



## CASE STUDY

OISD/CS/2024-25/P&E/11

Dt.: 10/10/24

### **INTRODUCTION**

Title: Fatal accident at maintenance fabrication yard during cleaning & stacking of tubes.

Location: Refinery

Loss/ Outcome: One fatality

### **BRIEF OF INCIDENT**

The injured person (IP) was engaged in cleaning & stacking of tubes of exchanger that were to be used for retubing in the maintenance fabrication yard near Crude Distillation Unit (CDU-III) of a refinery. The IP got entrapped below the tubes stacked at a height of around 3 feet from ground level at around 01:00 hrs. The IP was engaged in cleaning & stacking of tubes of exchanger that were to be used for retubing. He was shifted to Refinery OHC for first aid and then shifted to M/s VKM hospital, where he was declared dead at 01:50 hrs.

### **OBSERVATIONS / SHORTCOMINGS**

1. The temporary structure that collapsed had various flaws like

- Base plates, mandated to support all vertical metallic pipes, were not used.
- Bracings, essential for providing longitudinal stability, were absent.

Any guideline for ascertaining the structural strength (load bearing capacity) of the temporary structure was not evident, neither any assessment was done. Further, evaluation of the structural stability was also not carried out.

On calculation, it is arrived that at the time of the collapse, the temporary structure was bearing a load of about 3,300 kg of U-tubes. In absence of guidelines for the temporary structure made of scaffold material, and hence, considering the scaffolding standards outlined in OISD-GDN-192, the load on the structure would have warranted a construction similar to a medium-duty scaffolding. According to these safety standards, medium-duty scaffolding requires a maximum bay length (the distance between two vertical supports) of 1.8 meters. However, the actual distance exceeded this prescribed limit, which contributed to the instability and subsequent failure of the structure.

The above observations implied that the temporary structure was not constructed with the necessary strength to bear and transmit the imposed loads to the ground. It was neither adequately secured nor stiffened in both longitudinal and transverse directions, as required by safety standards.

2. It was observed that in many areas, similar types of temporary structures made from scaffolding materials were used for stacking various materials. However, there were no safety guidelines in place for such temporary structures, whether used for short-term or long-term stacking/storage.

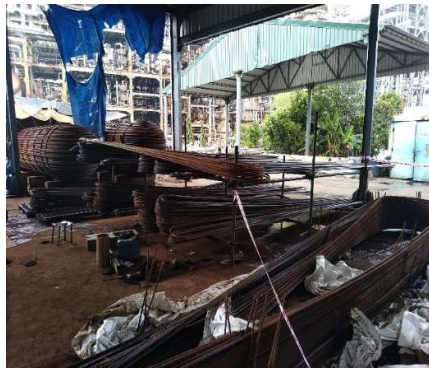
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3. The Hot Work Permit issued for welding, cutting, grinding, and stress-relieving work related to the retubing of eight exchangers in the maintenance area. The following were observed:
- The task of tube cleaning and stacking were not part of the job description covered by the permit. This indicates that the job which led to the fatality was conducted without proper authorization and without a valid work permit.
  - The work permit was issued and received by the same authorized person, implying issuing of permit to oneself, which was a violation of clause no. 6.4.1 (vi) of OISD-STD-105.
  - There was no standard maintenance procedure available for the cleaning, oiling and stacking of the tubes. Additionally, no Job Safety Analysis (JSA) was conducted for the retubing work, and no record of a toolbox talk was available, which is a violation of clause no. 6.3.1 of OISD-STD-105.
  - Verification and tagging of scaffolding/temporary platforms for healthiness, was marked as "Not Required," despite the use of scaffolding albeit as a temporary structure.
  - Adequate, ventilation and lighting, was marked as completed. However, a site visit during the night revealed the lighting to be inadequate.
  - The permit issuer cum receiver during interaction informed that he had not visited the site before signing the permits. He only arrived at the site after the IP had already been transferred to the Occupational Health Centre (OHC).
4. During the investigation, the storage location of the procured exchanger tubes was found to be an open yard without any protective shed. Upon evaluating the condition of the U-tubes, it was evident that no oil preservative coating or black bituminous paint had been applied to the tubes, indicating non-compliance with proper preservation measures.
5. None of the workmen reported the incident through any established communication channels to any personnel. Instead, all the workers were solely focused on rescuing the injured individual, collectively managing and transporting the person in pick-up van to the Occupational Health Centre (OHC). The rescue personnel did not even call for the ambulance/ fire & safety. In absence of any information, the OHC personnel did not specifically prepare for attending IP on arrival.
6. The contractor safety training module included emergency contact numbers, and placards/signage displaying these numbers were positioned at the entry to the fabrication yard. Although walkie-talkie sets were not provided, intrinsically safe mobiles were issued to supervisors for communication purposes. However, the review revealed that these handsets required the entry of a prefix code before dialling any emergency numbers. It was found that the workmen were unaware of this code, and it was neither included in the training module nor displayed at the yard. Additionally, no intercom telephone system, PA system, MCP, or other nearby communication devices were available for use in the event of an emergency.



Collapsed structure without base plate, braces, safety signage

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Stacking of U-Tube bundle beside the collapsed structure



Yard where the procured tubes were stored

*Pictures taken after the incident*

### **REASONS OF FAILURE / ROOT CAUSE**

The root cause of the incident was usage of an inadequately constructed structure and the failure of system to prevent/ check the same.

### **RECOMMENDATIONS**

1. Guideline for temporary structures and its usage should be developed. The usage of the temporary structure should be restricted to the load for which it is designed. The authorization and certification processes shall be ensured for all temporary structures.
2. Work permit system shall be aligned with the stipulations of OISD-STD-105 and it shall be ensured that the checklist is duly filled by competent personnel after site visit only.
3. For jobs for which SOP is unavailable (for safe execution), it is mandatory to carry out JSA before issuing the work permit as per clause no. 6.3.1 of OISD-STD-105. Further, toolbox talk (TBT) shall be conducted at the job site before the commencement of the job as per clause no. 6.3.3 of OISD-STD-105. The frequency of toolbox meetings shall be documented in the JSA.
4. Proper preservation process of spares should be ensured in line with clause no 4.3.2 OISD-STD-171.
5. Robust emergency communication systems, including intercoms, PA systems, intrinsically proof mobile phone and accessible emergency contact numbers, should be established and maintained. All workers should be trained on their use and understand any necessary procedures inclusive of emergency communication procedures, including any prefix codes required for dialling emergency numbers. Configuring emergency numbers in all the handsets being provided to contract personnel should be ensured.
6. Rescue activities should preferably be carried out by trained personnel. Ambulance services should be preferably utilised for movement of casualty. Mock-drills for rescue should be carried out to ensure awareness to all.

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