, refined the ideas and developed the LR 1300 V – what could be called the original crawler crane from Liebherr. Liebherr Ehingen produced a total of exactly two LR 1300 V cranes and supplied both of them to the TVA in 1978.

On the Liebherr test site in Ehingen in 1977 – LR 1300 with and without derrick system.

The LR 1300 V has three claims to fame: It was our first crawler crane. It was the most powerful crawler crane of its day. And it was also the first Liebherr crane from Ehingen to be sold to the United States of America!

As part of the celebrations marking the 50th anniversary of Liebherr in the USA, we wondered if we could find out what had happened to these special vintage cranes. And just look – we found Big Al.

On the trail in land of Dixie

But from the very outset. The LR 1300 V was an outstanding crawler crane at the time. Liebherr designed a monster crane specially for building nuclear power plants, with the V in the name standing for the added power version, whilst the LR 1300 was the standard version – in addition to the existing 105 tonnes of superstructure ballast, the LR 1300 V also had 950 tonnes of derrick ballast on a rail-bound ballast trailer with a 31.5 metre derrick boom. This enabled the full potential of the crane to be used – increasing its maximum lifting capacity from 300 to 585 tonnes. In this configuration, the TVA used the two large cranes for construction and maintenance work over a long period of time.

After several years in the service of the TVA, one of the two cranes was eventually bought by Barnhart Crane & Rigging in 1987. Paul Reynolds, Branch Manager at Barnhart, thinks back with a frown: “The crane was in poor condition. We did a great deal of work on it over a period of several months. Rodents had badly damaged the electrical systems, which meant that we had to replace them in full. But finally, it looked like new!” The crane owner called the heavy duty crane LR 1700 and used it to dismantle a nuclear power plant in Tennessee. The Liebherr crane then worked on the company’s own equipment storage facility until it was sold to China due to a

lack of work orders for it. And this is where the trail runs cold.

Lost and found – Big Al

But this is not the end of Paul Reynolds' story. In 1994, the TVA bequeathed the second LR 1300 V to the US State of Mississippi. In turn, Mississippi gave the crane to ship repair contractor Moss Marine. Paul Reynolds takes up the story: "Moss Marine asked us to dismantle the LR 1300 V and transport it to Moss Marine's shipbuilding site. Once we got it there, we reassembled it in full and prepared it for action." A good ten years later, when the crane had reached the grand old age of 27, Moss Marine offered to sell the LR 1300 V to Barnhart. "We are proud to have bought this brilliant, unique crane in 2005 after which we refurbished it at great length. Our engineers repaired the hydraulic system, completely refurbished the crane control system, replaced all the relays and circuit boards and replaced them with a modern PLC", says Paul Reynolds. The crane, known at Barnhart as the LR 1700, then completed several spectacular heavy duty hoists throughout the country. But unfortunately, the mobility costs of the old crane were relatively high.

But like a chameleon, this piece of crane history keeps on adapting to new situations. Since 2009, the LR 1300 V/LR 1700 has been a fixture on a barge in the water at the deep sea port of Mobile in Alabama. It was modified so that the derrick boom could be guyed on the deck of the vessel. The floating crane is lovingly known as "Big Al". Al is short for both the State of Alabama and for Alan Barnhart. He is President of Barnhart Crane & Rigging Co.

For the last ten years, Big Al has been travelling around the waters of the Gulf Coast and up as far as Chicago, carrying out a very wide range of hoisting work involving loads weighing up to 400 tonnes. The majority of the work involves loading freight onto barges, railway wagons and heavy transport vehicles. Big Al also regularly carries out work on lock gates, bridges and quayside equipment. With over 42 years of service under its belt, Big Al is still as reliable and powerful as ever.

Still fresh after more than 42 years – Big Al on the barge at the Port of Mobile, Alabama.

LR 1300

- Max. lifting capacity: 300 t on 21 m main boom with a radius of 6.5 m
- Load moment: 2,057 mt
- 105 t superstructure ballast

LR 1300 V

- Max. lifting capacity: 585 t on 31.5 m main boom with a radius of 13 m
- Length of derrick boom: 31.5 m
- Load moment: 10,500 mt
- 105 t superstructure ballast and 950 t derrick ballast on rail-mounted ballast trailer

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