Overview

- Brief overview of 2014 construction fatal accidents;
- Brief sharing of fatal construction accidents that were concluded recently;
- Our investigation findings; and
- The lessons learnt.
Overview

Construction Fatalities

- FFH (Caught in-between)
- Struck by
- Collapsed/ Failure of structure/ equipment
- Collapsed of formwork
- Crane
- Electrocution
- Fire
- Caught in-between

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Overview

Fell from lift landing

Fell through glass canopy

Fell through lift shaft
Case Study 1

Fell from Lift Landing

Worker died after falling from height
Synopsis of Accident

- On the accident day, the Deceased and a co-worker were tasked to install, by welding, rectangular steel hollow sections to the new lift landings for a lift upgrading project.

- As the Deceased was lowering an electrical cable for the welding machine from the 8th storey lift landing, he fell over and landed on the 1st floor.

- The Deceased was pronounced dead at the scene.
An open side was observed on the right side of the lift landing area.
Synopsis of Accident

The Deceased landed here
Guard-rails, which dropped to the 1st storey together with the Deceased
Investigation Findings

- Hollow sections were to be installed as vertical stiffeners on both sides of every lift landing. The existing guard-rails at the landing’s edges obstructed the placement of the hollow sections.

- In order to install the hollow sections, the guard-rails had to be shifted.

- The Deceased and his co-worker used hammers to tap and displace the guard-rails, sufficient for the placement of the hollow sections, before proceeding to install the rectangular hollow sections.
Investigation Findings

Rectangular Steel Structures installed by the co-worker and the Deceased.
Worker fell from height

RA did not identify the hazards of shifting the guard-rails.

SWP was not developed on how to safely shift the guard-rails.

Control measures were inadequate to ensure that the end plates of the pipes were secured to prevent displacement.
Case Study 2

Fell through Glass Canopy

Worker died after falling from height
On the accident day, the Deceased and his co-workers were working on top of the car porch canopy roof when the Deceased fell through an opening and landed on the floor slab of the car porch.

The Deceased was immediately conveyed to the hospital, but succumbed to his injuries on the same day.
Synopsis of Accident

Deceased fell through this opening

3.4m
Investigation Findings
Investigation Findings

- RA and SWP for glass installation work on the car porch canopy were available.

- Two A-frame ladders of heights 2.5m and 2.95m served as access to the car porch canopy.

- No fall restraint was established on the roof of the car porch.
Lessons Learnt

Falling Hazards

No height access equipment used during glass installation works, e.g. scaffolds, MEWP, etc.

Control measures as stated in RA/SWP not implemented on site.

PTW for work at height not implemented on site.

No fall restraint system was provided.

Worker fell from height
Worker died after falling through a lift shaft
On the accident day, the Deceased and his co-worker were tasked to lower dismantled lift motor parts from a lift motor room.

The Deceased was lowering the parts through a floor opening in the lift motor room when he fell through the opening.

The Deceased landed in the lift pit and was killed on the spot.
Synopsis of Accident
Synopsis of Accident

1.2m

beam

Floor opening
Fiber rope used to lower the dismantled lift parts to the ground floor through the lift shaft opening.
Synopsis of Accident

Floor opening in lift motor room

36m
During the lowering process, a worker would use the elevated beam as a belay device to control the other end of the rope, while another worker would stand at the edge of the floor opening to guide the lift parts that were lowered.

Workers were instructed to anchor their body harnesses to a rope grab which was in turn attached to an independent lifeline tied to an anchorage point.
Investigation Findings

Fiber rope

Rope grab
Investigation Findings

C-channels weighing about 146kg

Fiber rope
Worker fell through lift shaft

Risk Assessment

Falling hazards

No RA conducted for the lowering of dismantled lift parts through the lift shaft.

Work Method

Method stated in safe work procedures differs from method used on site.

Unsafe Act

Worker working near the edge of the floor opening without anchoring.
Overview

Struck by wall panel  Buried by collapsed earth  Crushed by cold milling machine
Worker died after being struck by collapsed wall
Synopsis of Accident

- On the accident day, the Deceased and his co-workers were carrying out housekeeping work at the 6th storey area.

- They had just assisted the hoisting of a skip bin and were in the midst of unrigging its hoisting wires when a scissor lift operated by another worker grazed against a row of prefabricated wall panels in the same vicinity.

- As a result, the entire row of panel wall collapsed and struck the Deceased on his head. The Deceased was subsequently pronounced dead at the scene.
Synopsis of Accident

The Deceased was standing here
Each panel weighed about 250kg
Investigation Findings

- The panel wall was designed to be anchored vertically to reinforced concrete beams/floor slabs, and laterally to reinforced concrete columns.

- Glass panels were supposed to be installed between the top of the panel wall and the horizontal beam above.

- The panel wall was externally propped to prevent toppling during its erection process. However, all props were removed after the wall panels were constructed and handed over to the glass panel contractor.
Investigation Findings
Investigation Findings

- The entire wall was found to be freestanding without any external prop or bracing for about 2 weeks prior to the accident.

- The wall panels’ starter bars designed to anchor the said panels into the floor slab were found to be undersized, i.e. shorter than the designed length.

- RA was conducted and SWP was developed for the wall panel erection works. But it did not identify the risk for the wall panels to topple when it was left freestanding.
The stiffener’s starter bars were shorter than its design requirement.

The wall panels’ starter bars were shorter than its design requirement.
The wall panels’ starter bars were shorter than its design requirement.
Worker crushed by toppled wall

Props were already in place to prevent toppling, but were removed prematurely.

RA failed to identify the risk for the panel wall to topple if left freestanding.

No specific SWP/work instruction to ensure the panel wall had to be properly anchored before props were removed.

Toppling of panel wall

Engineering Control

Risk Assessment

Safe Work Procedure
Case Study 5

Buried by Collapsed Earth

Worker died after excavated trench caved in
On the accident day, the Deceased was working in an excavated trench when one side of the trench suddenly caved in.

The Deceased was buried between the collapsed earth and the timber shoring within the accident trench.

The Deceased was rescued, but succumbed to his injuries on the same day.
Synopsis of Accident

The Deceased was trapped here

The collapsed earth
Synopsis of Accident

- 7.1m
- 2.4m
- 2.6m
The excavation work started the day before, where excavation and shoring works were progressively being carried out; but did not complete that day.

Timber was used to shore the surrounding earth in the accident trench.

As the excavation was incomplete, the accident trench was only partially shored, i.e. only 3 sides were shored.

The worksite had experienced heavy showers in the early morning of the accident day.
Investigation Findings

- Timber planks
- 1.2m
- 12mm
- 2.4m
- Pile caps
- Horizontal steel props
- Timber plywood panels
Investigation Findings

- Timber shoring only for 3 sides
- Horizontal steel props
Investigation Findings

- RA was conducted and SWP developed for excavation works; but it did not address the hazards/risks for shoring works.

- There was no SWP or work instruction on how to safely construct the shoring system.

- Consequently, the shoring for the accident trench was not adequately constructed to prevent the earth from collapsing.
Investigation Findings

- PTW requires the safety supervisor to check earth condition after heavy rain; but was not implemented.

- The workers and supervisors carrying out the construction of the shoring had no prior experience and were not trained in the works.
RA conducted failed to identify the hazards/ risks for the construction of shoring in the accident trench.

Inadequate shoring constructed for accident trench.

Failed to properly implement PTW as no safety supervisor inspected the trench after rain.

Untrained and inexperienced workers and supervisors for shoring works.

Worker buried by collapsed earth.
Worker died after being crushed by road milling machine
Synopsis of Accident

- On the accident day, the Deceased was supervising a worker who was operating a cold milling machine (“milling machine”) to mill a road in the worksite.

- During the midst of the road milling operation, the Deceased used his right foot to sweep away the granulated grains.

- But during his sweeping process, his safety shoe was caught by the running nip of the milling machine’s milling drum and the Deceased’s entire body was pulled into the milling drum enclosure.
Synopsis of Accident

The road milling machine

The Deceased’s body
The concrete pathway

The asphalt road

The milling of the asphalt road for subsequent resurfacing works
Re-enactment of how the Deceased used his right foot to sweep

Synopsis of Accident

The milling drum and its enclosure
Investigation Findings

- The milling machine was originally equipped with adequate safety features (i.e. original guard, protective bow and side plate) and warning signs.

- But all these safety features were removed and modified with a rubber flap without consent or approval from the manufacturer.

- Warning signs provided were also removed.

- RA was conducted and SWP was developed for road milling operations. But it was generic and not specific to the road milling task carried out by the milling machine.
Investigation Findings

The hinged cover for the drum enclosure

The guard and protective bow was modified with a rubber flap

Warning signs were also removed

The side plate was also removed
Investigation Findings

The guard with protective bow

Adequate warning signs

The side plate
Safe Work Procedure

SWP not adequate to address the risk of workers coming into contact with the rotating drum; and the method to check the milled depth.

Work Method

No safe work method to check for milled depth.

Lessons Learnt

Caught by rotating drum

Engineering Control

The milling machine was originally provided with safety devices, but were removed and modified with a rubber flap, rendering it ineffective.

Risk Assessment

RA failed to identify the hazards/risks involved in using the milling machine and the activity of checking the milled depth.

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Something to Ponder….

- Do you think those accidents are preventable?
- How would you feel if the Deceased is someone you know or someone that you care about?
- Do you have the VISION ZERO mindset?
Thank You for your Attention