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High lights

A small number of German manufacturers have been building high reaching, lightweight truck and trailer mounted cranes for many years. In the past decade their popularity has been growing across a wider geographic area, among both end users and rental companies. What sets these cranes apart? Will North reports.

These cranes are often referred to as aluminium cranes, due to their all-aluminium booms, but this is becoming something of a misnomer as ultra-strong lightweight steels allow a rethink. Böcker, for example, is increasingly making use of these high strength steels in its booms although the other major manufacturer Klaas, has maintained its all-aluminium concept and makes use of an uncommon boom welding technique.

Can this breed of cranes be characterised by its carrier? Or are they simply another form of truck mounted crane? It is similar in some ways to the situation in North America where larger boom trucks are now virtually indistinguishable from truck cranes. In both cases a distinguishing factor is their long reach for their nominal capacity, combined with a standard commercial chassis which offers high road speeds and easier and less costly maintenance and repair.

Both companies also offer trailer mounted cranes alongside their truck mounted versions and, in the case of Böcker, cranes on tracks. A third German producer, Paus, offers a smaller product range largely mounted on trailers, although it is more than capable of mounting them on a truck chassis. One thing all three manufacturers have in common is that they started out and continue to offer inclined material and furniture lifts, mostly trailer mounted. A competitor in this arena on the global stage, is South Korea's Horyong which offers a wide range of truck mounted inclined hoists as well as cranes, however the cranes are more telescopic loader cranes and an entirely different beast.

Defining characteristics

So, what are the defining characteristic of these cranes? Could it be their lightweight boom systems with integrated telescopic jib/top boom - a characteristic shaped by their intended use of lifting relatively light loads to considerable heights and radii? Or is it the fact that their relatively light weight allows them to be mounted on a standard two or three axle truck chassis? A feature that makes them considerably less expensive and easier to run and deploy than a traditional All Terrain. They may not have the same nominal capacity, but as with mobile self-erecting tower cranes they tend to outperform at height and reach when lifting lighter loads. Given the number of loads of 1,000kg or less makes them a compelling option for both rental fleets and end users with a specific application in mind.

A classic aluminium truck crane

Aluminium cranes can get into areas where more traditional cranes might struggle

The uptake of this type of crane has been steadily spreading out from its German speaking home market with France beginning to see the benefits while the UK has become a substantial market for the two big suppliers. This has involved a substantial change of attitude among British crane rental companies which have tended to prefer cranes with as high a nominal capacity as possible for their size, and a machine that on paper at least, can be all things to all people.

Part of the fleet

In the UK, Keith Morgan is one of those fleet owners who has found a space for these cranes in a general crane and access rental fleet. He has one Böcker and three Klaas cranes. But his company, Crane Hire Solutions, also offers All Terrain and spider cranes, as well as other lifting and access devices to end users across the English Midlands.

One of the key advantages he sees in these cranes is their boom systems. "The jib is unstowed hydraulically within the width of the crane and luffs at will, which gives a lot more reach over tall obstacles such as buildings compared to a conventional stick boom," he says. "This has numerous advantages and means that we do not have to rig fly jibs or extensions, reducing the risk of working at height and avoiding the need to find room on site to install them. This also reduces time on the job."

"They are a lot lighter than an All Terrain crane and this makes them easier to get from job to job. It also reduces disruption to the site when setting up. Also they can be operated via remote controller and

Keith Morgan's Crane Hire Solutions uses a Klaas for a typical job, lifting roof trusses

Cranes like this Böcker are ideal for up and over lifting

you can actually stand alongside the load you're lifting and placing precisely into position."

Morgan offers his cranes on contract lifts. On most jobs, they are sent out with an operator accompanied by a slinger or a lift supervisor. "We don't get a lot of long-term hires for them," he said. "They're more like a taxi crane where you might have a couple of lifts when you get to site and then you move on to the next one. They are lightweight, manoeuvrable and quick to move between sites."

The benefits of them being mounted on standard commercial trucks keeps ownership costs down. Damaged or worn out tyres for example can be sourced from or replaced by any tyre company that serves the transport sector, for perhaps a third of the cost of an AT. The carrier can be also maintained or repaired by a regular commercial vehicle dealer or service company.

They can also safely achieve and maintain the same road speeds as regular delivery trucks. For users in the UK, this means they can be driven under normal road regulations, rather than following STGO regulations that allow heavier vehicles to travel on public roads, but at limited speeds and sometimes requiring permits.

On arrival on site, the lower gross vehicle weight means they can be set up in a wider range of locations, although Morgan routinely checks ground bearing capacity before sending his cranes out. "With these cranes," he says, "you're not asking for the same capacity out of the ground to set the weight of the crane."

Capacity where it matters

At first glance, where these cranes fall behind small All Terrains is nominal capacity. In standard configurations, none of these cranes lift more than three tonnes, although they can be configured to lift as much as 12 tonnes. Compare that to an All Terrain crane where capacities typically start at 30 or even 50 tonnes.

However when it comes to reach, they often outperform two and three axle All Terrain cranes. They are also designed to work without any additional counterweight with typical axle loads of 10 tonnes and never exceeding 12 tonnes.

The longest boom on a Klaas is on the K1100, which offers maximum tip height of 60 metres and a maximum radius of 55 metres. At a radius of 46 metres and a height of 34 metres, it will lift 350kg. Alternatively, it can handle 500kg at a similar radius but a height of 26 metres.

Liebherr's smallest AT crane with a 60 metre boom is the 90 tonne four axle LTM 1090-4.2, which can carry 8.8 tonnes of counterweight and no extensions within the 12 tonne axle loads. In this taxi crane configuration, it has a maximum radius of 36 metres at a height of 46 metres and a capacity of 900kg. Install all 22 tonnes of counterweight and it's a totally different story of course. You can also achieve 60 metres or more on the 60 tonne three axle LTM 1060-3.1, but only after rigging the bi-fold swingaway. The point of the aluminium cranes is that they are fully self-contained and ready to go a few minutes after arriving on the job - without installing extra counterweight or faffing about with extensions - while being light enough to work from surfaces such as a private driveway or car park without extra large outrigger mats.

The biggest Böcker is the AK52. As the name suggests, this has a 52 metre main boom in standard configuration. At a 40 metre radius and a height of 25 metres it can handle 500kg. Tadano's smallest All Terrain, the three axle 55 tonne AC 3.055-1, has a 50 metre main boom and can carry six tonnes of

Kranservice Solle finds a wide range of uses for its Klaas K950, from concrete pours to hot tub deliveries

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counterweight within 12 tonne axle loads. Maximum radius is 38 metres where it can lift 800kg at a height of 22 metres.

For a mixed fleet, like Morgan's, the question is what proportion of the work coming in can be handled with the aluminium crane's limited nominal capacity. If, as is often the case, there is plenty of demand to lift lighter loads to greater heights or reach, then there is a compelling argument to run some of these truck cranes in the fleet. Their ability to easily handle multiple jobs in a single day over a wide range of height and outreach typically provides an excellent return.

In addition to the rental market, for some specialist contractors running long-term projects which will keep a crane busy handling lighter loads at reach for months or years at a time, then owning your own aluminium crane can be an ideal way to cut costs while improving the service.

That was the situation Mark Bishop of ME Bishop found himself in. His main business is carpentry for the housebuilding sector, working with major UK developers like Persimmon, Barratt, and Redrow. Increasingly, these companies use Modern Methods of Construction (MMoC), a range of techniques that aim to reduce build times. A major component of the MMoC approach is working with larger elements, prefabricated modules, but also 'big blocks' rather than individual bricks.

Mark Bishop has purchased two Böcker tracked cranes, used here to lift storey-high aircrete blocks and roof trusses for Barratt in Cannock

Altigrues covers the Paris region and finds its Klaas truck mounted cranes ideal for city centre work

Barratt used this approach on the Deer's Rise project in Cannock - the housebuilder choosing to use H+H's Celcon Elements modules. The system uses single storey lightweight Aircrete concrete panels to form the external and internal walls. Once the foundation is laid the ground floor can be completed in a week, with the entire structure of a two storey home weatherproof by the end of the following week. An approach like this is entirely reliant on the use of a suitable crane. These big panel blocks are way too heavy to be lifted by hand and must be lifted over the façade scaffolding that forms part of the technique, surrounding the building's footprint.

Bishop says that his first investment was in people: "We got a few guys trained up to manage the lifts, perform risk assessments and work as slinger signallers. Initially they worked with rental cranes, however, we had no control over the price we were getting charged, or availability," he says, "so we thought if we are hiring that many cranes we may as well buy one of our own."

ME Bishop started off with a Böcker truck mounted crane and soon added a second. When they are not busy he will hire them out to other contractors. When Barratt came asking about a way to perform the Deer's Rise job, it felt that using a truck mounted crane throughout would be too expensive.

"Böcker has a tracked crane (the RK 36), that has to be cheaper to buy and cheaper to run," recalls Bishop. "That meant we could save them a little money, not so much, but a couple of hundred quid a week, which they thought was good."

The RK36 offers specialist contractors like ME Bishop further advantages. Delivered to site on a trailer, the crane can move around site on its tracks and with low ground bearing pressures it can easily handle rough or sloping ground. With MMoC jobs working more like a factory production line than a standard construction site, one of these cranes can lift the big blocks for the walls, while a second lifts roof trusses into place.

But purchases like this are still a gamble for a smaller specialist contractor like Me Bishop. "We were wondering if they were ever going to do another site like this," he says. "But now the client has committed to use the technique for a 350 home project in Stafford." A job like that will keep Me Bishop's tracked cranes busy for a long time. And with his investment in people and equipment, he's positioned his company to take a leading role in closing the UK's housing supply gap.

Structural differences

These two manufacturers take very different approaches on how they make the key structural components of their cranes. Klaas uses aluminium throughout its range and has a dedicated in-

One of Böcker's trailer cranes working from a barge

house aluminium welding system which it uses to join the four pieces of each boom section. Böcker uses a mix of aluminium and the latest high strength steels, forming rectangular booms with curved corners out of two boom shells.

Aluminium requires different approaches to welding when compared to materials like steel. Unusually, the oxide that forms on the surface of aluminium melts at a higher temperature than the metal itself. Klaas's booms have two side sections, with top and bottom sections that are pierced by oval holes, reducing the overall weight of the boom. The side sections are folded at 90 degrees on each edge, creating a flange that is used to attach these to the flat, pierced, top and bottom sections. These are joined using a friction stir welding (FSW) system developed by ESAB.

ESAB explains in a presentation on the system that FSW was first developed in the UK in the 90s, by Wayne Thomas of The Welding Institute - the Cambridge-based association for welding and joining specialists. Initially thought of as a laboratory curiosity, it was soon picked up by industry which saw that it could be used to join materials previously thought of as unweldable.

Unlike other welding techniques, FSW uses friction to generate heat. The ESAB welding machine used by Klaas - one of just a handful in Europe - clamps together the top and side sections of the boom. A specially formed, wear resistant spinning head is moved along the join. This heats the material without fully melting it. As the head moves forward, the metal cools and bonds together.

Böcker uses a different set of innovations in its booms. The latest cranes from the company use high strength steels, developed around the turn of the millennium, which are formed into U-shaped shell pieces, and joined to create a rectangle with rounded corners. The company also uses one-piece aluminium profiles, manufactured using a production process developed for large cross section tubes with one or two longitudinal welds.

Andreas Sparrer, head of international sales for Böcker, says: "Around 2008 we became aware of special high tensile steel alloys with weight characteristics and properties similar to aluminium.

Denkmalbau specialises in historic building repair, and finds Klaas cranes ideal for roof work

A Wiesbauer Klaas trailer crane demonstrates its compact dimensions

The crane offers variable outrigger spread

The aluminium was required in order to make lightweight and high performing booms, which gave the possibility of a high reach. But today, there are steel alloys that have the same, and even better, characteristics in terms of weight lifting and reach performance. So that is why with certain models, we have made a transition to steel booms."

Product lines and features

Both companies offer an extensive range of truck mounted cranes. Each model is categorised by gross vehicle weight, load capacity and reach. But they also offer a selection of different lifting, access and material handling products. As we have seen with the cranes we have looked at, they are all characterised by their high reach and light weight.

Klaas's truck mounted crane range comprises seven models. The smallest - the K700 - is mounted on a two axle 7.5 tonne truck and lifts up to 1.6 tonnes in standard configuration with a maximum tip height of 34.5 metres. At the other end of the Klaas range is the K1100. This is mounted on a 26 tonne, three axle chassis and can lift a maximum of three tonnes in its standard configuration and has a 60 metre boom/jib.

All Klaas cranes use a variable positioning outrigger system which calculates the stability of the crane and carrier based on outrigger pressure. Andy Crane, distributor Kranlyft, explains: "Once you have the outriggers out to 300mm they are fully variable. You can set the outriggers wherever you want them, it doesn't have to be in any fixed positions."

Böcker uses a PL- based system for measuring the stability of its cranes, much like that on modern All Terrains. This takes measurements from sensors across the crane and carrier to calculate the optimum capacity for the actual configuration.

The Böcker range comprises five models, ranging from the 7.5 tonne two axle AK 37/4000, which lifts up to two tonnes in standard configuration and reaches 35 metres, up to the 26 or 32 tonne GVW AK 52, which lifts up to three tonnes in standard configuration with a boom extending to 52 metres.

An alternative to the truck cranes are trailer mounted cranes. These are more popular in Germany and surrounding areas, where contractors and rental companies are used to towing heavier equipment to site, but less popular in some countries due to challenging road rules for towable trailers.

A Paus PKT 31 trailer crane

Klaas has four models, with tip heights ranging from 25.5 to 34.3 metres. Böcker has three models ranging from 30 to 34 metres extension, as well as the tracked model, the RK 36/2400, which reaches a height of 34 metres in standard configuration. Paus offers two trailer cranes, the 1.6 tonne, 31 metre PTK 31, and the one tonne, 27 metre PTK 27. Like the Klaas and Böcker cranes, this has a folding telescoping jib, offering reach up and over obstacles.

Roof tiles and removals

As we have said, all three European manufacturers also offer inclined material and furniture lifts. They are joined in this by Korean manufacturer Horyong which recently signed a European distribution deal with Italy's CEM.

These devices are in many ways the precursors of the cranes we have looked at. Klaas, for example, launched its first aluminium lift back in 1947, while its first crane came along in 1993. Böcker has offered products like this for more than 50 years.

Inclined lifts aim to solve the same problem for roofers and builders as their crane counterparts - to get a relatively light load where it is needed. The lightest versions are essentially a container attached to a ladder, powered by a winch.

How they stack up

Manufacturer	Model	Vehicle class	Max Hook height	Capacity standard/option
Klaas	K27-32 TSR	7.5t	32.0m	1.5t
Klaas	K700	7.5t	34.5m	1.6t
Böcker	AK 37/4000	7.5t	34.3m	2.0/4.0t
Böcker	AK 36/4000	12.0t	35.3m	2.0/4.0t
Klaas	K750 RS	7.5t	36.4m	2.0/4.0t
Klaas	K850 RS	13.5t	36.9m	3.0t/5.0t
Klaas	K900 RSX	16.0t	38.4m	3.0/5.0t
Böcker	AK 42/4000	16/18t	41.3m	2.0/4.0t
Klaas	K950 RSX	16.0t	43.5m	3.0/5.0t
Böcker	AK 46/6000	18/26t	43.4/45.3m	3.0/6.0t
Böcker	AK 52	26/32t	51.3/54.3m	3.0/6.0/12.0t
Klaas	K1003 RSX	22.0t	52.7m	3.0/6.0t
Klaas	K1100 RSX	26.0t	60.0m	3.0/6.0t

Manufacturer	Model	Carrier class	Max Hook height	Capacity standard/option
Klaas	K17-24 TSR	Trailer	24.0m	0.8/-t
Klaas	K280	Trailer	25.5m	0.8/-t
Paus	PTK 27	Trailer	26.3m	1.0t
Klaas	K21-30 RS	Trailer	29.8m	1.5/-t
Böcker	AHK 30	Trailer	29.3m	1.5t
Böcker	AHK 30 KS	Trailer	29.3m	1.5/-t
Paus	PTK 31	Trailer	30.3m	1.6t
Klaas	K23-33 RS City	Trailer	32.8m	1.5/-t
Böcker	AHK 36	Trailer	33.3/35.3m	1.5/2.4t
Böcker	RK 36/2400*	Tracks	33.3/35.3m	1.5/2.4t
Klaas	K400 RSX	Trailer	34.3m	1.6/3.0t

**Tracked version weighs 4.5 tonnes - all other trailer cranes less than 3.5 tonnes*


CEM is now the European master distributor for Horyong material and furniture lifts

Böcker's smallest model, the Top Lift, takes this approach. It comes in three versions (Basic, Standard, and High Speed) able to reach heights of 20.3 metres, differentiated by capacity - the Basic lifts 150kg, the Standard 250kg and the High Speed 230kg - and, as the name of the last version suggests, hoisting speed. Böcker now offers a specialised platform for lifting solar panels.


A Böcker Agilo Inclined aluminium material lifting action

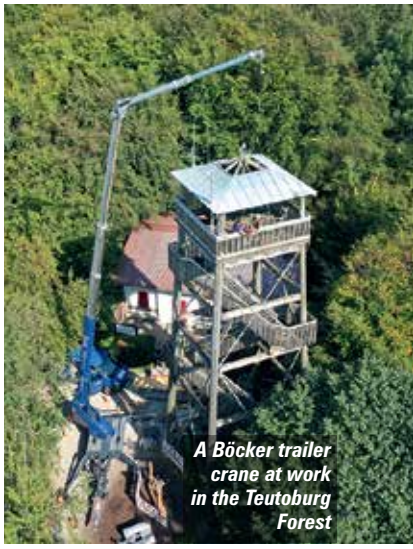
Both of Klaas's models - the Toplight 21 Construction and HV 26/6 KA - are trailer-based, as are Böcker's Simply, Junior, Avario and Junior G units. These can lift a little more and a little higher: the Avario, for example, lifts 270kg and reaches 27 metres. Material lifts like these are a common sight in many cities in mainland Europe.

Furniture lifts are very similar but feature a larger and higher capacity platform. Klaas's van-based Bigmover, for example, can raise a 400kg load to a height of 16 storeys. In the UK Kranlyft's Andy Crane says that these are proving increasing popular with specialist movers. "They're very lightweight, very easy to tow and also very cheap, compared to using a crane."

Jake McCaugherty, MD of Böcker UK, added that so far sales in the UK have been clustered around London and the south east, with owner-operators such as specialist furniture movers and furniture retailers.

Green future

The lightweight truck cranes are also playing a growing role in the environmental market, given they are ideal for jobs such as installing rooftop solar panels, while on the other hand they increasingly feature from low or zero emissions power sources.


A Böcker trailer crane at work in the Teutoburg Forest

Böcker offers an electric drive system that can be installed alongside the Power Take Off auxiliary drive on its truck mounted cranes. This plugs into 400kV three phase site power outlet and is sufficient to operate multiple crane operations simultaneously. For customers who do not have electric power now but might in future as more restrictive regulations come into force, they can order their crane with the e-Ready Kit, which allows for future retrofits.

On its larger models (the K950, K1003 and K1100) Klaas supplies two drives as standard. In addition to a diesel engine, a 400 volt electric motor is installed, so the operator can choose the type of drive depending on the site and operating conditions. As the diesel engine operates separately and independently, the truck engine is protected, and its value is significantly maintained due to shorter operating times.

On smaller models, an electric motor is supplied as an optional extra and is not fitted to the crane permanently in order stay within vehicle weight limits, but can be easily installed on site when needed.

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