



AN INVESTIGATION INTO CRANE AND SCAFFOLD SAFETY IN CONSTRUCTION INDUSTRY

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The aim of this study is to determine whether construction sites involving cranes and scaffold in Australian large construction sites have been in compliance with the existing Work Health and Safety (WHS) requirements. The research comprises three case studies which investigated the causes of crane and scaffold safety incidents that occurred in New South Wales. The results of the case study on a number of separate sites in Sydney, NSW have shown that without stringent safety procedures in place to abide by the WHS Act and Regulations, major accidents can occur and can cause serious injury and could cause potential fatalities while working with cranes and scaffold. Results also found that a number of limiting factors including communication skill, regular maintenance, safety checks, safety culture and safety investments could contribute to the severity of the incidents.

Keywords: Scaffolding, Falls from height, Australia.

1 BACKGROUND

According to Safe Work Australia (2012), the Construction industry employed 1.01 million people in 2011–12, or 9% of the Australian workforce. The construction industry has a major impact on Australia's economic growth. Master Builders Australia state that 'the building and construction industry is a key driver of the Australian economy and makes a major contribution to the generation of wealth and the welfare of the community, particularly through the provision of shelter'. To ensure the construction industry stays strong in Australia, it is imperative that strict rules and regulations are set out in regards to workplace health and safety (Safe Work Australia 2012a). Australia's safety standards are among the best in the world, although there are still opportunities for improvement. Over the five-year period from 2007–08 to 2011–12, 211 Construction workers died from work-related injuries and there were 13,735 serious injury claims (Safe Work Australia 2012b). Of these numbers, being hit by moving or falling objects accounted for 29 deaths and nearly 2,200 or 16% of the serious injury claims. This type of incident is often related to the use of cranes and scaffolding in which improper procedures and maintenance can have fatal effects. There is a need to ensure crane and scaffold contractors are following the correct Work Health and Safety procedures that are in place, as well as ensuring plant and equipment is maintained for safe use throughout its operational life. Regulatory issues related to crane and scaffold safety have come under increased scrutiny as a result of recent incidents that occurred in New South Wales, Australia (Safe Work Australia 2013). The aim of this research is to determine whether workers operating cranes and working on scaffolding have

the necessary skills to comply with the current WHS laws and regulations in Australia. The objectives of the research are the following:

- (i) Compare the procedures set out by the WHS Act and Regulations in regards to cranes and scaffold compared to what is actually happening on construction sites in Australia;
- (ii) Investigate the causes of crane and scaffold incidents that have occurred in the New South Wales suburbs of Ultimo, Mascot and Barangaroo; and
- (iii) Observe the skills of workers and management operating in and around cranes and scaffolds and their awareness of the required safety standards and the magnitude of the potential consequences.

Previous studies reported the need for safety investments, revised training methods, frequent maintenance, strict certification and the importance of basic communication ensure a safer working environment for workers by enhancing the safety capabilities of the crane and scaffold contractors (Safe Work Australia 2013). Without attention to these key factors, workers on a construction site could be exposed to high risk situations which could result in fatality or in serious injury.

A crane is an item of plant intended for raising or lowering a load and moving it horizontally including the supporting structure of the crane and its foundations (Safe Work Australia 2012b). Cranes are common on construction sites all around the world and are vital to the progression of a project. The main use for cranes on construction sites is to move materials around the site which is much more efficient than manual handling.

The Safe Work Australia's Construction Fact Sheet (2011) identifies that falls from height accounted for 51 fatalities. Of these numbers, 18 involved falls from buildings, 15 involved ladders and 8 involved scaffolding. Statistics on hit by moving or falling objects accounted for 29 deaths (Safe Work Australia 2012b). These statistics are heavily linked to cranes and scaffolding therefore, further research work the safety of cranes and scaffold is important to gauge the status of current safety standards. In Spain, about 40% of serious accidents are caused by falls from height, and of these about 30% involve falls from temporary devices on structures assembled to work at height (Rubio-Romero 2013).

The numbers of persons being hit by moving or falling objects through crane and scaffolding use warrants improve scrutiny by employers and regulators. Workers should be able to go to work without the risk of death or serious injury.

A number of construction contractors own and operate a fleet of tower cranes. Most of these towers are rented and operated by in-house or contracted personnel. Frequent inspections of crane use are essential in order to keep the machinery safe and to ensure that operators of these cranes are obtaining the necessary checks and maintenance procedures, whether on a weekly, monthly or yearly basis. Scaffolding provides access through a construction site as well as being a safety measure. Scaffolding allows workers to work at extreme heights that would otherwise be unsafe to travel without the aid of scaffolding. Scaffolding is designed to prevent falls from heights which can result in either serious injury or death. In the 2009-10, Safe Work Australia, notified fatalities from scaffolding work and stated that two workers died because they fell from scaffolding.

2 RESEARCH SCOPE AND METHODOLOGY

In this study three incidents involving crane and scaffold that occurred in and around the Sydney CBD were also investigated to find the causes of these accidents. Data and relevant information on the incidents were sourced from media reports as well as Work Cover NSW incident reports.

Information was gathered under “Freedom of Information” (FOI) laws. Details about the causes of the three incidents on crane and scaffolding failure are presented in the following section.

3 CASE STUDIES ON CRANE AND SCAFFOLD SAFETY

3.1 Ultimo Crane Collapse

On 27th November 2012, news broke that a tower crane had caught on fire at the outskirts of the Sydney CBD at a construction site at the University of Technology, Sydney (UTS) (Figure 1). More than 100 workers and 100 bystanders were in surrounding buildings and were evacuated from the area. The crane operator managed to escape the cabin through the crane ladder. The boom of the crane ultimately collapsed and landed on the building structure below.



Figure 1. The tower crane at Ultimo construction site on fire.

A newspaper article reported that safety maintenance was not up to date and the company had failed to undertake regular safety check even though it was pointed out to them through an earlier safety inspection (Australian Financial Review 2012). After discussion with officers of the WorkCover Authority of NSW and a review of the incident report it was confirmed that the protruding arm of a crane had collapsed on top at the University of Technology, Sydney, construction site after catching fire.

3.2 Mascot Scaffold Collapse

On February 25th, 2014, it was reported in the local media that a scaffolding structure had collapsed on a construction site in Mascot, New South Wales (Yahoo7 2014) (Figure 2). Two men were on a scaffold at the time of collapse and fortunately they escaped with only minor injury. It was also reported that the collapsed scaffold brought down power lines on the street and completely covered two trucks. There was also a concern for leaking fuel from the impacted trucks. As a result of the incident more than 100 people had to be evacuated from the area. The NSW Police and the WorkCover Authority started their investigations immediately after the collapse was reported. After discussion with WorkCover Authority officers and reviewing the information in the ‘Factual Inspection Reports’, it was found that the scaffold collapse was caused by:

- (i) A number of broken cables which were hanging from the services pole (electricity and telecommunication);

- (ii) Scaffold and building debris which were resting on the services pole;
- (iii) Scaffold and building debris protruded out from the building site onto a Street which blocked one lane of road for traffic;
- (iv) Parked trucks were covered with collapsed scaffold, raising concerns of fuel leaks; and
- (v) Damage to the exterior wall of the existing building next to the collapsed scaffolding. The workers' union also inspected the site a few months earlier and raised concerns about the safety of the scaffold.



Figure 2. The collapsed scaffold at the Mascot building site.

3.3 Barangaroo Crane Fire

On 12th March 2014, a fire broke out in the basement of a building on the Barangaroo development project in Sydney's CBD (Figure 3). A large blaze resulted in dense smoke being omitted from the construction site raising the alarm to existing surrounding high-rise buildings. Residents from all surrounding buildings were evacuated as a safety precaution (Ralston and Patty 2014). Fire persisted for several hours until the fire was brought under control. There was also a concern that the fire could cause damage to the tower cranes substructure and result in a collapse of the crane. Main roads surrounding the construction site were closed off, causing traffic chaos during the afternoon peak hour commuting period. Fire fighters from NSW Fire and Rescue responded until the blaze was controlled. Fire fighters fought the fire over two days with substantial damage to onsite construction material. The crane did not collapse and after the fire was extinguished, engineers were brought in to assess the structural integrity of the crane. WorkCover mentioned in their report that the fire appears to have been caused by a welding accident which set fire to formwork (Ralston and Patty 2014). Approximately 40 to 60 workers were on the lower levels when the blaze broke out and narrowly escaped death or seriously injured (Ralston and Patty 2014). After discussion with WorkCover officers and review of the Incident Report, it was confirmed that the large fire originated in the formwork at the basement area. The incident report also confirmed that a structural engineer would assess the area and provide a remediation plan to be followed before construction would re-commence.



Figure 3. The crane incident at the Barangaroo development project near CBD.

4 FINDINGS AND DISCUSSION

After considering the news reports on these various incidents and then obtaining incident reports through WorkCover, it is evident that there was a breach of work, health and safety requirements on these construction sites. The first incident in Ultimo could have been fatal had the jib of the crane been pointing out towards the road where hundreds of commuters were passing. It seems that the regular safety and maintenance checks were not carried out on this site. Fuel leaks are reported to have initiated the fire which in turn then caused the crane to collapse. If the appropriate maintenance checks were in place then the incident could have been avoided. It was fortunate that there were no injuries or fatalities although the company in question would still likely receive a heavy fine for an incident of this scale.

The Mascot incident suggests that regular checks of the scaffold were not undertaken and resulted in a collapse in which two workers were seriously injured and narrowly avoided death.

The Barangaroo incident was quite an extraordinary case as the events that unfolded were not directly related to the crane. Although the matter is still being investigated and recently reported that a basement fire was lit in close proximity to the base of the crane and was likely to be the initiating event. It was expected that the crane would have collapsed under the heat of the blazing fire. An interview with the Project Manager and Site Manager identified that the design of crane should also consider fire safety.

5 CONCLUDING REMARKS

Three case studies of incidents at Ultimo, Mascot and Barangaroo have been associated with crane and scaffold safety identified the need for improvements in safety protocols and procedures. Non-compliance with WHS Act and Regulations can lead to large scale incidents especially where cranes and scaffold are involved, resulting in property damage, injury or loss of life. It is evident that crane and scaffold incidents can not only affect site workers, but also impact on surrounding buildings and pedestrians. These large-scale incidents can also lead to tarnished reputation and heavy fines for all companies involved in the events. This study has emphasised the importance of regular safety checks and maintenance of high risk construction activities such as crane operation and use of scaffolding and are important in minimising safety incidents and large-scale damage.

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