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Pick up thy ballast and drive...

The increasing costs of diesel, support vehicles and drivers' pay are forcing mobile crane hirers to find ways of lifting more efficiently and therefore more cost-effectively. One area that seems to be gaining popularity is move back towards the true 'taxi' crane – especially for larger everyday cranes. By taxi crane we mean cranes that carry all or enough ballast to do most routine jobs resulting in big savings on associated support vehicle costs which hopefully benefit both the rental company and the customer.

Terex recently unveiled its new '60 tonne class' Challenger as part of this trend, but what about larger models? We take a look at the popular 90 to 130 tonne All Terrain class, now found in most rental fleets and consider the various trade-offs.

The average nominal capacity in rental fleets has steadily increased in recent years, driven upwards by a number of factors, including cheaper lifting alternatives at the smaller end such as loader cranes, telehandlers and mini cranes, coupled with suicidal crane rental rates. This has forced crane rental companies to look at equipment that gives better utilisation and return on investment. Last month's Cranes & Access 2010 UK/Ireland Rental Rate Survey confirmed that the 90 to 130 tonne All Terrain category, not only remained the strongest sector, but increased its dominance. Respondents said that this size of crane had the best utilisation (80 percent) and best return on investment (88 percent). This winning combination has created increased demand both for new and used cranes in this category.

Certainly from the manufacturers' point of view, this is a very popular crane category and accordingly, the main AT players – Grove, Liebherr, Tadano and Terex – have concentrated product development to ensure a strong and varied line-up.

Four or five axles

The sector is split into two major areas – four and five axle cranes (six if you opt for a tag axle on the Terex AC120-1) – giving customers a wide choice of a chassis size, main boom lengths and the amount of ballast carried within the allowed

axle weights. While the five axle cranes loose out in on-site manoeuvrability, the extra axle (allowing 60 tonnes GVW in most European countries) allows more ballast and lifting accessories to be carried on board, potentially reducing associated costs of support vehicles, wages, fuel etc.

The most recent four axle product launches – the Grove GMK4100L, Terex AC100/4L, Liebherr LTM1100-4.2 – tend to offer longer booms - 60 metres - at the expense of onboard counterweight. The Liebherr can carry as little as 2.5 tonnes within the EU's 12 tonne axle loadings. Unlike the other two cranes, it can lift 100 tonnes at three metres radius and has the greatest on board tip height.

There has certainly been a good deal of interest and discussion over the past few years over axle weights. For the majority of Europe 12 tonnes per axle is the maximum permitted and this is being ever more rigorously enforced. However globally it can vary from 10 tonnes right up to 16.5 tonnes per axle in the UK. Manufacturers have therefore designed cranes to a) achieve the lower weights by stripping, while b) designing brakes, power trains and axles to cope with the higher loadings.

Although not in this size category, the new Challenger 3160 (three axle, 160 m/t maximum load moment) from Terex illustrates the move by some manufacturers to build an AT that has everything on-board within the 12 tonne axle limits.

We have also included the Challenger in the performance table. Whilst this initially appears



Liebherr LTM1095-5.1

ridiculous, it does give a good indication of the performance of this new model. And if all the cranes were to work without additional counterweight it gives a very good account of itself. Unveiled last October the fully self-contained crane can lift 32.5 tonnes at five metres radius. It weighs 35 tonnes all up with a spare 1,000kg payload for lifting tackle and accessories within the 12 tonnes per axle. The quick remove counterweight drops this to under 10 tonnes.

Terex says that it has also ensured that this is a true one man crane by avoiding the need to work at height and makes rigging easier and quicker by giving the 50 metre telescopic boom a negative boom angle of five degrees. All rigging can be carried out from the ground. The 3160 also uses a three sheave, 'VarioHook' system with 18mm rope (six tonne single line pull) which shortens rigging time and cuts tackle weight.

Axle weights

● In the UK prior to August 2003, there was much confusion regarding

axle weights for cranes caused by 'grey' definitions in the STGO regulations and the Construction and Use Regulations where mobile cranes were classified as part of Engineering Plant. Cranes were restricted in two key areas – speed and weight – which caused considerable operational problems with operators regularly falling foul of the regulations.

● When classified as Engineering Plant the cranes were restricted to 12 miles per hour (with the exception of motorways). They were also designed with axle weights usually 12 tonnes per axle with the manufacturers VIN plate to match. In reality, the vast majority of cranes could not operate at these weights in travelling order – particularly once equipment such as tackle box, lifting chains/slings, outrigger mats and extensions were added.

● A revision to the Road Vehicles (Authorisation of Special Types) (General) Order 2003 (STGO) divided mobile cranes into four categories (see table).

Mobile Cranes STGO categories.

Category A	Minimum distance between outermost axles	Maximum gross weight of crane
Number of axles		
2	3 metres	20,000kg
3	5 metres	30,000kg
4	6 metres	36,000kg

Category B Cranes up to 12,500kg per axle

Category C Cranes up to 16,500kg per axle (max GVW 150,000kg)

Engineering Plant If any of the crane's axle weights exceeds 16,500kg the mobile crane will be classed as Engineering Plant.



Terex AC100/4L



Grove GMK5095

Most crane rental companies routinely run larger cranes in category C. However, even at the time this revision was introduced crane manufacturers warned that the speed limits or axle weights might be further reduced by restrictions imposed by the tyre manufacturers. Michelin recently felt that some or even most crane companies were ignoring the reduced speed limits associated with the higher axle loads and withdrew its 445/95 R 25 X Crane 174F tyres which the company said

should not be used on the road with axle loads above 15.6 tonnes due to overheating. As a result, it withdrew the tyres but did offer refunds for suitable replacements.

Comparing 90-130 tonne AT's

So what is available in this popular sector? In all there are 17 models from the four major manufacturers Grove, Liebherr, Terex and Tadano. What is immediately noticeable when comparing load charts is the maximum capacity at the

traditional three metre radius. Most Liebherr, one Tadano and one Terex can lift their full nominal capacity, the rest are significantly lower. Not that is important or even indicative of a cranes capability any more. This is one reason says Terex, why it is returning to using load moment in its model nomenclature rather than nominal capacity.

A Terex AC100/4 for example offers 80 tonnes at three metres, whereas a Liebherr LTM1100-4.2 has 100 tonnes and Grove's four axle GMK4100 and L offer just 70 tonnes. The Liebherr unit also has one of the longest main booms at 60 metres, but the trade-off is that in 12 tonne/axle transport trim it can only carry 2.5 tonnes counterweight, resulting in mid radius capacities considerably lower than the three-axle Terex Challenger.

A more fitting comparison between four axle '100 tonners' includes the Terex AC100/4 and Liebherr's 90 tonne LTM1090-4.1 both of which feature 50 metre main booms and have similar on-board counterweights (6.9 tonnes vs 6.7 tonnes). Apart from its low three metre rating, Grove's GMK4100 compares well with these two and has a longer main boom at 52 metres.

All three can lift three tonnes to 26 metres with on-board counterweight as can Tadano Faun's ATF90G-4, which boasts an 81 tonnes three metre rating and 51 metre boom.

Those looking for a five axle machine in this range such as the Grove GMK5095, Liebherr

LTM1095-5.1 and Terex AC100, get a longer boom and the ability to carry more counterweight. If you cover a wider area and have to travel further for work then this may be the best way to go.

'You pays your money and you takes your choice.'

From an on-site manoeuvrability point of view most are 2.75 metres wide, the Terex AC100/4 and 100/4L being the exception at 2.55 metres. Overall lengths range between 12.9 metres for the four axle Liebherr LTM1090 to just under 15 metres the Grove GMK5130-2 and all can travel in most jurisdictions without notifications.

Wide choice.....

Rising fixed costs combined with poor rental rates certainly focus the mind, as the comparison chart shows. It will be interesting to see how this sector will develop if it follows Terex's Challenger 'taxi' template. A four axle crane rated at 2.5 metres, fitted with a 60 metre boom that can take three tonnes to 30 metres, with say 15 tonnes of counterweight on board may prove very popular worldwide.

The ultimate 'jack of all trades'?



Tadano Faun ATF130G-5.

90-130 tonne capacity ATs and Challenger 3160

Make	Model	Axles	Max t @ 3m	Main boom	Max hook height	Cwt 12 t per axle	Max radius for 3t O-B cwt	Max Counter Weight	L x W x H
Grove	GMK4100	4	69.5t	52m	79m	6.3t	26m	26.1t	13.04 x 2.75 x 3.94
Grove	GMK4100L	4	69.5t	60m	81m	6.3t	26m	26.1t	13.04 x 2.75 x 3.94
Grove	GMK5095	5	69.0t	60m	81m	11.7t	34m	27.1t	13.48 x 2.75 x 3.95
Grove	GMK5110-1	5	95.0t	50.8m	89m	8.5t	28m	40.1t	15.00 x 2.75 x 3.95
Grove	GMK5130-2	5	94.5t	60m	92m	8.5t	30m	40.1t	15.00 x 2.75 x 3.95
Liebherr	LTM1090-4.1	4	90.0t	50m	76m	6.7t	26m	21.0t	12.90 x 2.75 x 3.91
Liebherr	LTM1095-5.1	5	95.0t	58m	82m	15.0t	34m	23.0t	14.6 x 2.75 x 3.95
Liebherr	LTM1100-4.2	4	100.0t	60m	92m	2.5t	22m	28.2t	13.50 x 2.75 x 3.95
Liebherr	LM1100-5.2	5	94.4t	52m	85m	11.5t	30m	35t	13.74 x 2.75 x 3.95
Liebherr	LTM1130-5.1	5	130.0t	60m	92m	9.0t	30m	42t	14.83 x 2.75 x 3.95
Tadano Faun	ATF90G-4	4	81.6t	51.2m	71m	6.5t	26m	22.3t	13.05x 2.75x 3.92
Tadano Faun	ATF110G-5	5	110.0t	52m	84m	8.7t	30m	35t	14.91 x 2.75 x 3.99
Tadano Faun	ATF130G-5	5	111.2t	60m	93m	6.0t	30m	42t	14.9 x 2.75 x 3.99
Terex	AC100	5	100.0t	50m	83m	13.3t	32m	32t	14.04 x 2.75 x 3.94
Terex	AC100/4	4	80.0t	50m	78m	6.9t	26m	26.1t	13.11 x 2.55 x 3.9
Terex	AC100/4L	4	80.0t	59.4m	85m	4.7t	26m	26.1t	13.24 x 2.55 x 3.85
Terex	AC120-1	5*	120.0t	60m	90m	6.2t	28m	40.4t	14.18 x 2.75 x 4.00
Terex	Challenger 3160	3	35.6t (at 4m)	50m	50m	6.9t	24m	6.9t	11.49 x 2.55 x 3.65

*tag axle option

O-B = On Board counterweight

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To MOT or not to MOT – that is the question.



All reputable crane operators are fully aware that a mobile crane carrier should be in a 'road worthy' condition. But unlike other large commercial road-going vehicles, it is not currently subject to an 'MOT' test in the UK. Whilst bona fide crane rental companies ensure that even their older cranes – some may be more than 20 years old – comply, the lack of a legal 'MOT' test is causing both safety and unfair competition problems that many in the industry think needs rectifying.

Imagine two new companies setting up at the same time – one in haulage and the other in crane hire – and because of the current economic climate, both want to set-up as cheaply as possible and look towards older equipment.

The new haulage operator must obtain a licence - issued by the Department of Transport - to transport goods commercially. All haulage companies and contractors regardless of size must meet the basic licence criteria otherwise they are not allowed to legally offer road haulage services.

Licence checklist

To obtain a licence the Department of Transport will check that the company has:

- an acceptable operating centre
- an acceptable maintenance system

- an owner of appropriate financial standing and good repute
- an owner or an employee that is professionally competent met all the legal requirements that a haulage company must comply with.

It also means that the vehicles are subject to the annual test for commercial vehicles – a commercial vehicle MOT - which is carried out in four distinct stages:

- Stage A: Topside (usually outside)
- Stage B: Underside (over the pit)
- Stage C: Lights
- Stage D: Roller Brake and exhaust emissions test

The cost of the full test and inspection varies depending on the number of axles and whether it is



carried out within normal hours or not but can be up to a current maximum of £183 per vehicle.

Now let us look at the new crane hirer. He does not need a licence to operate thereby by-passing all the basic 'business' checks required by the haulage company. He does not need an acceptable operating centre (possibly parking the crane or cranes in a local yard or on a farm). Yes, the lifting gear has to be checked by a 'competent person' but his 20 year old crane does not have to pass any vehicle 'test' inspection.

We all know which company will have the higher set-up costs, the higher standards and a probably the higher charge out rates to cover these costs and provide enough for maintenance and further vehicle investment.

Cheap and cheerful

The problem in the UK is that there are numerous 'general engineering companies' which pick up a cheap old crane or two for their own use and then rent them out the rest of the time, undercutting the reputable crane hirers. (A quick scan of a few used crane ads this week revealed a battered 1985 Cosmos Clark 25 tonner for £20K.)

According to VOSA the main reasons commercial vehicles fail the annual test are miss-aligned headlights at 17.4 percent, closely followed by inadequate brake performance/ components/ secondary and parking brake performance at 15.5 percent. Lamp faults are a distant third at 6.2 percent. Yet as the law currently stands, mobile cranes do not have to pass any statutory roadworthy test.

At the CPA Crane Interest Group steering committee in February 2010, chief executive Colin Wood

reported that the members' initial response suggested that MOT tests for mobile cranes would not be unduly burdensome. However, concerns had been raised that this proposal would be followed by further restrictive and harmful measures, including requirements for operator's licences, tachographs and increases in Vehicle Excise Duty. With these issues in mind, the CPA rejected the proposal on cost and logistical grounds.

The CIG also had concerns that large mobile cranes would be too big to get into many MOT testing stations. At the general meeting in September several members also cited the additional cost of the downtime involved with the test, including rectification work and travel to and from the test centre.

There are already at least a couple of big crane sized rolling roads in the UK and at least one crane rental company we spoke to said that it would willingly open a rolling-road test centre covering another area of the UK, stating that it was a scandal that cranes are not tested for roadworthiness.

While most CPA members are likely to ensure their cranes are of a sufficient standard to travel on the road, you can be sure that there are other companies which do not take such care. Any road accident involving a 20 to 60 tonne GVW vehicle is liable to be serious. What is scandalous is that it may be caused by defective brakes which could easily have been picked up in an MOT style test.



The product of change

Terex is changing. This was the clear message given by Doug Friesen to the 900 plus existing and potential Terex crane customers at its open day at the All Terrain facility in Zweibrücken, Germany last October.

Friesen - at that time managing director of Terex Demag - is instrumental in changing both the employees' attitude and manufacturing process which is now starting to produce positive results. However last month, Friesen's job was expanded enormously when he was promoted to the new role of senior vice president, Terex business systems reporting directly to group chief executive Ron DeFeo.

Mark Darwin managed to catch up with Friesen to hear about the changes going on within Terex and take a quick tour of the new Wallderscheid AT manufacturing line.



Doug Friesen

Friesen joined Terex in 2005 as general manager of Terex Cranes North America. In the three years in that position he is credited with the significant improvements made at its Waverly, Iowa facility, leading the team that received a Chairman's Excellence Award in recognition of the outstanding financial performance by the Waverly facility in 2008. He then moved to Europe and Zweibrücken as managing director, obviously part of a longer-term plan within the company.

Prior to Terex, Friesen spent most of career in the auto industry working with General Motors and Toyota gaining extensive training and

experience in implementing lean business processes. This experience has prepared him well for new role where he will develop and implement the 'change' using the Terex Business System to accelerate, or in some cases re-start, its customer-focused transformation. TBS, which was initiated at Terex a few years ago, is more than an operations initiative and according to DeFeo, will become "the enterprise-wide playbook to deliver customer, team member and financial goals. We expect that TBS will provide us with significant competitive advantage through the use of customer-centric tools that continually enhance customer responsiveness and eliminate waste."

While all this sounds like classically-meaningless business speak or jargon, Friesen's role is to ensure that all business activities are governed by clear and time-tested - for TBS read Toyota - principles and processes - all of which are designed to ensure workplace safety, eliminate waste and encourage a problem-solving and learning culture.

"Terex is changing"

"Terex is changing," he says, "we have done a lot but there is so much more to do. The key aim is to get to the point of being responsible to our customers and not making manufacturing mistakes. We are doing things, common in the aerospace/automotive industry, but not previously considered when making cranes. With a reduction in manufacturing problems this will allow us to concentrate on making and building new relationships and selling more product."

Lean manufacturing is Friesen's area of expertise and to implement new manufacturing systems and to achieve quality improvements more



The Challenger 3160 was unveiled but is not available until 2012

rapidly, Terex has brought in experienced people.

"You can teach this but it is too long a process," he says. "It is about raising standards both in the product and in the mind. Previously, too many things were just accepted as normal, now if the product is not right then the process is stopped and it is sorted. We will no longer ship anything with a fault. This new process is now seen in pockets throughout the company and is spreading."



New quality checks pick up potential problems.

DeFeo has made a conscious effort in recent years to change Terex from a merger and acquisitions company to one of operational excellence. The seed was planted for this mind shift with the acquisitions of Genie and Demag in 2003 - both with a strong name for quality and engineering, compared to the earlier Terex mantra of pile it high and sell it cheap. Some of the companies - such as Genie - are more advanced than others having adopted Boeing and Toyota processes for some time prior to joining Terex.

"Here at Zweibrücken, Wallerscheid we have introduced a new, hi-tech manufacturing line and are starting to see the benefits," says Friesen. "We now have an ambition to expand and standardise this manufacturing process across the whole company." This October Terex previewed its new three axle,

60 tonne Challenger 3160 All Terrain crane which will be available in the first quarter of 2012. "We want actions to speak louder than words with customers seeing a positive difference in the product. The best press is when customers talk to one another and I think they are seeing something different from Terex."

"Of course we measure defects per unit and look at warranty costs - they are all positive but not positive enough. There is a move in the right direction but it is not a dramatic

change. The deeper we get into this the further back we go - say to the product design stage - adopting customer's views on the product even before the prototype stage. This way of thinking/designing/building is a completely different concept for us."



New processes and tools increase speed and safety

It takes time

"I have been on these initiatives for a few years and can now see the local management at Zweibrücken understand and see the benefits. I know it is working when I don't have to push any more which usually takes about 12-18 months. Here at Wällerscheid we are right on target. In another 12-18 months it will be fully ingrained to the point where new staff naturally adopt the new system."

The Andon system used on the new final assembly line is a complete reversal of traditional roles, with those on the line flagging an issue and management having to run to sort if they are to avoid a complete stop. Wällerscheid – which was opened in 1997 now employs around 800 - has four production lines producing AC models from the AC40 to the AC350. Line two introduced last September builds the smaller AC models – the AC40 and AC50 as well as the new Challenger series. In a nutshell, the assembly line consists of six 'stations' each taking 10 hours to complete and manned by two or three people. The whole line moves forward in two hour blocks i.e. five times per station. Components for each task within the station are pre-delivered and pre-assembled alongside the line ready to feed into the process at the appropriate stage. This arrangement results a

dramatically reduced amount of time on the production line – assembly and final check taking 60 hours.

The whole line works on a 'traffic light' system (red, amber and green) at each station which indicates progress. All green means the line is ready to move on time.

A problem is flagged by a red light and warning buzzer and management has a one minute response time to start the solution process which has to be completed within a certain time to keep the whole line running smoothly.



The beginning of the final assembly line - six sections each taking 10 hours



The new Challenger 3160 is produced at the new line at Wällerscheid

The new system has meant a reduction in the headcount needed (25 now rather than 30) an increase in the number of cranes produced and a drastic reduction in the number of problems to be rectified after the crane comes off the line. The new system also increases safety during assembly. Using QCOS, potentially hazardous procedures are assessed and replaced by more reliable and often more mechanised solutions giving a safer work environment as well as being quicker and more reliable. Developments planned over the next three years include changing the whole facility (boom assembly etc.) to the new system.

Get it right first

The unveiling of the Challenger and the fact that it is not available for another year shows that Terex is now willing to wait and get the product right before starting shipments, which was previously not the case. "We will now not put out any products that are not ready," says Friesen, "We have to deliver a quality product."

The company has been accused in the past of fitting cheap smaller items such as switches, which might save a few pence in production but cost a fortune being down the line, how is that being improved? Changing suppliers?

"We are not shy in changing but most of our suppliers are good, in the past maybe it was our fault for not specifying correctly. Now we have clear specifications and clear design characteristics so we can hold them to task if it is not what we asked for. Most suppliers are happy with this but they have to have the capability and a similar concept of quality to ourselves."

The future?

As well as improving quality, Terex Demag has a long-term vision for its crane line-up. "We are looking out to 2020 with our crane products, the entire range will be changed along the lines of the Challenger over the next 10 years. Cranes will be grouped in 'families' based on the number of axles with at least one new AC family and models (perhaps two) every year for

the next 10 years.

"The vision for the CC crawler crane range is not as clear – we are in discussions at the moment to identify the gaps we need to fill.

We are market leader with the CC2800 and have some innovative changes coming out in the near future to remain in that position.

We have recently

entered the 300 tonne and below market (Topower in China) and we think there is a benefit in combining Demag engineering with Chinese cost-effectiveness. The Chinese market isn't as technologically advanced as Western Europe but they are constantly improving specification and quality standards."

Competitive threats from the Far East?

"The Chinese are the biggest competitive threat - their home market is so big and still growing. The problem will come when that slows down and they need to push exports.

I see the Indian market being very competitive although there are not many companies there at the moment – it is a good place to get in early and make an impact. Terex already manufactures in India and that will grow - we see India as a low cost manufacturing area.

The global market is constantly changing and we need to move with it if we are to keep growing."



The new light system on the final assembly line



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