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# DIY towers

Self-erecting tower cranes are becoming an increasingly common sight on smaller to medium job sites across the UK and Ireland. C&A asked a number of the UK & Ireland's players to explain the wave of popularity.

Hoping to cash in on the current trend is Belgium-based tower crane manufacturer Arcomet, which recently entered into a 50-50 joint venture with the UK's Airtek Safety to form Airtek Cranes. Airtek is now solely responsible for the distribution of Arcomet self-erecting tower cranes in the UK. According to Arcomet's joint managing director Leo Theyskens, the UK market has been a priority for the company for some time now and it already has a fleet of 40 self-erecting cranes on lease to a wide variety of builders but with a particular focus on the house-building sector. By the end of 2003 Airtek Cranes plans to have at least 80 self-erecting units leased throughout the UK and as many as 200 operating on sites across the country within the next five years.

"Self-erecting cranes are designed for use where access is awkward and space is limited," says Theyskens. "The cranes are quick and



Pictured is Arcomet's new 6 tonne capacity AF 38 truck mounted self erecting tower crane mounted on a Tadano Faun carrier. The unit carries a 38 metre maximum boom length where it can lift 1.8 tonnes.



Liebherr says that its new 32 TTR crawler-tracked fast-erecting tower crane can be prepared for operation by a single person in 30 minutes.

simple to erect, can move large quantities of material around a site quickly and easily and can be operated by virtually anyone on a site following a short training course."

The company says that self-erectors hold a number of key advantages over the use of either mobile cranes or fork lifts on site. The speed and efficiency of self-erectors enable site managers to employ "just-in-time" delivery systems for site materials as they allow large quantities of materials to be placed exactly where and when managers need them. There are also environmental advantages, especially for operation in sensitive urban locations. The cranes generate little or no noise, enabling extended working hours where noise restrictions apply and dramatically reduce the volume of mud and filth generated by a building site.

With 75 years experience in the self-erector business, Potain says that self-erecting tower cranes have become a permanent and essential feature of the building and construction landscape. It agrees with Arcomet in that, in addition to safety and reliability requirements, the most important features of modern self-erecting towers are convenience and simplicity of transport, erection and operation.

The Intermat exhibition in France last May saw the introduction of the MB 13, the latest addition to Potain's Igo hydraulic self-erecting range, which began with the 1.8 tonne capacity Igo 15 back in 2000. The company says that the fundamentals of the Igo concept are to provide cranes which are easy to transport and set up on site and offer reliable, efficient and cost-effective means of materials handling for smaller building and construction projects. The 1.8 tonne capacity Igo MB 13 has a light,



According to Mantis Cranes' Rober Rowlette, "One of the principal benefits of a self-erecting tower crane against a top slewing crane is in costs in terms of both set up and removal, as well as operating costs.

short caravan-type convoy with a permanent single axle and 2-position tow-bar and mechanical jacks and hydraulic erection mechanism that provides quick levelling and unfolding. With a 20 metre jib, 16 metre under hook height and a 700 kilogram lift capacity at a 20 metre radius, Potain says that the unit is suited not only to builders, but also carpenters, roofers and specialist renovation companies.

Potain recently delivered a unit to Ireland-based Mantis Cranes, which also took delivery of nine of Potain's larger 6 tonne capacity HDT 80 self-erecting units late last year. According

Mantis Crane's Rober Rowlette, "despite a slight slowdown in the Irish market, productivity is still king and more and more builders are coming around to the idea of the self-erecting tower.

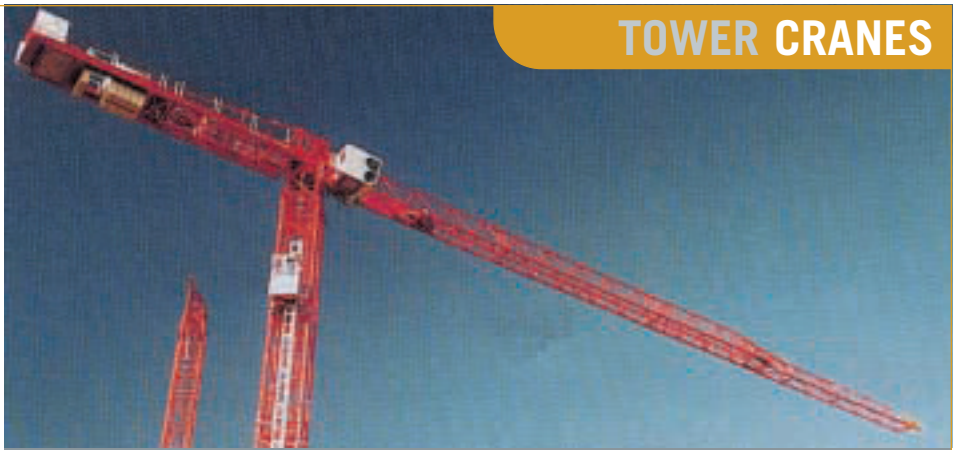
"Most project managers seek the most cost-effective way of completing the task over the duration of the project. Factors driving this calculation include set up costs, running costs, removal costs and project duration. In all these areas the self-erector beats other lifting solutions, such as fork lifts, mobile cranes and top slewing cranes, when operating within its effective load curve. The self-erector also has a smaller static footprint than a top slewing crane and the dynamic footprint of a mobile crane or forklift without the additional costs associated with them.

"Against a top slewer," continues Rowlette, "a key feature of a self-erector is that a dedicated driver and banksman/slinger are not required. The situation in Ireland and the UK is that the operator is 'ticketed' but is also able to act as his own banksman/slinger. In Ireland, we recently introduced a new ticket for self-erector operators which holds a prior requirement that the operator also be an experienced banksman/slinger as this is seen as load management and is viewed as being an equal part of the overall job. Considerable labour saving over top slewing cranes is gained from this.

"The most popular self-erecting cranes in Ireland are those offering the greatest capacities at a given radius. In particular, cranes in the 1 tonne at 30/35 metre radius



**City Lifting says that it plans to further expand into the UK self-erecting, self-drive market and is awaiting the delivery of its seventh Spierings folding tower crane.**



IT HAS taken two years in the making, but Germany-based tower crane rental company Wilbert Kranservice has manufactured its first ever crane. The WT200 e.ronic is an 8 tonne capacity tower crane unit with a 65 metre saddle jib, which the company says can be transported in just two truck loads.

are extremely popular and are well-suited to the Irish market, which is predominantly low-rise. These units typically have 20 metre plus underhook heights. Equally, cranes with 1 tonne radii at 45 metres are relevant to certain larger projects. I would estimate that there are about 225 self-erectors operating in Ireland and approximately 80 per cent of these are in the 30 –35 tonne/metre range with approximately 10 per cent being higher capacity units.

According to Mariano Moritsch at Terex Cranes, "although self-erecting crane sales to Ireland are not as strong as in the UK at present, it is nevertheless a growing market." Terex is currently present with about 25 units, mainly 32 and 36 metre jib units and is also currently producing a complete range of self-erecting tower cranes at its Milan facility.

Across the ocean in the UK, another long-standing advocate of a different kind of self-erecting tower crane is London-based City Lifting, which introduced the Spierings brand of truck mounted self erecting cranes into the UK for the first time around three and half years ago. The company currently operates six, 8 tonne capacity units and is currently awaiting the delivery of a seventh unit, a SK1266/AT6, capable of lifting 1.7 tonnes at 60 metres.

"We are investing heavily into self-erectors," says Bob Jones, general manager of City Lifting. "The UK market is a lot more competitive than 12 months ago and we will be looking to expand further into the self-erecting, self-drive market. The Spierings unit can be erected on site by remote control in 15 minutes, offers a viable alternative to traditional mobile cranes with large ballasts and is very popular for confined high rise project sites."

Also taking on board the upward trend in the UK is Liebherr which recently launched its new

32 TTR fast-erecting tower crane. "There has been a significant move towards small cranes with adaptability in mind," says Dermot O'Neill, sales & service manager at Liebherr Great Britain. "The 32 TTR is more environmentally friendly than say a telehandler and, because of its manoeuvrability, could replace any number of conventional tower cranes on a job site."



**Vanson Cranes has added this new Raivan MR36+3 'flat top' city tower crane to its crane hire fleet. The 4 tonne capacity unit can lift 1.05 tonnes at a 36 metre maximum jib radius, which can be reduced by 6 metre increments to 18 metres.**

The 32 TTR is the first tower crane produced by Liebherr that features a crawler-track undercarriage. The unit can travel with the tower erected at a maximum angle of 15 per cent in the longitudinal and 10 per cent in the traverse direction. A specially designed trailer also allows the unit to carry 12.2 tonnes of ballast to its operation site, where it can position the ballast itself. When travelling to the building site, the unit can travel with the complete equipment installed, including the undercarriage, tower, jib and generator. The unit's telescopic jib can be extended to 7 different lengths of 18, 20,22,24,26,28, and 30 metres, while the tower can be set to three different hook heights of 14.5, 19 and 24 metres. Liebherr says that the 32 TTR can be prepared for operation by a single person in 30 minutes, and says that it will offer a more versatile lifting solution to conventional models on confined project sites.

## Tower crane safety project put on hold

The UK Department of Trade & Industry has frozen funding into a UK research project into tower crane safety headed by Construction Industry Research & Information Association (CIRIA). The DTI said that it would

not hand over its promised contribution of £70,000 until the UK's Health & Safety Executive completes its inquest into the Canary Wharf tower crane disaster which killed three workers in May 2000.

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# Crowd control

**The use of anti-collision systems on tower cranes is nothing new, least of all in France where the use of the systems is a legal requirement. By comparison, acceptance in the UK has been much slower. Based on a presentation given by Alain Voyatzis at the recent Crane Safety Conference 2003, C&A takes a look at why more and more of the UK's tower crane rental companies are warming to the idea.**

A CITY skyline these days looks almost incomplete without the image of tower cranes standing guard over their own creations. They have more-or-less become a symbol of a continued socioeconomic expansion which, by its own nature, calls for construction sites to be conducted at an ever-increasing pace. An ever-increasing pace, however, means more and more machines on site, and increasingly congested sites calls for increasingly stringent safety requirements.

Anti-collision systems for tower cranes were first brought to industry attention, as a product of France, in the 1980s in response to the growing number of tower crane collisions which represented one of the main causes of tower crane accidents behind only collapse, power line contact and load falls. In 1987, the fitting of such systems to tower cranes became a legal requirement in France and remained very much a French phenomenon until the mid-90s when wireless communication technology freed construction sites from the fragile and cumbersome cable interconnection between cranes. It was at this point that the UK began to seriously test anti-collision technology on its tower cranes, even though it is not a legal requirement due to what Tim Rowley, general manager of the UK's Cranesafe, wholly owned subsidiary of SMIE, calls "looser regulations" than those in France.

Today, however, Rowley estimates that the company has distributed some 250 anti-collision systems to UK tower crane rental companies including, Select Plant Hire, Bovis Construction, Balfour Beatty and Delta Tower Cranes, and the number is rising. The company says that undoubtedly the highest profile contract to date has been the supply of its SMIE A30 anti-collision equipment to co-ordinate up to seven Comedil saddle and luffing jib cranes on hire to Bovis Construction for the construction of the new Scottish Parliament building.

**The UK's Cranesafe says that its highest profile contract to date has been the supply of its SMIE A30 anti-collision equipment to co-ordinate up to seven Comedil saddle and luffing jib cranes on hire to Bovis Construction for the construction of the new Scottish Parliament building.**



So what is the method behind anti-collision technology? Fundamentally, an anti-collision system will calculate the amount of 'free space' required to bring a moving crane to a halt if a potential contact situation between more than one crane is detected. For a heavily loaded crane jib slewing at full speed, in excess of 90 degrees may be needed to bring the crane to a halt. Add a second crane travelling in the opposite direction and the stopping distance required to avoid a collision increases to 180 degrees or more. From this it is easy to see the level of anticipation that is required to avoid contact. The anti-collision system method can be broken down as follows;

- Geometric, deterministic calculation of the position, speed and free space needed to allow the unrestricted halting of the crane in view of the braking capacity of each movement on a moment to moment (real-time) basis.
- Verification that the space needed by all other movements of all other cranes does not overlap or interfere with the crane in question.
- When the beginning of an overlap is detected (risk identification) a breaking process is initiated for all crane movements involved.
- Correspondence to a 2-D plan projection analysis.

In addition, current development for future generation systems may provide additional benefits including;

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## SAFE HAVEN

At this point, it is important to stress that although the systems have been designed with many fail-safe features, they are not to be considered as fully failsafe safety devices, but rather as operator support systems. A long list of crane defects are being identified by today's systems, such as certain, but not all, component failure on a crane or communication failure between

*The cost of a single accident in terms of crane down time, site down time, material damages, worker injury and the damage to a company's image is far greater than the cost of installing an anti-collision system.*

any two systems that must exchange information.

Once a defect has been identified, a system's behaviour is adapted to make the best possible use of all the remaining information available to it, such as:

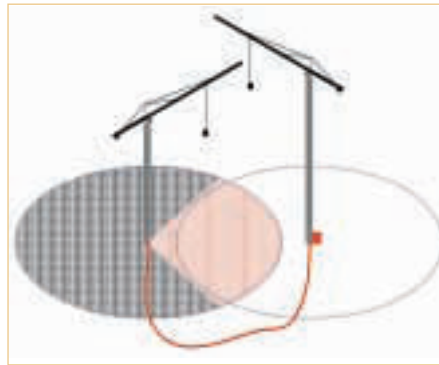
- Internal defect of the system = complete blocking of the corresponding crane.
- Override of the system = complete freedom of movements of the corresponding crane.
- Opposite crane system with defect, override or communication failure = the systems operate according to available information, making no guesses about unknown elements.

Under normal operation the crane operator obtains a support that brings tangible risk reduction during his operation and thus a clear safety benefit. When a defect materialises, in most cases this is identified and dealt with by the system in such a way that only completely conscious and responsible corrective action has to be implemented in order to continue operations until repairs take place. If the exceptional case of an unidentified defect arises, until such time of detection the only increased risk would be due exclusively to a driver attitude of active dangerous driving, which is an attitude chosen under individual responsibility, and not induced by the equipment. It is true that if an operator misjudges a situation he will not be protected against his judgement while the system is failing. But neither would he/she have been protected in the absence of a system from the outset. In the case of an unidentified defect, the operator is faced with a situation of reduced safety improvement and not increased risk.

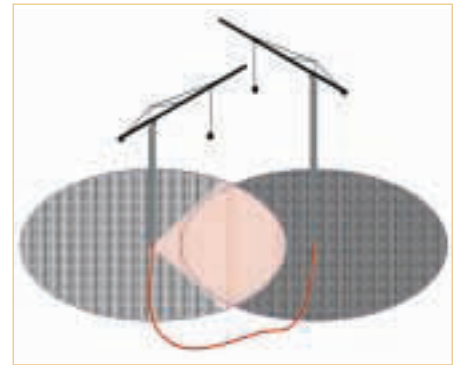
In short, the crane operator is better protected for his or another operator's potential misjudgements and is only exposed to higher risks if he or any other operator chooses to operate recklessly.

## ROUGH RIDE

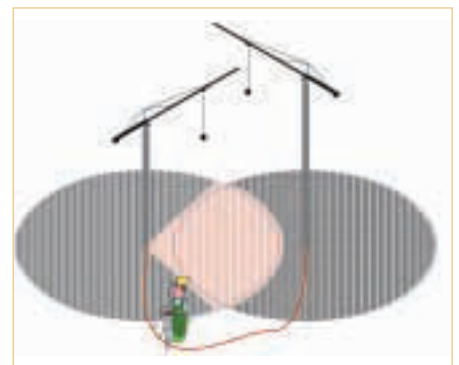
Despite the advantages of anti-collision technology general market acceptance has not been as straight forward as one might think. From a productivity perspective, this acceptance has been hindered by the fact that the concept



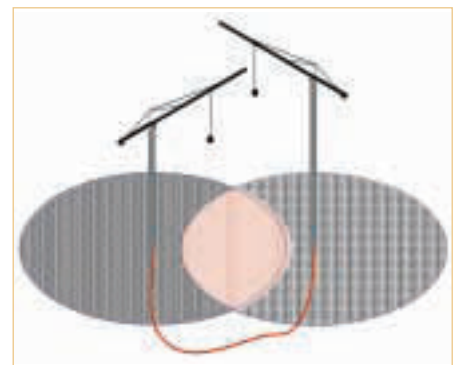
When a high crane is overridden (thus 100 per cent free), the low crane is limited as shown.



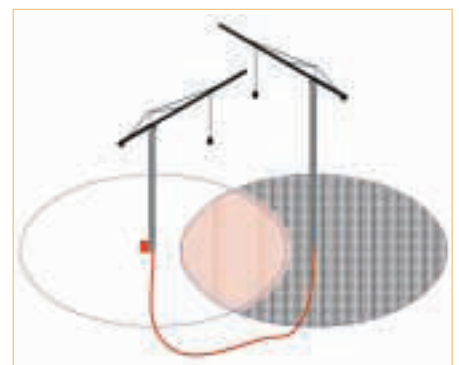
When a high crane system detects an internal defect (thus 100 per cent blocked), the low crane is limited as shown.



When communication between cranes is interrupted, both cranes are limited as shown.



When a low crane is overridden (thus 100 per cent free), the high crane is limited as shown.



When a low crane system detects an internal defect (thus 100 per cent blocked), the high crane is limited as shown.

was imposed in many countries, such as France, through mandatory regulations. The systems were initially seen to be too expensive without any visible immediate compensation or return. The installation and programming process was seen to use up valuable crane time and when eventually installed would bring new limitations to a crane's movements, since they stop them against the operator's, or even the site management's will.

On closer inspection however, the advantages become clearly evident. It seems obvious that a crane operator should not have to worry as much about verifying the whereabouts or the potential behaviour of all the other cranes around him/her on a project site. The operator is able to focus his/her attention primarily on the job in hand – i.e. his/her own load. The early detection of the potential objective inhibition from the presence of another crane on site will impose a reduced approach speed with a positive effect on productivity that may be less than intuitive. Consider the example of the efficiency that would be brought about through the implementation of an optimal maximum speed limit on the M25 and the elimination of hard sporadic braking.

But, perhaps most importantly in terms of productivity gains is a reduced accident rate. The cost of a single accident in terms of crane down time, site down time, material damages, worker injury and the damage to a company's image are far greater than the cost of installing an anti-collision system.

Thus, not only is productivity not hampered by the implementation of anti-collision systems, but, on the contrary, rather very much enhanced. The fact that the inclusion of anti-collision systems has been a mandatory requirement in France for more than 15 years, has not prevented French building companies in keeping their position amongst some of the fastest builders in the world.

C&A

Alain Voyatzis is managing director of France-based crane safety system specialist SMIE. This article is based on a presentation given at the Cranes Safety Conference held in London in May 2003.