

Here is the footage from “Site Safety Seminar for Capital Works New Works Contracts”, which was held on May 12, 2014

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His presentation topic is “Lifting of I-Beam by Lorry-mounted Crane and Prevention of Fall of Person through Floor Opening”

Good afternoon everybody. I am happy to share two cases with you. The first case is about a lorry-mounted crane lifting two I-beams. Let me tell you some background of the accident. It is about a metal works subcontractor’s worker. The accident took place when two I-beams were being lifted by a lorry-mounted crane. Before the accident happened, relative staff had had a successful “trial lifting” with the two I-beams, which I will explain on the term “trial lifting” later.

As you can see here, risk control measures for lifting of materials by lorry-mounted crane had been set up and implemented on this site before the accident happened. Here I will not discuss in detail, as basically they were some common safety measures on many sites, including appointing competent signalers and riggers; following guidelines for inspecting lifting appliance; prohibiting any lifting operation exceeding safe working load; ensuring no person is allowed to be under a load when it is being lifted; providing a control rope for lifting long objects; avoiding lifting objects with a single leg sling; using a receptacle when lifting loose materials. These are the measures commonly taken on sites before the accident happened.

I believe either on this site or every site, lifting operations are high risk activities, every sites are the same. It is recorded that a General Foreman was appointed to supervise the signaler and rigger in the lifting operation. For this site, they had arranged the general foreman to study a Construction Materials Rigger course, course no. A12, organised by Construction Industry Council. In the appointment certificate of the general foreman, it is also stated in detail his appointment as a signaler and the related duties. I will not cover the seven points here, but I can share with you on the third point. This general foreman is required to supervise every lifting procedure and we have specifically required him to perform as a signaler, so as to ensure the load

after rigging are ready for lifting. When the load was lifted to approximately 500mm in height from the ground, as a signaler, he was especially required to check again to ensure the safety of load, if it was fixed to lifting chain before lifting could be continued.

Now let me talk about the accident. As said, before the accident happened, the appointed general foreman was supervising the lifting procedure by a lorry-mounted crane. The deceased worker and his colleague were responsible for rigging the two sides of the I-beams. Just as I said, each of them, the deceased worker and his colleague were on the two sides rigging the I-beams, but they used “shortening clutch” to shorten the lifting chain. Before the lifting, the general foreman and the lorry-mounted crane driver had ensured nobody was around the two I-beams. The general foreman and the lorry-mounted crane driver kept communicating when the two I-beams were lifted to a height of 500mm and held there. Then, the general foreman checked if the I-beams were fastened to the lifting chain.

As said, during the trial lifting, the general foreman and lorry-mounted crane driver had made sure the beams were securely rigged and balanced. Then they proceeded to lift the two beams while they kept communicating. Suddenly, two things that should not have happened took place simultaneously. What were they? When the two beams were lifted to a height of about two meters, the worker responsible for rigging suddenly headed back and walked under the I-beams being lifted without reason. At the same time, what happened? A chain ring on the shortening clutch went loose, making one I-beam lurched and hit the worker on his head. The whole process was recorded by a CCTV camera at the site, but sorry I am not sharing the footage with you.

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It is a photo of the accident scene. When the photo was taken, government officials had not yet arrived. As you can see, there were two chains, one of which the ring went loose from the shortening clutch, making the two I-beams lurched and hit the worker.

We can also look at the weight and length of the two I-beams. They were 3.85m long and less than 1.5 ton altogether. Look at the lorry-mounted crane and the two legs chain sling. They both had valid certificates. After the accident, the lorry-mounted crane was proved in good working condition without a trace of being crushed. The chain was not damaged, abraded or deformed. As you can see, every chain has two

shortening clutches. After the accident, look at the conditions of the two shortening clutches. They were not damaged. The chain was the one in the accident.

Additionally, according to information given by the lorry-mounted crane operator, the Automatic Safe Load Indicator (ASLI) of the lorry-mounted crane did not make any alert when it happened. Our company also asked a registered professional engineer to carry out a series of test afterwards. In the simulation test of lifting, two I-beams of similar length and weight, with two similar two-leg chain sling and a lorry-mounted crane were used.

You should note, as I said before, one major function of the shortening clutch is to shorten the two leg chain sling to suit actual working environment. However, if you want to shorten the two chains with the shortening clutches, you have to be careful, because the chain ring can be in normal direction or reverse direction. In other words, if the shortening clutches were not used properly, I am sure the safe working load of the two leg chain sling would be much lower than that specified in the certificate. We should be careful about it. Anyway, in each of the tests, we lifted the two I-beams up by 500mm from the ground, we carried out a trial lifting, then proceeded lifting of the two I-beams for not less than 10 times. In none of the tests, the shortening clutches detached from the chain ring. After “trial lifting” was properly carried out, detachment of chain links from shortening clutches during subsequent lifting operation was thus highly unusual.

After the incident, our company established the Working Guidelines for the Use of Mobile Cranes on Sites, defining clearly the qualifications and responsibilities of persons involved, including mobile crane operators, lifting signalers, riggers, lifting supervisor and other safety personnel at site. This is only cited from our company document, but can also be your reference. I am not going to read every detail of it, but what is important is that we have clearly define the criteria and requirements for the training qualification and experience of the above mentioned persons. The requirements are applied to each of our company’s sites. This is one of the improvement works we implemented after the accident. It was not specific for one single site, but for every site belonging to our Company.

Furthermore, we have set up requirements. Here is a form stating the construction materials commonly lifted at our sites. Our company provides proper lifting tools and requires workers to use. In lifting I-Beams, our company specifies to use this kind of beam clamp, it is the safest method and can prevent the accident from happening

again. Meanwhile, as shortening clutch is commonly attached to any kind of chains, our company has thus also set up requirements. Before carrying out lifting procedures, a lifting chain should be selected properly because the selection of a proper chain is important. We don't choose a long one and shorten it with a shortening clutch. In this regard, after the incident, shortening clutches are prohibited by our company except for special circumstances under a permit-to-work system.

This was the first case to share. The next case to share is about prevention of fall of person through floor opening. Let's talk about its background. It involved a prefabricated louver installation worker. When the accident took place at a ten-storey building of a private project, he was found lying on the floor slab on 3/F of tower crane opening. Something more, this is the floor plan of the scene.

Before the incident, he and 3 co-workers were deployed to install prefabricated louvers on the external wall of lift machine room on roof of this building. Outside the room, a double scaffolding was installed to provide a safe working platform for workers to install the prefabricated louvers. This is the opening of tower crane where the accident happened. The location was marked in red. This hole of tower crane is on the 10th floor of the building. Protective nets were installed to cover up the floor openings on 5th floor and 8th floor for prevention of objects falling through the tower crane opening and down to the bottom.

When the accident happened, the worker and three co-workers were not at work, they were taking rest. All of a sudden, the three workers heard a loud bang, the three co-workers didn't know where the worker was until they heard the bang sound that they looked around and approached the floor opening, looking down from the 10th floor and through the tower crane opening, they found the worker lying on the 3rd floor. The photo was taken immediately after the accident. In this photo, you can see there is a backpack. Can you guess whose backpack this is? It belongs to an officer of the Labour Department. The officers arrived. As you can see in the photo, this was the tower crane opening and there were also bamboo-made handrail and toe boards. If we look down the opening from this floor, you can see that the nets on 8th and 5th floors were broken.

This is also an officer from the Labour Department who carried out inspection at the scene after the accident. What about this photo? This is the location of tower crane opening and the double scaffolding that surrounded the opening. The width of this space was as narrow as 0.3m. Two bamboo members were erected to fence off the

0.3m-wide space. You can see the space between tower crane access and the double scaffolding. At the tower crane opening, there is a row of starter bars, upon two of which was a piece of cloth. This photo is clearer. The cloth was taken out. It exactly matched the missing part of the worker's trousers. Obviously the pair of trousers was snagged by the starter bars. The cloth belonged to the worker's trousers.

His trousers could be snagged by the starter bars when the worker fell down, leaving the cloth there. This cloth is an important clue, because we can then come to the following three points. First, I believe the worker fell down to the tower crane opening from a rather high place, that his pair of trousers was snagged by the two starter bars. Besides, it is reasonable to think the worker was on his way to join his three co-workers to rest with them as they were taking rest when accident happened. Look at the photo. He should have climbed out to the gap hastily because it is where the co-workers rested at that time. It is believed that he slipped and fell down into the hole from height.

From this photo, if he did not take the shortcut and went around it instead, he could have met his colleagues successfully. So we also wondered why the worker did not take this way to meet the three workers, but climbed past the gap of 0.3m wide blocked by two bamboo members. The inference is proved to be valid. The most important evidence is his trousers. The cloth was snagged at the starter bars.

As a responsible contractor, we will not attribute the incident to the worker, so we specially set up some requirements because of this accident. What are they? These are cited from our company documents. It is required that metal fence must be firmly installed at building edges on all floors at site, especially floor openings, such as tower crane openings or reserved openings. We want to unify the material used and avoid wood or bamboo. We use fences made of metal.

Second requirement, if involving same location, or multi-level floor opening, our company required to install double protective nets at a proper location. The lower layer protective net should effectively prevent humans or large objects from falling. The upper layer is a dustproof net to prevent smaller objects from falling. Mechanism should be also set up to clear the debris from the net. This is it for the cases. I hope, through the two cases, especially the improvement measures taken after the two accidents, members in the industry can review if relevant measures should be taken at site to avoid accidents of similar kinds. I believe it is also the aim of our workshop or seminar today. It is the end of my sharing. Thank you.