



Gottwald pioneered the back to back cab, which Grove then copied on the AT180



Grove AT180

CRANE MAINSTAY

In Europe the All Terrain crane has been the mainstay of most crane rental fleets for more than 30 years. It is easy to think it was always the case yet they only began to appear in the late 1970s and never took off until the 1980s. Until then most European rental fleets were made up of truck cranes while in North America it was a combination of truck and Rough Terrains, the vast majority less than 50 tonnes.

In the following pages we look at changes to this market which has shrunk significantly and yet in China and other regions the 25 tonne truck crane still makes up most of the rental market. So, what has changed in the West?

Economics and alternative solutions have played a role - low rental rates for two or even three axle All Terrains, combined with rising prices for new cranes undermined their financial viability. The cost of an operator which is the same for a two axle 40 tonner or a 100 tonne crane is also a factor. Alternatives include aluminium boomed truck cranes - from Böcker or Klaas - articulated loader cranes and telehandlers. Some jobs previously carried out by small ATs have also been taken over by spider cranes which can get closer to the lift and compete with larger cranes working at longer radii.

As a result of shrinking demand Grove dropped its two axle models a few years back while sales of Tadano's ATF40G-2 and Liebherr's LTM 1040-2.1 also waned. Conversely Irish company Rivertek began importing Kato city cranes into Europe, starting with the 20 tonne two axle CR-200Ri in 2015. The Kato relaunch has been highly successful, with an updated range now offered.



Gottwald AMK 45

BACK IN THE MARKET

Then Demag reintroduced its three axle AC45 City crane, while Liebherr updated its LTC 1050-3.1. More recently Tadano unveiled a new two axle All Terrain - the 40 tonne AC 2.040-1 - and we know that Grove was looking to re-introduce a two axle All Terrain this year or next, although we have no idea if this still remains a live project. Quite why manufacturers and their customers are ready to dip their toes back into the market has been hard to define. However, as the next few pages highlight, the market is now divided between two cab ATs and single cab City cranes. Their advantages over truck or loader cranes include compact dimensions as much as all wheel drive and steer.

If you look back to the birth of the All Terrain, Thomas Smith in the UK and Germany's Demag can claim to have designed All Terrain crane concepts in the 1950s, but it was Gottwald that commercialised the concept in 1966 with the AMK 45, an 18 tonne 'push-me pull-you' single cab machine. Eight years later France's PPM launched a high speed 14 tonne Rough Terrain, the 14.07 ATT - to all intents and purposes the first City crane - or a Rough Terrain crane with high travel speed and sprung suspension.

The concept of a pick & carry 4x4x4 Rough Terrain crane combined with the road manners of a truck crane has always been an attractive proposition. In Switzerland, Grove dealer Stirnimann converted 18 tonne Grove RT60S Rough Terrains into All Terrains by changing the transmission and installing a chassis cab with mechanical steering connection. The cab folded into the chassis when on site. A few years later Grove copied the



Gottwald AMK 45

Gottwald with the 18 tonne AT180, which sold moderately well but was notoriously unreliable... as were the Gottwalds.

THE GAME CHANGER

In 1977 two 25 tonne 'game changers' arrived, the P&H WS-250M based on its Rough Terrain model and built in Dortmund, Germany and Liebherr's 25 tonne LTM 1025. Both models were however also unreliable. Grove dropped the AT 180 after failing to overcome the reliability issues, and quit the AT market, only returning full force in 1995 with the Krupp acquisition.

Liebherr however, persevered and by the mid-1980s managed to overcome the reliability issues and the concept finally took off. P&H then introduced the 15 tonne Omega S-15 which also sold well - it looked right and was a handy little taxi crane. At this point all ATs had drive controls in both cabs and offered pick & carry capacities. Somewhere along the way superstructure cabs lost their steering wheels, although the city type All Terrain retains it of course. Perhaps that and the more compact dimensions are what makes them a popular alternative to small All Terrains?



Liebherr LTM 1025



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The Grove GMK3050-3 All Terrain



The Tadano AC 3.045-1 City

INDOORS AND OUT

At the lower end of the All Terrain market - 55 tonnes and below - a sharp distinction has emerged between two crane types - the classic All Terrain concept that first emerged in Germany which focuses on good road performance with off road capability, and 'city' cranes, with roots in Japanese Rough Terrain crane designs, which tend to focus on compact dimensions for tight spaces, often working indoors, Will North reports.



The Liebherr LTM 1030-2.1

Design distinctions can be seen across most All Terrain classes. At higher capacities, some cranes offer exceptionally long booms and minimal set-up for jobs such as tower crane erection, while others focus more on offering a range of configurations for the heaviest lifts. In the mid-range market, a new generation of long boom cranes has begun to push out shorter boom counterparts.

At a glance though, it can be hard to spot the difference between these crane types. That is not the case when it comes to the smaller All Terrains. The difference between a 'standard' All Terrain and a 'city' crane is immediately apparent: city cranes have a single cab and a boom that stows at a negative boom angle beside the cab when travelling.

The 'boom down' design (highlighted in the accompanying chart), and lack of a chassis cab, allows for significantly reduced carrier dimensions. For example, Kato's CR-250Rv city crane lifts 25 tonnes and has a 29 metre main boom but has an overall chassis length of just 7.31 metres. Liebherr's smallest All Terrain, the 30 tonne LTM 1030-2.1 - which dates back to 1997 with over 2,500 delivered - is a standard dual cab design, has a slightly longer 30 metre boom, but a carrier length of 8.53 metres.

On the road, a similar difference can be seen. Tadano offers two All Terrains between 40 and 45 tonnes capacity. The all-new classic two axle 40 tonne AC 2.040-1 has a 35 metre boom with an overall stowed length - including boom overhang - of 11.14 metres. Its 'city' counterpart, the 45 tonne three axle AC 3.045-1 has a 30 metre boom and an extra axle but is 2.44 metres shorter on the road and offers a tighter turning circle on the

job site or in the confines of a factory.

The geography of countries like Japan and Italy - both long and narrow, surrounded by sea and with a mountainous spine - has perhaps helped shape the designs developed by their crane engineers. Both countries have developed ranges of compact crawlers, spider cranes, small truck cranes, pick & carry cranes, and Rough Terrains that allow owners to bring lifting power into tight spaces.



The Kato CR-250Rv



Gruas Roxu lifts a Kato city crane on to a bridge in Spain



Japanese city cranes became popular, as the name suggests, for their ability to work in confined city centre job sites. In crowded cities like Tokyo, where land is expensive and developers make use of every inch of the building envelope, compact road going cranes are a vital tool in any fleet. City cranes, and their close cousins, roadable Rough Terrains, were developed for this market.

German cranes more obviously put the 'all' into 'All Terrain'. Even at lower capacities, these cranes are designed to offer finely tuned choices between roadability and taxi crane capacity. We can see this by again looking at those two Tadano cranes, the AC 2.040-1 and the AC 3.045-1 city. The two axle crane can carry 1.1 tonnes of additional counterweight within 12 tonne axle loads, or 6.5 tonne at 16 tonnes per axle. For customers in countries like the UK, which can make it easier to travel to site with all the counterweight on board.

The three axle city crane can only be configured with 10 or 12 tonne axle loadings, but with a maximum 5.3 tonnes of counterweight along with additional equipment including a 32 tonne hook block, 13 metre swingaway extension and a runner, used for reaching into confined



AC 2.040-1

low headroom spaces, as well as 400kg of additional payload. At the same axle loads, the two axle All Terrain can only carry only a 25 tonne block, 1.1 tonnes of its maximum 6.5 tonnes of counterweight and 150kg of payload, with no extension.

Over recent months, two new cranes (marked in bold in the accompanying chart) have launched in this capacity class. Both tell us something about the future of the industry. From Liebherr comes the new city type LTC 1050-3.1E, the first All Terrain crane with built-in electric lifting power, while the previously mentioned two axle Tadano AC 2.040-1, is the first crane designed by the combined engineering teams from the former Tadano/Faun and Demag facilities in Lauf and Zweibrücken.

ELECTRI-CITY

Over the past couple of years, the mobile crane industry has begun to treat the idea of emissions free lifting more seriously. On the mobile tower crane side, Spierings now offers electric carrier drive on one of its cranes, the City Boy, and both it and Liebherr offer electric lifting. In the crawler market, Liebherr, Marchetti and P-VE now offer battery electric powered travel and lifting. More recently Tadano has announced plans to build an all-electric Rough Terrain. And, since 2019, both Tadano and Kato have offered electric power pack modules for their city cranes, allowing them to perform emissions free lifts when required.

Liebherr's new LTC 1050-3.1E is the first All Terrain with an integral electric power pack, although it still has to plug into a 60 or 125 amp AC power outlet or battery pack. In some respects, it is just catching up - or leapfrogging - its rivals Demag/Tadano and Kato which have offered an electric power pack option since 2019.



Tadano AC 3.045-1 City



Liebherr's new LTC 1050-3.1E is the first All Terrain crane with a built-in electric power



Manufacturer	Model	Capacity	Type	Boom	Hook height	Emissions-free lifting	Axles	Height	Carrier length	Transport length	Width
Kato	CR-130Rf	13t	City	24m	30m	Power pack	2	2.87m	6.00m	7.47m	2.00m
Kato	CR-250Rv	25t	City	29m	38m	Power pack	2	3.29m	7.31m	9.20m	2.40m
Liebherr	LTM 1030-2.1	30t	Taxi	30m	44m	N/A	2	3.55m	8.53m	10.31m	2.55m
Liebherr	LTM 1040-2.1	40t	Taxi	35m	44m	N/A	2	3.55m	8.53m	10.93m	2.55m
Tadano	AC 2.040-1	40t	Taxi	35m	47m	N/A	2	3.60m	9.22m	11.14m	2.55m
Tadano	AC 3.045-1	45t	City	31m	46m	Power pack	3	3.18m	7.22m	8.70m	2.55m
Liebherr	LTC 1050-3.1	50t	City	36m	48m	N/A	3	3.83m	8.92m	10.42m	2.55m
Liebherr	LTC 1050-3.1E	50t	City	36m	48m	Built-in	3	3.83m	8.92m	10.41m	2.55m
Liebherr	LTM 1050-3.1	50t	Taxi	38m	54m	N/A	3	3.79m	9.26m	11.83m	2.55m
Manitowoc	GMK3050-3	50t	Taxi	40m	51m	N/A	3	3.77m	8.77m	12.19m	2.55m
Liebherr	LTM 1055-3.2	55t	Taxi	40m	56m	N/A	3	3.70m	9.47m	11.35m	2.55m
Tadano	AC 3.055-1	55t	Taxi	50m	54m	N/A	3	3.61m	9.33m	11.50m	2.55m

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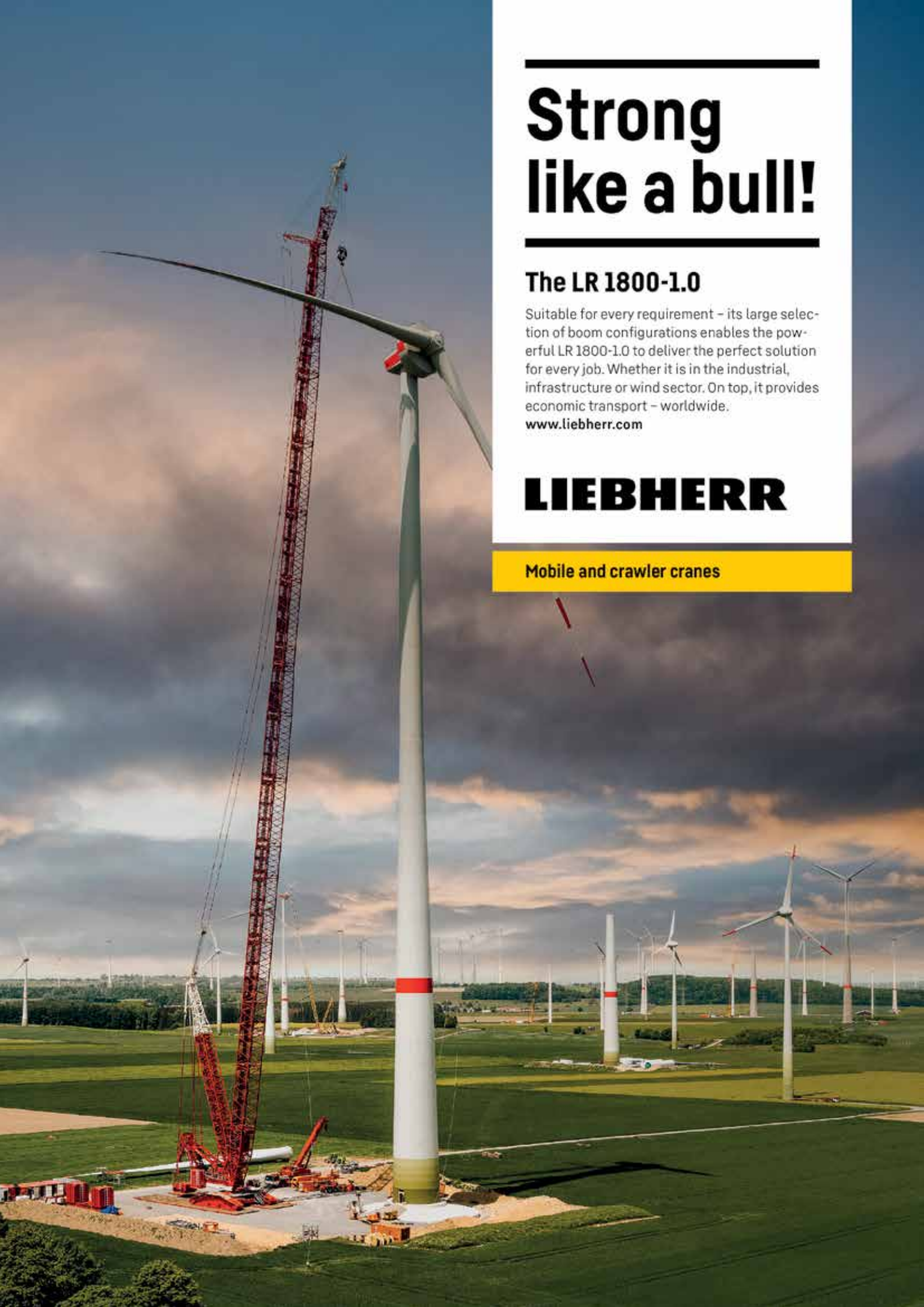
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The approach for both power packs is similar. The crane must be specified for use with a power pack when ordered. This allows the hydraulic connections needed to be built into the crane. The power packs contain the electric motor, hydraulic pumps as well as a battery. The power pack can be unloaded by the crane itself or on some models even travel on board. Once coupled to the crane's hydraulic system, the electric motor replaces the crane's on-board diesel to power the crane functions.



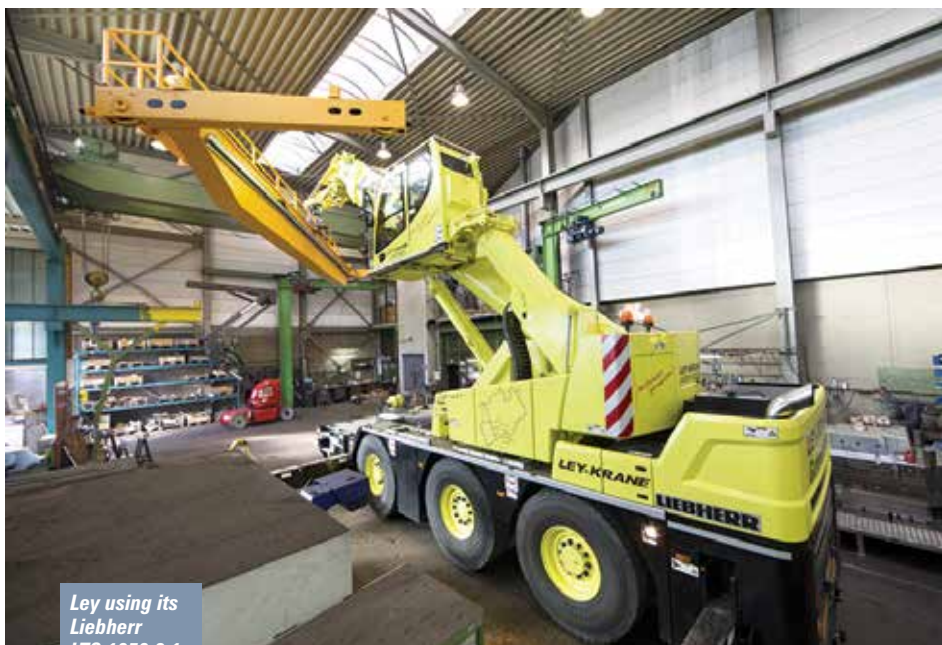
A diagram showing how Liebherr's electric system connects to the crane's transmission

Both Kato and Tadano point to the flexibility that this approach offers. For fleets that carry out many city centre jobs, but only occasionally need to work emissions free, one power pack can be shared between a handful of cranes which may be enough to meet current customer requirements. This might be particularly useful with the Tadano E-Pack, as it can also be used on some of an increasing number of the manufacturer's All Terrains and can be mounted on the crane at the depot, travelling with the crane.

Local job requirements and customer base may well help shape fleet owners' choices between a power pack and a built-in electric system. If you are regularly taking on jobs in very cramped conditions and with emissions restrictions, then a fleet of two or three units of the incredibly compact but lower capacity Kato city cranes with a single shared power pack, may be the best call. If you need a bit more capacity, and only require an emissions free crane for regular construction sites in ultra-low emission areas, then the Tadano package might be the better bet. And if you expect to have frequent work for an electric crane, then Liebherr's built in approach is likely to appeal.



Tadano's E-Pack is available for the new AC 2.040-1 and the AC 3.045-1, as well as larger All Terrains



Ley using its Liebherr LTC 1050-3.1 to install a gantry crane



E-Pack on board

But what of those jobs where emissions free lifting is required but a decent electric power source is not available on site? Liebherr head of product management Jan Keppler points to a recent innovation that may help. Some companies are already beginning to offer battery packs on a trailer. These are sufficient to power an electric city crane through a shift and can be easily towed to the job site, in some markets by the crane itself. While this market is still developing, it looks increasingly likely such equipment will soon become available to buy or rent. And it is easy to imagine that they will soon include solar panels for ongoing top ups throughout the day.

Liebherr currently only offers the electric version of the LTC 1050-3.1 with the Telematik pinned boom. The new shorter rope extended boom option that it launched last year, is currently only available with pure diesel power, even though it might seem to be the more suitable partner for the electric power pack? In many respects Liebherr's Telematik boom offers more boom extension configurations in order to maximise the reach or capacity. Since launching the concept around 10 years ago, around two thirds of customers have selected Telematik booms, according to Keppler. This apparently drove the decision to launch the LTC 1050-3.1E with the pinned boom. However, the rope extended boom is faster, simpler and according to Liebherr when launched - better for working indoors. "If we discover there is a need, we have designed the crane in a way that we could switch over tomorrow," says Keppler. "If we see demand for the rope boom, plus the electric drive, then we would say 'Okay, let's think about how many units we could sell?'. We would calculate it and if a big customer came to us and ordered, say, 10 units with a rope boom and electric power, then we would do it."



ABOVE AND BEYOND.

THE AC 6.300-1

Take your business to the next level with the Tadano AC 6.300-1. It delivers class-leading reach combined with strength, including the ability to lift 15 t on a fully telescoped 80 m boom. To allow for high versatility, the AC 6.300-1 can be adapted to the needs of a variety of jobs and is the smallest crane in the Tadano AC range with a luffing jib. The HAV and many components are shared with several other Tadano 5-axle cranes – increasing your return on investment and reducing the amount of spare parts you need to have on hand.

One disadvantage of the city crane design is that the single cab is used for both driving and lifting. Its location on the superstructure means that it is not ideal for road travel. Liebherr has overcome this on the LTC 1050-3.1 by mounting the cab on a telescopic arm/boom, which allows it to be telescoped to the front of the chassis for road travel. It also provides the option to elevate the cab to a height of 7.8 metres with the simple addition of a lift cylinder, which can be ideal for lifting over obstacles providing the operator a clearer view of the lift.

Current regulations mean that there must be a mechanical connection between the steering wheel and front axles, requiring a mechanical connection to be made to the front axles before moving out on to the road. On fixed cab city cranes, that connection must run down into the chassis and forwards. With Liebherr's approach, the cab is positioned directly over the front axles, allowing for a more direct connection to be made. Keppler, who has driven both versions of the LTC 1050-3.1, says the older approach had a good deal more play in the steering while the current configuration feels far more responsive on the road.

COMBINE TO DESIGN

Tadano completed its acquisition of Demag from Terex in 2019. The purchase saw two of the four German All Terrain production facilities, Tadano in Lauf and Demag in Zweibrücken, come under the same ownership. In the years since, the company has been working to combine them. Today, engineers at both Lauf and Zweibrücken work together as part of a single design team.

The new AC 2.040-1 is the first child of this marriage. Tadano product manager Michael Klein explains that the company started at this point as it wanted to fill out its range. A quick look at the accompanying chart illustrates why the company felt this was necessary. Liebherr has five models in this capacity class, including the two LTC models - diesel and electric. Kato focuses squarely on the lower end of the market, while Grove currently has just one model under 55 tonnes, the 50 tonne, three axle GMK3050-3, although a new smaller two axle crane has apparently been on the drawing board for some time - possibly one for Bauma in October? Before the launch of the new AC 2.040-1 Tadano also had just one standard and one regular taxi type All Terrain in the form of the three axle 55 tonne AC 3.055-1 and the 45 tonne AC 3.045-1 City.

Tadano's intention with the Demag purchase was to offer a wider range of mobile cranes and perhaps most importantly it gave the company a well regarded lattice crawler crane product, as well as a broader line up of All Terrains, particularly at the higher end where Tadano had not been particularly successfully.

The AC 2.040-1 helps fill in another gap in the range. The dearth of two axle All Terrains is related to the fact that they are obliged to compete with a host of other, often lower priced alternatives such as truck cranes, articulated/knucklebooms and aluminium boom cranes as well as small RTs. This seems to have changed a little in the past few years. "There is decent demand for two axle cranes," says Klein. "One



Tadano's new AC 2.040-1, the first crane from the company's combined design team at Lauf and Zweibrücken



of the main applications is roofing and house building, and this remains a stable source of demand. In Germany, it's even going up: the number of houses which have been built in the last two or three years has increased a lot."

An All Terrain though can go where some of these alternative crane types can't, working on rough job sites with ease, while the new AC 2.040-1 can be supplied 'E-Pack ready', allowing it to lift without emissions. The crane comes with the IC-1 Plus control system, inherited from Demag which ties in with the infinitely variable Flex Base

outrigger system, allowing the crane to maximise the capacity available for areas or limited space.

The crane also features Tadano's Surround View. This uses six cameras to let the operator see all around the crane. On the road it helps the operator clearly spot and monitor other road users, such as cyclists. On the job site, it can show the possible outreach of the outriggers, as well as the tail swing radius at the current position of the crane, displayed on a computer-aided screen. It was first launched on recent 80 and 450 tonne cranes but is now available on a growing number of Tadano models. ■

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