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Spiders spreading

It is just over 40 years since Japanese loader crane manufacturer and Komatsu distributor Maeda introduced one of the world's first spider cranes, the CP 150. The concept combined one of its telescopic booms with the spider leg outrigger concept first seen on the Falck Schmidt spider lift, and a compact Komatsu style tracked chassis.

The result was an ultra-compact crane that could squeeze into and set up in the tightest of spaces, carrying out work previously done with block and tackle or a larger crane working from a distance. Maeda continued to develop the concept, with the arrival of the MC264HC in 1989 and MC354C in 1990, both of which are similar to the products offered today.

R&B Engineering, which builds the Mighty Crane, claims to have introduced its first spider crane a few months earlier than Maeda, with a product aimed at the stone and quarry industry, although details are limited. The other big Japanese spider crane manufacturer Furukawa/Unic has a similar background to Maeda having started with telescopic loader cranes, before introducing its first spider cranes in the early 1990s.

Maedas from the late 1980s

Spiders arrive in Europe

Spider cranes first appeared in Europe in 1999 when Kranlyft, the Kato distributor at the time, introduced Maeda. Prices were high and sales limited to a few niche buyers. Glass handling specialist GGR purchased some of them for its glass handling work, and sensing the potential, began looking for its own spider crane brand. It soon found Furukawa/Unic and purchased a few units, in spite of the fact that Unic had no interest in CE certification. Having evaluated the product, GGR set about doing its own CE type approval. As a result, it was appointed the Unic master distributor for Europe, Africa and the Middle East. With two manufacturers now on the market and GGR adding them to its rental fleet, the concept began to take off, initially in the UK and then the rest of Europe.

Unic and GGR at Intermat 2006

The new Maeda MC305CB-3

The Imai stand at Saie, Bologna in 2004

The Italian job

At the same time, Italian loader crane distributor and body builder Ormet launched a spider crane to meet the needs of Italian glass and curtain walling contractors working around the world. Built by its Imai man basket manufacturing division, the first units were horribly unreliable and looked like something the village blacksmith had turned out, when compared to the Japanese built products. In the words of one major contractor using Imai cranes on high rise building projects in London: "They are absolutely brilliant, but you need a full time mechanic with them!"

The Jekko name was adopted around 2007 for the first series production models, which were far better, but still a tad rustic. By 2010 the cranes had improved significantly, at the same time its innovative and detail engineering became world class, with each model better than the last. This time last year the company celebrated the production of its 2,000th crane. In the meantime, the Japanese manufactures have been slow to innovate, although their products are easy to use and absolutely bulletproof in terms of reliability.

Second Eco for Maeda

Today the key focus is on battery powered models, Maeda launched its 2.82 tonne MC285C-3 last year and unveiled the larger 2.98 tonne MC305CB-3 at Vertikal Days. Rated at 2.5 metres it features a five section main boom for a maximum tip height of 13.5 metres. It manages 790kg on the fully extended boom or 260kg at a 12.1 metre radius. Power comes from 55 volt 180Ah lithium-ion battery pack, said to provide up to 14 hours of lifting operations. It can be fully charged in 4.5 hours, or to 80 percent in three hours. White non-marking tracks are standard, while options include black tracks, radio remote controls, a single fall hook and 850kg or 1,500kg searcher hooks.

Big lithium Jekko

Jekko unveiled a lithium powered version of its eight tonne SPX1280 spider crane in July. It uses a 20kW electric motor and a 96 volt/400Ah lithium-ion battery pack. A dual voltage - 230 volt single phase or 400 volt three phase - onboard charger is standard, and the

Jekko unveiled a lithium powered version of its 8t SPX1280 spider crane in July

machine can also work while being charged. It features a five section 17.7 metre main boom plus a range of jibs including a 3.5 tonne searcher jib and a 7.6 metre four section hydraulic jib that provides a maximum tip height of 26.6 metres.

Early to the market

GGR/Unic was very early to the market, unveiling its wheeled 0.995 tonne Eco-095 and 2.9 tonne capacity Eco-295 in April 2013. Powered by a more traditional 48 volt battery pack they offered 2.5 hours of continuous operation, still sufficient for many applications. It followed with tracked versions of both cranes in 2018.

The Unic Eco-095 on tracks was introduced in 2018

Dutch range all 'e'

Another manufacturer that has developed substantially in recent years is Dutch manufacturer Hoeflon. As with Jekko, its 'fit and finish' now matches that of the Japanese products and it is also developing a strong reputation for ground breaking product development. It announced its highly innovative nine tonne C30e electric machine in 2019 and followed up with the fully electric three tonne C6e spider crane last year. The new model features a five section 11.5 metre main boom and a 4.3 metre hydraulic luffing jib to offer a maximum tip height of 17 metres. It is powered by a lithium phosphate battery pack, and can run at 60 percent utilisation for up to eight hours before requiring a re-charge. It can also operate while plugged into mains power, topping up the battery pack while in use. The smaller two tonne C4e is also available as an all electric crane with a similar power pack to the C6e.

The other major spider crane trend is the move towards larger articulated models.

The 9t Hoeflon C30e in action

A new species of crane

The spider crane, a small, usually telescopic, crane mounted on a rubber tracked carrier, is a concept imported from Japan that began to take off around 20 years ago. Since then, the sector has gone from strength to strength in an increasing number of European countries and North America. The Japanese manufacturers have been joined by one or two European manufacturers, most notably Italy's Jekko, which has been pushing the concept's boundaries, including the introduction of larger models with articulated loader cranes. Will North takes a look at this emerging market.

The combination of tracks and articulated booms is not unique: mini crawler cranes and spider cranes are now well established product sectors. But these cranes tend to have relatively low nominal capacities, and are designed within certain dimensional limits, the small and middle range models can typically travel through standard single doorways when stowed, while the larger models are compact enough to manage standard double doors. This allows them to be used indoors, even in locations without large industrial doorways. This critical requirement has tended to limit their size and they rarely offer a maximum capacity of more six tonnes, although Jekko offers the eight tonne SPX 1280, while the Unic range extends to the 10 tonne URW-1006.

Knuckles & tracks

In recent years a new species of crane has begun to evolve, hybridising knuckleboom cranes with crawler carriers. The first examples of this new breed were one-offs. Knuckleboom/ loader cranes are generally designed to be installed on the end user's choice of chassis, often chosen for an application other than lifting. So, some, suitably protected, have been installed on marine vessels, while others have been mounted on dedicated tractor units and standard commercial trucks. However, over the years, some companies such as Germany's Hüffermann Krandienst or Wemotec have occasionally mounted them on different types of tracked or wheeled carriers for specific applications, but always as a special order for a specific application such as heavy industrial machinery installation.

In the UK, Coppard Plant Hire has been creating 'hybrid cranes' such as this for some time, selecting the combination for strength and mobility. "We were working on some jobs a fair way from the road," says Joby Coppard. "If you use a standard crane, you need a long heavy duty temporary roadway to get in. With a crawler chassis crane you can just track into where you're going, lift what you want to lift, and track away again."

The company has previously mounted a number of units on tracked Morooka all terrain carriers. The resulting machines offer low ground bearing pressures with the chassis specifically designed to cope with the softest of ground conditions but are capable of carrying fairly large cranes. They include a Hiab 071A on one unit, an Amco Veba VR30 on another, as well as large PM and Palfinger cranes. These cranes cover maximum capacities that range from 2.5 tonnes all the way up to 31 tonnes.

On many jobs they are backed up by tracked load carrying units, which can bring loads to or from the lifting location. Coppard says: "We are doing a bit of standard construction with them occasionally, if the job requires it. But it's those specialist jobs where they really make a difference. We have done some pylon work with them for example, as well tree removal in places where

One of Hüffermann's cranes, a Palfinger on a wheeled chassis

A PM/Coppard crane handles a footbridge

it's very difficult to get to. Other applications where they have really scored include mobile phone mast installation and bridge work, in fact we have done a bit of everything."

One source of work that is seeing increased demand at the moment is solar farms, where Coppard is using its large, tracked carriers to replace transformers for maintenance or repair. Such sites rarely have roads in place, so the combination of a large crane and tracked carrier is a real bonus. Coppard has taken a pragmatic approach to selecting cranes for the units it has built. "We like to share it about," Joby Coppard jokes, explaining: "On the older cranes, it was just what we had on lorries. As we've got bigger, we have had to specify the cranes. The PM we used was actually a marine crane. Then when we went for the next stage up, we went for Cormach, as PM don't do one that big."

A convertible

That latest Coppard unit was on display at the recent Vertikal Days event. It is designed to be easily swapped between carriers. This allows it to be delivered by road on its truck chassis, getting as close to the job site as possible. It is then raised up on its outriggers, so the road carrier can drive out from underneath, and the tracked carrier moved in to take over. To ensure it is easy to use and safer, Coppard designed the ballast weight of both carriers to be within 20kg of each other. The crane on this demountable unit is a Cormach 240000AX E9, able to lift 30 tonnes at almost six metres radius, and handle 1,020kg at 44 metres.

Purpose built

While Coppard are adapting existing machines to work on tracked carriers, some crane manufacturers are now offering purpose built

The new Coppard/ Cormach 240000AX E9 can easily switch between its truck and tracked chassis

Once on tracks it can travel cross country to the lift site

Palfinger PCC cranes are 'go anywhere' machines

crawler knuckle boom cranes. Palfinger and Jekko have both been pioneering this concept, with Palfinger launching a three model range in 2018, that employs the same concept that Coppard is now using. The previous year Jekko had launched the 15.5 tonne JF545, shortly after Fassi had acquired a minority stake in the business.

Palfinger's Palfinger Compact Crane (PCC) range includes three base models, and as with almost all knuckle boom cranes, they are available in a variety of boom and jib configurations. In their simplest configurations, with just the main boom, the PCC57.002 lifts 10 tonnes at five metres radius and 2,550kg at 16.9 metres. The PCC71.002 lifts 11.5 tonnes at 5.3 metres and 2,550kg at 19 metres, while the largest model in the range, the PCC115.002, can handle 17.3 tonnes at 5.4 metres and 3.550kg at 20.7 metres. All can be configured for longer reach, and up and over - or inside and up - lifting, using different jib configurations as needed.

Hemmo Luijerink is Palfinger's product manager for this range. He notes that for the last 20 years, many customers, such as Coppard, have been mounting knuckle booms on alternative carriers, but notes: "It is always a one off custom built product."

Increases in loader crane capacities has spurred further developments in their use. Once, these cranes were almost purely logistics tools, purely loader cranes. But today an increasing number of very large cranes are too big in terms of space and weight to share a wheeled carrier with load transport space and have therefor morphed into pure lifting machines.

Initially these larger knuckle boom cranes competed with truck cranes or smaller All Terrains. Mounting them on tracked chassis allows them to compete with other cranes, including Rough Terrains and telescopic crawler cranes on construction sites, as well as specialist tools such as jacks and skids for industrial installation work.

As the manufacturer of both the crawler chassis and the crane, Palfinger has been able to look at the overall design and features of its knuckle boom crawler range, evaluating a wider variety of uses, in a way that is perhaps harder for an end user like Coppard. One highlight that Luijerink points out is the way the Palfinger PCC cranes are mounted on the carrier. They can be moved backwards and forwards, and side to side, while raised on outriggers, using the outrigger beam extension/retraction function. By doing this, it can even 'walk' sideways. It does this by raising

Palfinger PCC cranes are ideal for heavy machinery moving

the crane and tracks, moving them sideways, lowering the outriggers, and then extending the beams out one side, raising the crane again, retracting one side at the same time as the ones to the rear are extended.

The crane is controlled using Palfinger's PALcom control system, which monitors the crane's key stability criteria, such as outrigger set up and slew position. As the crane can be shifted while up on outriggers the ballasting effect of the crane, including chassis position etc… changes and thus impacts the dynamic or live load chart.

Taken together, these innovations mean the crane can take on many jobs that involve difficult or constricted access, both indoors and out. It has been used to install transformers on computer server farms, for roof or window replacements on city centre residential buildings, and for installing photovoltaic solar panels.

This versatility and flexibility should make these cranes attractive to specialist rental fleets. Denmark's BMS and Norway's Kynningsrud have been early adopters of these cranes as part of their rental fleets. The advantage - or challenge - for rental companies is that the cranes are most commercially attractive when employed as part of a contract lift proposal, rather than let out on an hourly rate. The rental rate for the crane itself might well be higher than for a standard truck mounted knuckle boom, or even an All Terrain crane, but its flexibility and ability to work with just an operator, means the overall job can be performed more quickly, with less staff, for a lower cost.

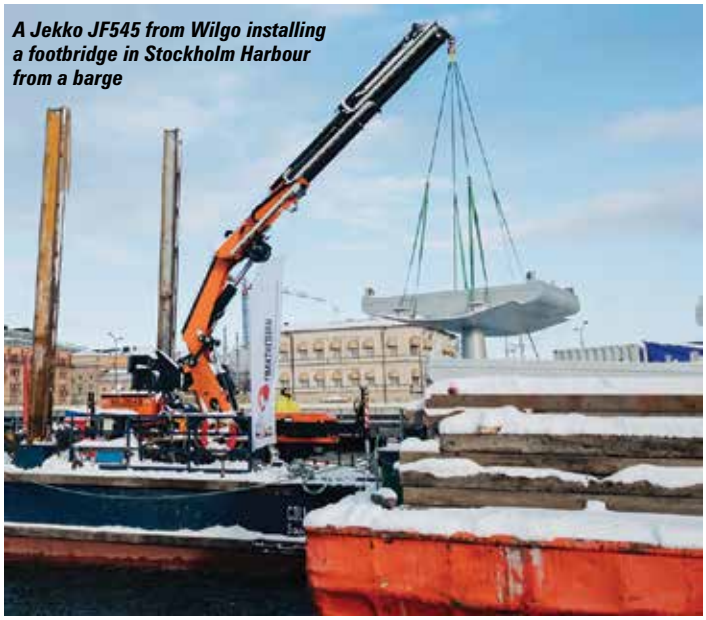
As this piece was being written, Palfinger UK contacted us to say that it had received its first unit, the 17.3 tonne PCC115.002, and that it was in detailed negotiations with a number of potential purchasers, all of whom planned to use the crane themselves for specialist applications. Managing director Alan Johnson, said: "I see strong potential for these cranes in hire fleets. As soon as one or two are out there, the hire market will swiftly seek to get involved and we are talking to a couple of them in addition to the end users."

Opportunities for synergy

It's a standard phrase in investor relations releases when talking about almost any new merger or acquisition, that they provide opportunities for synergy. Often, it's hard to see when or even if these 'opportunities' have been achieved. But for Fassi, which bought a stake in Jekko in 2016, the synergy has been very tangible, in the form of the JF series of crawler knuckle booms. The range now includes five cranes, ranging in size from the JF40 - which is essentially a spider crane, but made from a small 2,500kg Fassi crane on a tracked spider chassis - all the way up the JF990, which can lift over 21.5 tonnes.

The synergy here is between Fassi's long track record in building articulated cranes, combined with Jekko's expertise in tracked chassis technology. Alberto Franceschini, sales and marketing director says: "They offer all the advantages of the X-shaped outrigger format on a true spider/mini crane, where the outriggers can rotate from being parallel with the chassis to a 45 degree angle, they can also be set independently in terms of extension and opening angle, allowing more flexible positioning to adapt to the surrounding environment without interfering with elements that would normally be considered obstacles. The moment limiter automatically detects all the working parameters and calculates the capacity and stability in real time, guaranteeing maximum 360 degree continuous stability."

Jekko's 21.5 tonne JF990



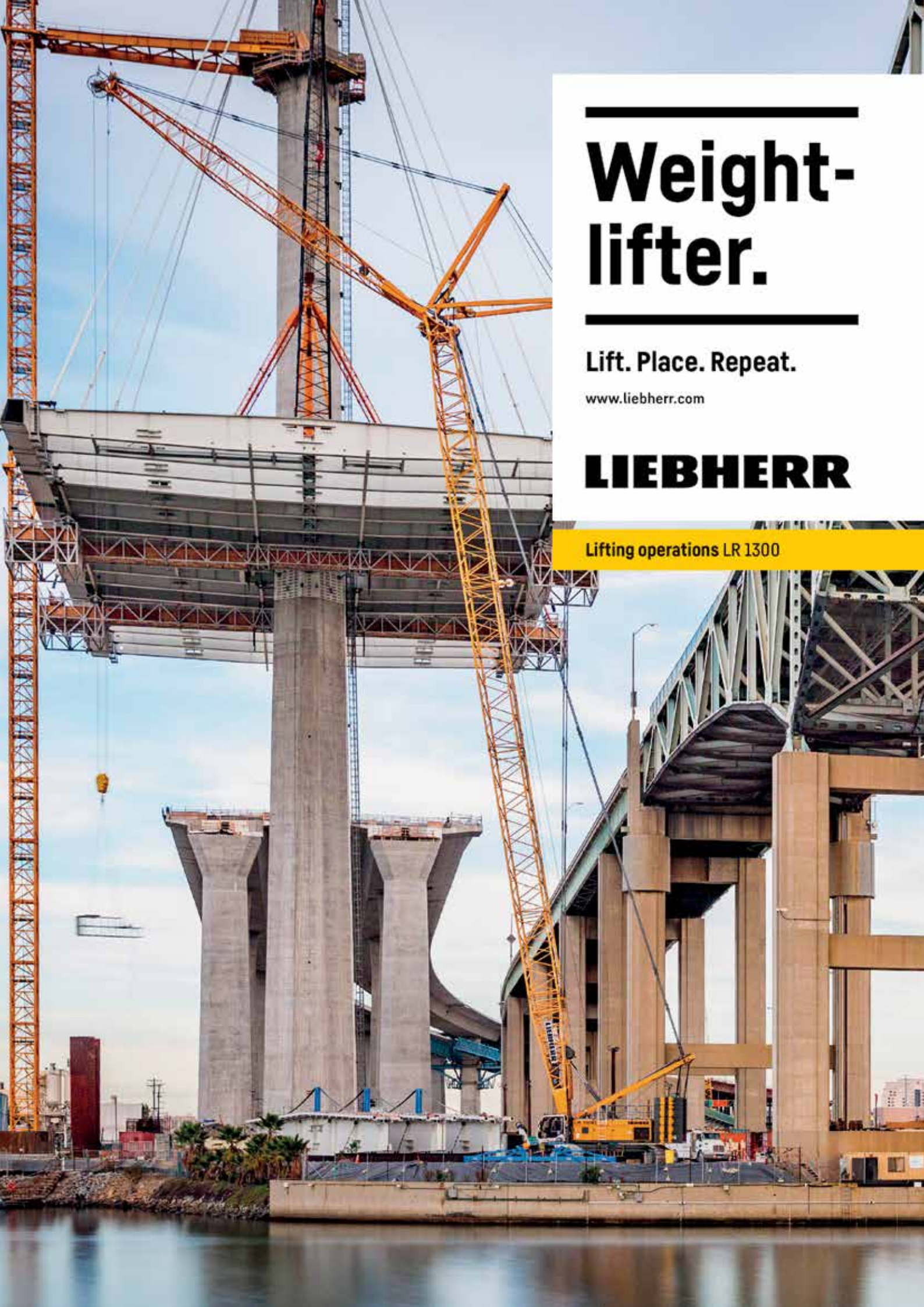
A Jekko JF545 from Wilgo installing a footbridge in Stockholm Harbour from a barge

In the UK, Jekko has been selling its products through JT Cranes, with the company showcasing a JF 545 at Vertikal Days. Managing director Russ Taylor said: "The 545 is an incredible success story, Jekko simply can't build them fast enough. They are just so versatile and flexible, the duties are great, and the reach and capacity, it's just a brilliant idea and concept."

These cranes also offer the advantage of familiarity, adds Franceschini. "An operator used to the classic truck mounted loader crane might have struggle with a spider crane, but the crawler mounted knuckle booms are a familiar concept for those operators. They provide a completely different way to approach the work, especially when going beyond the classic applications. Being a larger version of a spider crane, the JF models are often used for similar types of work, including glazing, general material handling on construction site, tree pruning and in industrial applications. Combining small size and reduced outrigger footprints, they are perfect for indoor maintenance, where there is a lot of industrial machinery, and you need to take up as little space as possible but are required to lift very heavy loads."

The standard models are diesel powered, but with an AC electric motor on board. This allows them to be plugged in when required, for example for indoor work. But this could also offer them advantages when working in inner city environments, where noise and

The first PCC115.002 arrives in the UK



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Many of these cranes can also reach under and up

emissions, as well as space to set up, are an increasing issue.

A second hydraulic circuit allows a whole range of attachments to be fitted to the boom nose, extending the crane's potential applications. Think, for example, of the grapple saw attachments covered in Cranes & Access July 2021, Safety Balance. A fully EN 280 compliant work platform is another of the attachments available.

Growing the market

GGR has built a strong reputation in the UK and Europe, importing innovative lifting devices and attachments and offering them for sale and rent. This has allowed them to develop a dominant position in several market segments such as glazing and cladding, and across the industry on jobs where compact lifting is key.

Daniel Ezzatvar, GGR's new products and partnerships director, says: "If you look at GGR from day one, the business model has always been about innovating, introducing products to the market, and underpinning those products with training. Essentially we've grown the market for a lot of these products."

The company is now importing the BG range of tracked knuckle booms from Italy, fitted with cranes manufactured by Effer. The largest in the range are the 14.5 tonne CWE 525 models, which GGR is calling the TMC525, as part of its UK branding. It has a maximum tip height of 20 metres on the eight section main boom, while a six section jib takes this to 32.5 metres and out to a radius of 29.4 metres. In fact, it offers 12.6 metres of horizontal outreach from the main boom nose at an up & over height of 20 metres.

A CWE 525 reaching a difficult to access area with a large glazing panel

A 14.5 tonne BG CWE 525 working on a remote canal lock gate

Ezzatvar says: "While this remains a specialist product, it falls very much within in GGR's area of expertise. It's certainly not a general machine, if you look at its capacity, it's a specialist piece of equipment. There's a lot of proven equipment out there that caters for the sort of standard area of the market. This is more on the periphery. And it's more representative of how we operate as a company. We have quite a broad range with a lot of exceptional pieces of kit. And that's where we see this fitting in. It's not something you'd go and run a hire fleet on the back off."

Fitting a niche

These cranes are not going to fit into a standard general rental fleet or even into a specialist crane hire fleet, in the same way that a small All Terrain might. In a larger or more specialised fleet, however, there may be scope for them to be kept busy on job sites that would otherwise prove a challenge, allowing contract lifts to be carried out more efficiently.

They will most likely be more popular with specialist contractors. As with all knuckle booms, they can be configured at the point of purchase with a choice of boom length and jibs, not to mention additional attachments. For a specialist, who regularly faces lifting challenges, this type of crane could be a real boon.

As has already been stated, the range of jobs these cranes can be used for covers a lot of applications, including industrial installation and moving, renewable energy maintenance, a whole range of roof work, including solar, and tower work, such as installing mobile phone masts. For the right buyer, these cranes can make the work faster, easier, safer and thus less expensive. Expect to see a lot more of them popping up on job sites as their capability is spotted by busy contractors.

A Jekko JF545 in a tight squeeze