



CRANE SAFETY BRIEFING

London Hazards Centre Response to Health and Safety Executive CD 239

Proposal to remove

The Notification of Conventional Tower Cranes Regulations 2010 (S.I. 2010/333)

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Cranes “Bill” – for flowers, not funerals !

By Graham Shepherd

There's not a lot more magnificent
than tower cranes manoeuvring on high;
(as long as safety measures aren't
as impracticable as pie in the sky....!)

Once assembled, all cranes should be LOLER examined –
(not just registered) to receive their “MOT” –
by independent, third-party, licensed engineers,
allowing HSE inspectors to better police crane safety.

All crane operators should be licensed.
The CPA's Best Practice Guide should be turned
into an HSE-enforced Regulation –
discouraging everyone from getting their fingers burned.

Indeed, everything needs to be done to promote safety
by a dedicated team to monitor all construction plant.
Proactivity might prevent crying over spilt milk;
(or, more seriously, unnecessary harm), c/o an HSE grant.

Any cost is “peanuts”, if it leads to saving lives !
Cut-backs are misguided. Funding safety's so worthwhile.
Tower cranes deserve a “pick-me-up”; (well, something of a lift !)
Regulations shouldn't be removed. Cranes deserve the “extra mile” !

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Introduction: Tower Crane Disasters

Tower cranes came to the attention of the UK public following a number of crane collapses which resulted in nine fatalities - five in London. In the decade 2000- 2010, there were more than 60 accidents involving cranes including 9 deaths and 25 serious injuries in the UK.¹

Significant UK Incidents involving tower cranes

<i>Date</i>	<i>Incident</i>	<i>Company</i>	<i>Fatalities and other serious injuries</i>	<i>Fines & costs</i>
May 2000	Canary Wharf	Hewden Tower Cranes	Killed: Peter Clark, 33, Martin Burgess, 31, Michael Whittard, 39.	No HSE prosecution - but Hewden Stuart said it cost the firm £500,000 after it shut down its entire tower crane fleet for safety inspections ²
Feb 2005	Worthing	W D Bennett	Gary Miles, 37, Steven Boatman, 45 another worker severely injured	WD Bennett fined £125,000; subsidiary Eurolift £50,000. WD Bennett £264,299 costs.
Sept 2006	Battersea	Falcon Cranes	Michael Alexa, 23 Jonathan Cloke, 37	
January 2007	Liverpool	Falcon Cranes	Zbigniew Swirzynski	no HSE prosecution
March 2007	Liverpool	Sitewold Construction Bryn Thomas Crane Hire	Mark Thornton, 46	Bryn Thomas Crane Hire Ltd (in administration) £4,500 Frederick Scott – operator- £2,500. Judge Gilmour QC said an “appropriate” fine of £300,000 could not be imposed because Bryn Thomas in administration. Sitewold (ceased trading) £50 Benjamin Lee, Managing Director, £80,000 plus £18,478 costs. ³
June 2007	Croydon	Select Cranes subsidiary of Laing O’Rourke	Four workers narrowly escape death. One was seriously injured & three others trapped 45 metres in the air for seven hours. The operator trapped in the cab	£100,000 fine and £33,196 costs.

¹ HSE/NW/42Pocklington. 29.10.2010

² <http://www.cnplus.co.uk/news/crane-crash-cost-500k/904477.article>

³ HSE/NW/06Siteweld 16.12.2011

July 2009	Liverpool	Bowmer & Kirland; Bingham Davies	hanging from the side of the building had to be winched to safety by a rescuer suspended by cables from a second crane. Ian Gillham, 55, multiple injuries and legs paralysed	£280,000 fine for B& K £1,000 for BD Massive damage to property Bingham Davies out of business.
December 2007	Forest Hill London			
Jan 2010	Preston	Pocklington		£15,000 fine

The HSE analysed tower crane incidents throughout the world looking at 86 incidents between 1989 and 2009, 10 of them in the UK. They concluded the causes of the accidents, when they could be identified, were dominated by erection/dismantling/climbing and extreme weather. No particular crane manufacturer was identified as being more prone to incidents than any other. An analysis by Tim Watson, Tim Watson Consulting, of 51 serious incidents worldwide involving tower cranes only in a similar period⁴, shows the UK to be the country with the most serious incidents. The worst 5 countries are:

- UK – 8 incidents
- China – 6 incidents
- USA – 5 incidents
- Russia – 4 incidents
- Netherlands – 4 incidents.

The UK Tower Crane Industry

There are around 1500 tower cranes in the UK and, at any one time, around 1000 of these are in use⁵.

In the UK the companies involved in these incidents are not small firms. Falcon Cranes, responsible for 3 deaths, owned 20% of UK's tower cranes, had a fleet of 220 and a turnover of nearly £20 million⁶ in 2007. Select Cranes who owned the crane which crashed in Croydon is a subsidiary of Laing O'Rourke. Peter Philips Managing Director of Hewden Tower Cranes, which killed 3 workers when it crashed in Canary Wharf in May 2000, was the Chairman of the Construction Plant Hire Association Tower Cranes Interest Group (TCIG) up to 2008⁷.

The crane hire industry has not had a good record on health and safety. In 1994 Baldwins Industrial Services Ltd, at the time one of the bigger hire companies, was fined £70,000 for issuing false crawler crane test certificates and hiring out untested cranes. The director Richard Baldwin was fined £20,000⁸.

⁴ Tim Watson Consulting Ltd
http://www.khl.com/servlet/file/Tim%20Watson.pdf?ITEM_ENT_ID=46975&ITEM_VERSION=1&COLLSPEC_ENT_ID=38?q=tower-crane-stability; accessed 22.5.2012.

⁵ The Construction Plant Hire Association

⁶ Penman and Sommerland, Mirror.co.uk, 26.7.2007, <http://blogs.mirror.co.uk/investigations/2007/07/falcon-crane-bosses-must-not-g.html> accessed 22.5.2012.

⁷ Construction Plant Hire Association <http://www.cpa.uk.net/p/Tower-Crane-Interest-Group/> accessed 22.5.2012.

⁸ Construction News 9.11.1995

Shortly after the Canary Wharf collapse it was revealed that it was the third major safety scare involving cranes on Canary Wharf in the previous six weeks⁹ and that safety paperwork had gone missing¹⁰.

HSE Enforcement

In 2005, after five workers had been killed in tower crane incidents, concern was such that HSE announced a blitz of all tower crane companies would be carried out with inspectors visiting headquarters and sites to audit management systems¹¹. Mobile crane companies, 21 in total, had already been inspected in similar fashion in 2005. Yet the jury in the inquest into the deaths of Michael Alexa and Jonathan Cloke in September 2006, said of Falcon Cranes:

“At that time there was no adequate formalised process and procedure to allow for faults to be managed, escalated or investigated. In addition there was a vacuum of structured management in the company’s service department.”

In October 2006 sometime after the Battersea deaths HSE issued a safety alert on the use of tower cranes, which amongst other things said examinations should be carried out after erection:

“..... by a competent person who is sufficiently independent and impartial and is not involved in the erection process.”

Around this time the crane drivers organisation United Crane Operators were demanding a tougher inspection regime and sell by dates on old cranes¹².

In January 2007 following the Liverpool Falcon collapse which killed a site worker and injured the crane operative, a prohibition notice was served on all Falcon Cranes that had not been independently examined. 180 Falcon cranes were taken out of service.¹³ According to the Construction Safety Campaign it was later found that 10% of these cranes had failed to meet the safety standard requirements.

The Notification of Conventional Tower Cranes Regulations 2010 (S.I. 2010/333)

Following the Lofstedt review HSE are consulting about removing these regulations saying the HSE stands to gain £8,000 and the crane industry £51,000 (it costs just £20 each time a crane is registered).

We echo comments by Construction Safety Campaign supporters that this cost is “peanuts” and can easily be carried by the industry.

In addition, we would emphasise this cost bears no comparison to some of the costs highlighted in the first table - which do not include human costs, including NHS costs for the severely injured, civil claims for damages, costs of replacement of damaged cranes and of rebuilding damaged property.

Also this cost bears no comparison to the US OSHA estimate in 2008 of construction industry costs of \$50,000 per injury, and \$7.5m per fatality (see below Economics of better regulation from the United States).

The regulations are not onerous. The crucial requirements regarding registration as well as documenting when and where a tower crane has been erected on site, are that the register records:

⁹ Construction News 25.5.2000

¹⁰ Construction News 22.6.2000

¹¹ <http://www.cranestodaymagazine.com/news/hse-to-blitz-uk-tower-crane-industry/>

¹² Construction News 2.11.2006 <http://www.cnplus.co.uk/news/drivers-fear-ageing-cranes/375404.article>

¹³ see : <http://www.healthandsafetyatwork.com/hsw/content/hse-orders-falcon-pull-cranes-checks> and technical alert : <http://www.hse.gov.uk/construction/pdf/towercranes.pdf>

- the type and age of the crane and who owns it
- the date of the last thorough examination as required by the Lifting Operations and Lifting Equipment Regulations 1998, LOLER
- whether that examination revealed defects which could cause imminent risk of serious injury
- re-registration after a crane is reconfigured, eg extended on site; if something untoward happens; if the examination expires in the course of the job.

Whoever has the responsibility for ensuring that the crane is thoroughly examined by a competent person (as required by LOLER) should also ensure that the notification is made to HSE. This is normally the Principal Contractor on a site - not the crane supplier.

Problems:

- it can be up to 14 days before registration has to take place & allows for notification without thorough examination.
- the examinations can be done by an in-house person - not a truly independent expert
- the register only covers tower cranes: not self-erecting cranes or mobile cranes
- the industry is monitoring itself
- Competence is not defined - although the Provision & Use of Work Equipment Regulations 1998 requires that "every employer shall ensure that all persons who use work equipment have received adequate training for the purposes of health and safety, including training in the methods which may be adopted when using the work equipment, any risks which such use may entail and precautions to be taken".

UK Voluntary Agreements

Best practice guidance on crane safety, including their inspection, maintenance and thorough examination, is found on the Strategic Forum for Construction Plant Safety Group's website: <http://www.cpa.uk.net/p/Plant-Safety-Group/>.

Crane maintenance and thorough examination

In 2006 the crane drivers organisation United Crane Operators were demanding a tougher inspection regime and sell by dates on old cranes¹⁴.

In the forward to the Guide *Maintenance, Inspection and Thorough Examination of Tower Cranes*, Stephen Williams, at the time HSE Chief Inspector for Construction and Chair of CONIAC¹⁵ says:

"However, investigations into recent accidents have shown that enhanced standards of maintenance and thorough examination could have reduced the chance of death or injury."

The guide was produced in May 2008 by the Tower Crane Interest Group, TCIG, of the Construction Plant Association. Drawing up the guide involved discussions with the Strategic Forum for Construction (SFfC) Tower Crane Group, Construction Confederation, HSE, the Major Contractors Group, National Construction College, Battersea Crane Disaster Action Group, Safety Assessment Federation (SAFED), United Crane Operator's Association¹⁶. The working group drafting the guide included a representative for insurers.

¹⁴ Construction News, 2.11.2006, <http://www.cnplus.co.uk/news/drivers-fear-ageing-cranes/375404.article>

¹⁵ Construction Industrial Advisory Committee - part of HSE - with trade unions and employer representatives

¹⁶ <http://www.cpa.uk.net/p/Tower-Crane-Interest-Group/> accessed 1.6.2012

The 13 Annexes provide a range of detailed practical information and checklists for thorough examination, including daily, weekly, in-service and pre-delivery maintenance checks. It recommends regular, that is monthly, management review of maintenance records.

Thorough examination: is required at installation; at periodic intervals 6 months or 12 months; after exceptional circumstances.

LOLER permits thorough examination to be carried out by competent persons from both third party in-service inspection organizations and “in-house” examiners. LOLER says: **It is also “essential that the competent person is sufficiently independent and impartial to allow objective decisions to be made.”**

Most **third party inspection bodies** that carry out thorough examinations of tower cranes will be members of the Safety Assessment Federation and hold accreditation to ISO 17020. The United Kingdom Accreditation Service (UKAS) is the sole UK body authorised by Department of Business, Innovation and Skills to carry out accreditation to ISO 17020.

In house examination

The guide recommends demonstrating independence by accreditation to ISO 17020 with specific points about competent examiners:

- they will not examine their own work
- they have the authority to stop the crane being used
- they are authorised to send reports to HSE when there is serious and imminent danger
- they must not be paid by results.

The guide says (page 40):

“From this, it is clear that thorough examinations, following erection, carried out by any member of the erection team (including the supervisor) would not have the required degree of independence. Members of the erection team may however, undertake supplementary inspections, tests and reports requested by the competent person.”

To demonstrate competency the guide recommends (16.3 Qualifications and Experience page 43) both appropriate recognised academic qualifications and a relevant level of practical experience in a related engineering field. Examples:

- Engineering Technician from the Engineering Council or equivalent (e.g. appropriate ONC with relevant experience) plus 5 years minimum experience within a relevant discipline with at least one year working within an engineering discipline related to lifting equipment;
- Person trained in a relevant engineering discipline with a recognised and documented engineering apprenticeship (in lieu of an academic qualification) plus 5 years minimum experience within a relevant discipline with at least one year working within an engineering discipline related to lifting equipment;
- Level 3 (Tower Crane Erection) or Level 4 (Engineer Surveyor National Vocational Qualifications (NVQ) are available for competent persons carrying out thorough examination of tower cranes.

It is recognised that continuous professional development and training records are kept for all competent workers responsible for thorough examination.

Training of crane operatives

A study published in September 2006 by Beavers for the American Society of Civil Engineers¹⁷, looked at 127 crane related fatalities in the United States between 1997 - 2003, there being many earlier studies of greater numbers of crane deaths by the Federal Occupational Safety and Health Administration, OSHA. This

¹⁷ Beavers, Moore, Reinhart, Schriver, *Crane Related Fatalities in the Construction Industry*, Journal of Construction Industry and Management ASCE, September 2006.

study concludes: “it appears to the writers that there is a systemic problem in the construction industry: lack of training of those who are often required to work in and around crane lifting operations.” And two of their recommendations were:

- a “diligent” competent person should be assigned by the manager of construction operations to be in charge of overall crane operations with complete authority to stop unsafe operations;
- several types of crane-related construction fatalities will not be reduced until crane operators and riggers are required to be qualified with requalification perhaps every 3 years.

Training and licensing requirements vary enormously throughout the world as the following tables show¹⁸

Country - Europe	training and licensing requirements for crane operators
ESTA the European association for cranes and heavy transport	From April 2010 has begun to develop a unified licence - so a certified operator in one country can work in another. Goal is an EU crane licence.
Denmark, Norway, Sweden	A legal requirement to have a certificate. A crane operator certificate in Denmark requires a two-year apprenticeship at a crane company. Apprentices also study crane theory part-time at one of two special crane schools in the country. At the end of the two-year period, the apprentice has to pass both a written test and a practical test at the school.
Netherlands	The Netherlands is thought to be the only EU country with a programme accredited to the international standard for personnel certification and training, ISO:17024. A licence is a legal requirement on construction sites, though not in ports or if working in logistics or demolition in your own facility. There is an exemption for four months on a single construction site, to allow a foreign contractor to bring in its own operators for a one-off project.
UK	There is no legal requirement for crane operator certification—only a general requirement that machine operators are adequately trained. There is the Construction Plant Competence Scheme (CPCS), introduced in 2003 & adopted by the construction contractors’ association for working on any member’s sites. A CPCS card is required on major construction sites for slinger/signallers and lifting operation supervisors. The mobile crane card has two categories: blocked duties and pick-and-carry duties. Both theory and practical skills are tested at approved centres. All card holders are required to maintain a log book of their work experience and subsequent refresher training.
Germany	No legal requirement for certification, but there is a widely adopted and formalised industry training scheme
Greece	Experience required but nothing specified in law
Poland, Romania	No requirements

**Country - training and licensing requirements for crane operators
non Europe**

¹⁸ Bishop, P, 29.7.2010, *Being Competent*, *Cranes Today Magazine*, <http://www.cranestodaymagazine.com/features/being-competent>, accessed 1.6.2012.

<p>US</p>	<p>By November 2014 all crane operators in the USA will require certification to show that they have passed written and practical tests. Certification is already a requirement in 17 states and certain cities. The US government is putting its weight behind the National Commission for the Certification of Crane Operators (NCCCO), an industry body established in 1995 by the Specialized Carriers & Rigging Association to introduce a formal certification regime to the USA. Across the States, more than 50,000 crane operators have achieved NCCCO certification since testing began in 1996. Operators are required to re-certify every five years by sitting a written exam and attesting to 1,000 hours of crane-related experience. Those without 1,000 hours have to do a practical exam.</p>
<p>Japan Australia</p>	<p>Mandatory licences for crane operators from 1947. Valid for life. SafeWork Australia, introduced the National Occupational Health and Safety Certification Standard for Users and Operators of Industrial Equipment in 2001 for: crane and hoist operation; scaffolding and rigging; and pressure equipment operation. Previously state based certification schemes. Different classes of licences for different crane sizes: There is a separate licence for tower cranes. Tests every 5 years.</p>
<p>New Zealand</p>	<p>From 2010 the Crane Association of New Zealand has a code of practise & provides training.</p>

Economics of better regulation from the United States

When OSHA consulted about crane safety regulations recommended by C-DAC in 2008 (C-DAC stands for Cranes and Derricks Advisory Committee), they included a draft economic analysis of the impact of the new standard, particularly regarding costs for small businesses. OSHA estimated they could avoid 53 fatalities and 155 injuries every year and that at industry costs of \$50,000 per injury, and \$7.5m per fatality, the industry stands to benefit by \$406m per year.

Stricter regulation costs: operator qualification and certification will cost an estimated \$37.3m per year; tighter rules on crane assembly and dis-assembly will cost \$33.5m. Power line safety rules will cost \$30.8m and crane inspections \$21.6m.

But the industry in the US potentially gains a net benefit of \$283m from better regulation.¹⁹

And not forgetting....

Craig Page, 26, was killed by the boom of a crawler crane as he helped excavate a seven-foot basement in Denning Road, Hampstead in March 2009. At a prosecution at the Old Bailey this year in February it was revealed:

- The crane fell after hoisting a skip which could have weighed almost three times the safe amount.
- Experts agreed that an alarm system, that should have disabled the crane, malfunctioned.

¹⁹ Cranes Today, 8.11. 2008, <http://www.cranestodaymagazine.com/features/c-dac-finally-arrives/>

- The crane lift supervisor was in a hut at the time of the accident.

Harris Calnan Construction was fined £80,000 and ordered to pay £66,244 costs and the director Neil Harris was also fined.

Although not involving a tower crane, this incident highlights our general concerns about crane safety particularly the need for adequate training, and for strongly enforced regulations rather than reliance on the industry policing itself.²⁰

Conclusions and recommendations

- the true costs of lack of regulation are enormous and not the £51,000 it costs to run the crane register.
- the register must be maintained and extended to all cranes. If the public are reassured by a register it is not necessarily because they can call about particular cranes but because they believe the existence of a register allows HSE inspectors to better police crane safety.
- the cranes should be registered immediately they have had the LOLER thorough examination.
- however the register is not the crane MOT - the LOLER thorough examination is - this should be done by independent third party licensed engineers.
- all crane operators should be licensed.
- the Construction Plant Association's Best Practise Guide should be turned into a HSE enforced Regulation and Code of Practise: voluntary agreements are not enough.
- HSE should be funded to provide a dedicated team of engineers to monitor construction plant and equipment including cranes; or failing that, London should consider setting up its own city wide Building Inspectorate as they have in New York and other American cities, to monitor all aspects of the safety of building projects.

²⁰ Tom Foot, 2.2.2012, Camden New Journal, <http://www.camdennewjournal.com/>