There's more to specifying truck-mounted cranes and loaders than meets the eye. Brian Tinham examines the technical, operational and commercial issues that fleet engineers might want to consider

Lifting moments

Truck-mounted cranes come in all shapes and sizes, designed for everything from repetitive lorry loading and unloading – such as those on builders merchants' dropsides – to impressive and sophisticated long-reach, high capacity units aimed at specialised work. They can also be positioned at the front, centre or rear of trucks, dependent on the detail of the application. And they can be controlled by fixed lever controls, umbilicals or remote radio units. But for fleet engineers worried about fitness for purpose, value for money, and operational safety and stability, this sheer variety spells complexity.

That's surely where the specialists' experience and engineering expertise come in? Certainly, but Alan Johnson, technical director at ALLMI (the Association of Lorry Loader Manufacturers and Importers), says getting the right crane for the job ought to start with some simple reflection. "When specifying a machine, people need to look closely at its intended usage. One of the most glaring problems in our industry is simple shortsightedness – by operators, but also by some companies selling the equipment."

He rails against customer tenders that specify no more than capacity and reach – and suppliers that do little more than price them up. "People need to drill a bit deeper. What is the machine for? How long is it expected to last? Have the customer's load characteristics or operations changed since their last

Left: one of the larger crane units produced to date by TH White and recently delivered to Hams Transport. Based on a DAF Euro 6 XF105 510bhp Space Cab tractor, supplied as a 6x4 chassis, it was converted to an 8x4 to carry a Palfinger PK92002SH D crane – one of its largest, with a maximum lifting capacity of 27,800kg and reach of 13.5 metres

order? Are they likely to change again?" In challenging times, considering such questions might avoid early obsolescence – and also prevent cranes and loaders working too close to their limits.

Johnson suggests that, as a minimum, the industry should offer, say, 20% over-capacity. He accepts there's a balance to strike: bigger cranes mean more weight, so greater fuel consumption, less truck payload capacity and/or potentially heavier, more expensive chassis. Those are concerns whether your vehicles are tractors or rigids. But on the other side of that coin are longer-term effectiveness and minimised downtime. Talking of which, he also advises operators to pay attention to issues as basic as local service back-up.

In fact, ALLMI offers detailed advice, with key publications including its 'Guide for the purchase of chassis suitable for a loader crane' and 'Guidance for lorry loader installers and operators' – each aimed at smoothing the path to the right combination for a job.

Primary chassis considerations identified include: ensuring that your preferred chassis and loader crane are compatible; checking that equipment such as AdBlue and fuel tanks, exhaust systems, etc, will have been repositioned where necessary; specifying the right PTO (power takeoff), in terms of flow, pressure and usage, if factory fitted; and agreeing appropriate electronic controls, such as PTO and parking brake interlocking, engine stop-start and speed-up, and suspension lock out.

ALLMI makes the point, for example, that your chosen chassis frame may require additional flitching to achieve a lighter and lower structure: if so, this must be specified when ordering. Similarly, moving chassis equipment after delivery is needlessly expensive. Above all, the association warns that leaving issues until the crane is being installed can not only lead to more cost but, in some cases, make resolution impossible.

Refer to the ALLMI guide

It's a similar story with the choice of crane. Beyond reach and capacity, key specification factors, says the ALLMI guide, should include: attachments (their weight and how they affect the capacity of the loader crane and vehicle); net chassis payload and body length required; operator position and control preferences; whether an oil cooler is needed; and lifetime costs. However, the type of lift – what and where – also needs to be specified upfront.

And then, from the health, safety and technical regulation perspective, there is the EN12999 standard (the lorry loader equivalent to the Machinery Directive), currently being revised. That's why, says

Type approval

What about Whole Vehicle Type Approval (WVTA)? Les Drage, technical manager at TH White, who is also chairman of ALMII's WVTA working group, says it's a changing picture. The VCA (Vehicle Certification Agency) has now confirmed that, where the vehicle wheelbase is not interrupted and the only addition is mass, crane installations can be classed as an intervention, not another stage build, he says. "The only requirement is that all parties involved in the build communicate effectively so the crane installation does not affect anything the end-stage converter, manufacturer or bodybuilder needs to do, and can successfully type approve the competed truck."

That said, where the crane installer is also the bodybuilder, normal rules apply. Hence TH White's three-year development effort, which culminated in last year's accreditation by VCA to self certify front-, mid- or rear-mounted crane installations with any dropside or flatbed body. That applies initially to Iveco Stralis 26-tonne chassis cabs, but Drage expects the firm's Devizes and Bradford assembly plants soon to extend the approval to include DAF, MAN, Mercedes-Benz, Renault, Scania and Volvo trucks, as well as LCV manufacturers' vehicles.

The completed model used by TH White to achieve VCA type approval was an Iveco Stralis 26-tonne, three-axle chassis cab. It was fitted with a rear-mounted Palfinger PK13001K crane with radio remote control and a 6,880mm galvanised caged dropside body, built for Grafton Group.

Above and right: David Watson Transport approached Fassi dealer Walker Crane Services to install the largest crane possible on a three-axle tractor unit – for heavy lifting on sites with limited space. Walker collaborated with Volvo, specifying a 10-tonne front axle capable of hosting Fassi's newest F820RA.2.26 – an 82 tonne-metre crane with six hydraulic extensions – while not compromising the truck gvw

Les Drage – technical manager with Palfinger distributor and specialist bodybuilder TH White – any reputable crane installer offers consultative services on chassis and cranes.

"We conduct axle loading and stability calculations before we proceed with any enquiry, to see if the request stacks up, depending on what the customer wants to lift and where he wants to place it," he says. Such procedures are critical to ensuring that plated axle loads are not exceeded and that loads can be evenly distributed, both in running order (unladen) and at gross vehicle weight (when the load takes mass of the front axle). They also generate a theoretical stability envelope with the crane and its subframe in position, and determine the optimum outrigger requirements, if any.

Lifting calculations

"So when we're specifying a chassis for a very large, long-reach, front-mounted crane on, say, a 26-tonne six wheeler, our calculations will look at loading on the axles but also how to achieve real-world stability, particularly when the crane is fully extended," explains Drage. "The crane may be stable close in, but there may be non-linear lifting moments with the mass of the extending booms themselves also contributing to the tipping point."

That may well necessitate working with an OEM and third party converter, determining an adequate chassis and subframe – and then considering optimal designs and materials for the latter. It will also involve calculating the hydraulic extensions necessary to deliver a stable platform with outriggers for the full capacity of the crane, while retaining the chassis within its design weight under C&U (Construction and Use) regulations.

And it's much the same process for specifying lorry loaders for builders' merchant trucks – again optimising the vehicle for specified maximum payload (brick and block, pallets, etc), within a suitable wheelbase, body length and plated gvw, in line with the loader requirements. In this case, most operators prefer rear-mounted cranes, which means then designing the subframe to transfer the tipping moments along the chassis, without over-engineering the installation.

From a design and construction perspective, that's about running the stress calculations, taking into account the torsional rigidity and mass of the chassis, using the OEM's data. But from an operational perspective, it's about understanding the precise current and future duties of the truck and crane. For instance, will it be used to place materials kerbside, or over fences into customers' premises? If the latter, then the crane may need to be bigger and stronger – which costs more, in terms of money and mass, and may require a heavier-duty chassis cab.

Ian Roberts, UK managing director of Danish cranes manufacturer HMF, makes the point that, apart from the big boys, most companies in this sector don't have fleet engineers, so there has to be a reliance on the specialists. "We manufacture the truck cranes and subframes for the likes of Travis Perkins and Saint Gobain, to their bodybuilders' specifications," he says. "So we're now able to offer those configurations to the independents. Not only do they get a high degree of confidence that the combination will meet their requirements, because all the research and specification work has been done, but also we have the type approvals and can deliver within a 20-week lead time."

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