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Avoiding the crunch

Should anti-collision systems be fitted as standard on multiple crane sites? Would they have prevented the recent incident in London? C&A investigates

The recent spate of serious accidents has unfortunately raised the profile of the tower crane. So much so that in October the HSE issued a safety alert reminding tower crane operatives the importance of safe erection, maintenance, dismantling and operation.

Fortunately tower crane collapses - such as the Battersea incident in September in which two people died - are rare. However the very nature of the work a tower crane does mean that there is always the possibility of a collision - either with another crane or object - particularly on busier multi-crane sites.

Unlike France, the UK has shied away from making anti-collision systems mandatory. Is it just a matter of time before all tower cranes must be fitted with such as system or is the problem more complicated and would we be better served looking at safer work procedures as a way of reducing accidents?

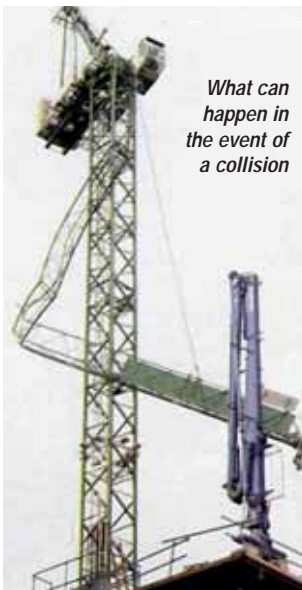
Historically, UK legislation tends to give us the rope, leaving it up to the company or individual to decide whether to hang themselves or not. The French regulatory system on the other hand is very explicit - even to the point of not just specifying that a system must be fitted, but how often a light must flash and the intensity of the bulb. We asked the HSE for its thoughts on the use of these devices, but so far it has declined to give a comment.

Currently, the crucial anti-collision reference in BS7121 Code of Practice for Safe Use of Cranes - Part 5 clause 10.7.4.4 states:

'Anti-collision devices are a useful aid to the operator when working on multi-crane sites but should not be relied on exclusively in place of operator vigilance and a safe system of work'.

It goes on to say (in clause 15.2) that it is 'essential that all multiple tower crane installations have an anti-collision radio system installed allowing open, unimpeded communication between tower crane operators so that in the event of the jib of one crane approaching another, the operator of the higher crane can immediately warn the operator of the lower crane'.

Whether operators involved in collisions are aware of the objects prior to impact is open to debate. Whether they would have the time to communicate and stop the jib (up to 35-40 degrees of slew is needed when fully loaded) is another matter altogether. The Code of Practice does however make the valid (but obvious) point that anti-collision systems will only warn of other tower cranes fitted with a compatible system - not of other equipment such as mobile and crawler cranes, access platforms and concrete pump booms that can also be a major, temporary problem.



What can happen in the event of a collision

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Typical UK legislation then - give the basics, leaving it up to us to interpret. Interpretation, of course, is only truly 100 percent clear following an incident and legal proceedings.

So has the UK got it right? Are the current systems comprehensive enough to cover all site eventualities and be relied upon totally, or is anti-collision just one area of a 'safe system of work' and therefore should not be specifically singled out?

Until the beginning of this year, industry estimates suggested that about 20 percent of cranes in the UK were fitted with anti-collision systems. Demand has soared over the last six months with Cranesafe - UK distributors for market-leading SMIE products - claiming a 37 percent increase over this period.

Cranesafe also cites an increase in rented systems although the major UK tower crane rental companies tend to buy the systems which they then hire out. However, they then top up additional demand by hiring additional units.

Some of this demand has to be attributed to the fact that the UK and Ireland tower crane population is growing very rapidly, from a low base. It may also be a result of increasing general safety legislation the result of which is self preservation and the hope of reducing the likelihood

Anti-collision devices are mandatory on sites such as this in France.



of an accident or liability in the courts if anything did go wrong.

On the limit

For many years limit switches have been available, physically restricting the operating area of the crane. On single crane sites, these can achieve the required result, but will severely restrict performance and efficiency on multiple crane sites, particularly if they over-sail each other. And once limited, the crane can never move into a prohibited area, even if there are safe working zones.

French legislation has created a base of local suppliers so inevitably the UK market for anti collision devices is currently dominated by French-based manufacturers. Leader by a huge margin is SMIE although more recently AGS has entered the market.

The latest SMIE products are the DLZ 341 a combined display, data logger and zoning system and the AC 243 Zoning and Anti-collision system, a fourth generation system which builds on over 20 years of continual development. Despite the introduction of its latest products, SMIE says that it has lots of older equipment - supplied five to 10 years ago - still out working.

"Technology has changed in terms of hardware but is not the critical factor," said Tim Rowley of Cranesafe. "With software upgrades, there is no reason why older equipment cannot still work well."

Although cranes have become more complex with an increasing amount of electronics, SMIE says that it works with manufacturers such as Liebherr and Wolfe to make its systems more of a plug-in device,

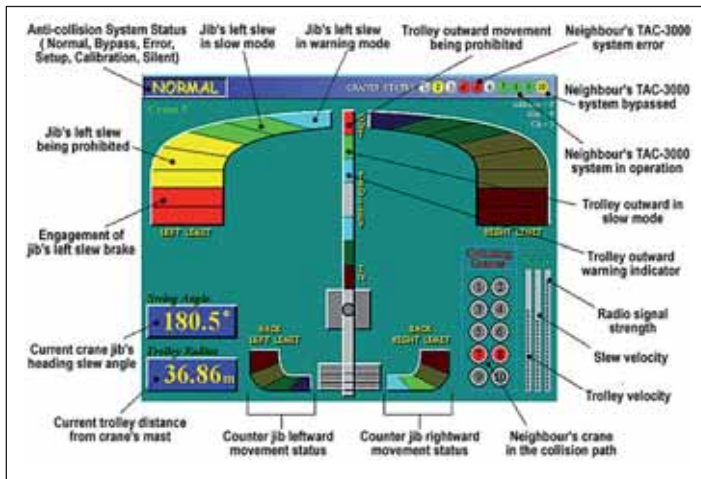
Modern construction sites have an enormous amount of equipment to reduce construction times



utilising a much of the cranes' electronics as possible.

Tower crane manufacturers have generally not produced systems because of compatibility problems between different cranes on one site. Potain has its Top Tracing system, the latest evolution of a product first marketed in 1998 known as the ZIZ 5 and SIZ 90.

French company AGS entered the European market about five years ago and believes sales in the UK will be as big as in France. Currently in talks with a potential UK distributor, the company has been concentrating on France, Spain and Italy. Its latest AC3 system has many sophisticated features including continually



The sophisticated TAC-3000 display with easy to read graphics

According to Potain, the system can be and is fitted and used with other marques of crane with systems at work in the UK.

Whatever the make of anti-collision system, they are all designed to improve construction site safety, efficiency and productivity. They do this by an early warning system alerting the operator of potential collisions or over-sailing of prohibited areas such as site boundaries, public areas, site offices and canteen and existing buildings.

The continued growth of the market - particularly when driven by existing or likely legislation - always attracts new entrants. Entering an established market gives the newcomer the advantage of seeing what is available and the chance to offer an improved system.

recalculating jib stopping distances due to wind and load, operator-friendly 'touch screen' technology, remote monitoring and quick installation.

One of the latest products to be launched into the global market is the TAC-3000 from Singapore-based e-Build Innovations. Alan Ho, e-Build's managing director explains the system's basic operation.

"For multiple crane sites, the TAC-3000 system operates in a 3D computer model incorporating all the tower crane's structural elements. Mast, front and counter jibs, tower heads, tie bars and trolley rope sags are digitised into the computer project file, together with site boundaries and any protected or no-oversailing zones. The system then computes the potential collision path between all the tower cranes

in motion on an 'X-Y-Z' dimension for any possible contact between physical parts and trolleys. Upon detecting a possible collision, the system provides audible and visual warnings to the tower cranes' operators and at the same time directly intervenes by overriding the operators' controls to slow down the jibs' or trolleys' movement until they stop before making contact either with other tower cranes' structures or protected zones in the collision path."

e-Build Innovations is currently in talks with UK and other European distributors to sell its anti-collision systems. Already very popular with Samsung and Hyundai in South Korea, the company is also pushing into the North American market with two distributors. Although early days, 30 units have been sold to Morrow Equipment (the Liebherr distributor which has more than 600 towers) and the McCarthy Group. It is also claiming a world record of 22 anti-collision systems on one project in Central Seoul, South Korea. Its distributor installed and commissioned 20, TAC-3000 systems in just over a week with two more to be installed when the remaining two tower cranes are erected.

"It is a fact of life that an increasing number of cranes with overlapping work areas are being used on construction sites to meet the increasingly tight construction schedules," said Ho. "However even in countries like USA (except for California) and South Korea where there is no mandatory requirement for anti-collision systems, contractors choose to use anti-collision systems for the safe operation of the multiple overlapping

cranes job sites and also improve the lifting work efficiency and productivity."

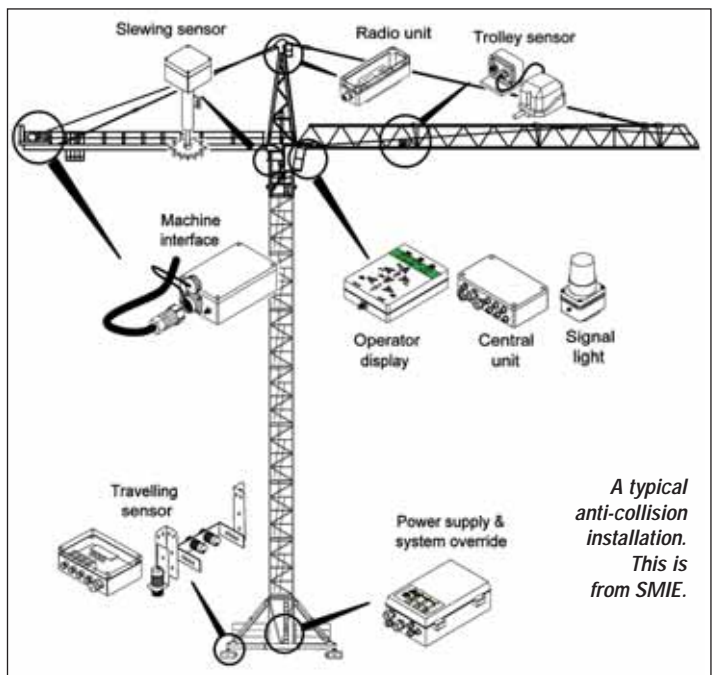
There is no doubt that anti-collision systems can be a valuable aid for the tower crane operator. No matter how highly trained and experienced he is, there is always the possibility of human error - particularly on very busy, multi-crane sites.

So why are such devices not more widely used? Most companies we spoke with expressed concern over reliability. Time after time we were told that the systems do not always work and thus can actually reduce safety should the operator become dependant on the device. Another concern expressed was the fact that if a system was fitted but not functioning, then the crane should not be used. So yet another thing to go wrong.

While these concerns are certainly based on factual experience, our look at the sector suggests that the past three years has seen a step change in the products offered with more comprehensive easier to use information. While the sector has also benefited from the arrival of more reliable and rugged electrical components with few parts that can fail.

The arguments against are very similar, if not identical to the ones made against Rated Load Indicators in those markets where they are not mandatory. Few in Europe would argue that these devices have not helped improve crane safety.

Having a sophisticated 'support' system keeping an extra 'eye' on operations has to be beneficial in reducing potentially fatal accidents.



A typical anti-collision installation. This is from SMIE.

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A crane with a view

Being able to see clearly is a prime requirement of operating any lifting equipment. The more the operator can see, the more efficient and safer the operation. Although technology and manufacturing advances have increased the popularity of equipment cameras, there are still areas that could and should benefit from having them fitted.

Load view camera systems, according to Orlaco - a Dutch company that has developed and produced crane camera systems for more than 10 years - can significantly improve crane efficiency as well as improving safety.

In tests carried out by the company involving an experienced tower crane operator placing loads out of



When mounted on a lattice or telescopic boom, the camera must use an oil-damped swing bracket to keep it vertical.

direct sight, it found that not only was the positioning more precise, but there was an average increase in productivity of 21 percent.

The improvements were attributable to the driver being able to see the banksman's hand and arm signals and seeing the load and final position.

Orlaco's latest system consists of an auto-focus zoom camera, mounted on the tower crane trolley or on an oil-damped swing bracket when on a lattice or telescopic boom. Using a wireless link or cable gives the operator live overhead pictures on a 7 or 10" LCD screen in the cab.

The camera is powered by means of an automatically charged battery

The load-view camera can significantly improve productivity and safety.



or from a power socket in the boom.

Orlaco maintains that whilst the camera system is most advantageous during blind lift operations, there is strong evidence that being able to view the load from directly above also has its advantages during non-blind lifting operations. The camera system allows the crane driver to determine the final position of the hook more precisely thus giving better and more confident control of the lift.

The use of load-view cameras is without question still in its infancy. In Holland, the only market where the system has been widely available over a period of time, 600 cranes or around 25 to 30 percent of the

national fleet of mobile cranes have a system fitted. In Holland crane producers such as Liebherr, Terex-Demag, Grove and Tadano-Faun have started offering the Orlaco system as an option while Spierings and Gottwald are already fitting them as standard.



The auto-focus zoom camera means the operator can view the load from directly above

Safety system saves lives

The number of deaths resulting from falls from a truck bed are apparently, only marginally below those resulting from falls from roofs. In a bid to provide a practical solution to this risk, Airtek Safety has designed a passive fall protection kit for truck loading and unloading areas using its airbag system. The standard 'TruckMat' System comprises 11 inflatable modules, in a range of sizes, that can accommodate a variety of truck and trailer length combinations and is inflated by either an electric or petrol driven pump. The width of air bags has been designed to accommodate potential fall heights of up to 3.5 metres. The company says that wider modules can be made to order for heights above this.

A classic application for this system is the temporary unloading areas for construction sites, particularly in city centre sites, where trucks pull up alongside the site and are unloaded by tower cranes. In such a situation a slinger has no option but to stand, not only on the truck bed, but is often obliged to climb on the material in order to attach the loads to the crane's hook.

The air bag 'loading dock' can remain in place in the case of regular deliveries, or quickly inflated for sporadic requirements. After the truck has driven between the bags, the ends can be pushed into place providing a safety net in the case of a fall.



Airtek has launched its TruckMat passive fall protection system for loading and unloading trucks.

Less bangs for your bucks

The Dangerous Substances and Explosive Atmospheres (DSEAR) Regulations 2002 were introduced to protect people from fires, explosive atmospheres and similar events arising from dangerous substances used in the workplace. As with most regulations it places a legal responsibility on the employer to protect its workers. The risk of explosion exists in many industries where flammable material such as gas, vapour and dust is present that could come into contact with an ignition source - for example from fixed or mobile equipment such as cranes and aerial lifts.

"Companies that have to deal with DSEAR, often do so in a very disjointed way," says Matthew Cook of Ex-Solutions Consulting, a relatively new division of the Pyroban Group. "A consultant typically visits a company and provides a lengthy report concerning hazardous area classification or sources of ignition, but often with no practical solutions. It is left up to the company to resolve any issues for themselves or find someone else to do it. This leaves room for error and unresolved issues."

Ex-Solutions Consulting claims to offer a full range of services from hazardous area classification through to training, equipment ignition assessment, explosion-proof conversion, testing, certification and product development. The company's consultants and engineers are fully supported by the Pyroban Group with access to some of its advanced engineering and manufacturing capabilities.

"Ex-solutions was set up specifically to understand the customer's needs and deliver bespoke solutions," said Cook. "Whether it is a manufacturing site or the design of a hydraulic pump, we take away the headache and much of the liability so that the customer can focus on their own business, secure in the knowledge that they are safe and in full compliance with statutory regulations."

Mobile equipment such as cranes and aerial lifts can be the ignition source that causes an explosion.

