CASE STUDY

OISD/CS/2024-25/E&P/05 Dt.: 28.05.2024

INTRODUCTION

Title: Fall & damage of drilling rig mast.
Location: Onshore drilling rig.
Loss/ Outcome: Financial Loss.

BRIEF OF INCIDENT

During lowering of the rig mast, Off Driller side (ODS) Junction point of A frame welded on bottom box snapped causing fall and damage of mast.

OBSERVATIONS/ SHORTCOMINGS

- Level IV/ III inspection of mast and substructure was not carried out/ due respectively.
- The welding/ joint below the cover plate (the joint which failed during mast lowering) and the L shape pipe to which the eye pad is welded has not been inspected during the previous Level III inspection. This suggests that the inspecting agency failed to identify the critical areas which need to be inspected during Level III inspection.
- Level II inspection was carried out by the crew prior to mast raising. However, the welding joint was not visually inspected as it was below the cover plate of bottom box. During the investigation, it was evident that that the joint has developed partially crack prior to the incident.
- A similar type of incident has happened while raising the mast of similar type of rig, wherein joint of 'A' frame with bottom box failed causing mast to fall down from height of 1.5 feet above big horse.

  The few key recommendations from investigation report were:

  - Health check/ assessment of rigs being done for repair/ replacement needs to be made stringent to include areas not covered during previous checks based on lessons learnt from the incident.
  - Inspection of derrick members to be done as per OISD-GDN-202.

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However, compliance of the OISD recommendations was not carried out for similar types of rigs which was evident in this particular incident.

- During interaction with the rig officers, it emerged out that water filled during the mast raise is not drained every time after the completion of mast raising operation. In the SOP available for mast raising, this aspect was not covered in the procedure whether water should be removed from bottom box or not after mast raise.
- During the meeting held with OEM, it was shared that inspection window near the failed joint has been fabricated on other rigs in the asset but there was no such window available at this rig. It was concluded with this fact that visual/ NDT inspection of joint below cover plate of bottom box has not been carried out in the past due to inaccessibility.
- A joint inspection of rig was carried out by OEM and the operator almost a year prior to the incident. OEM has provided the list of the recommendations for replacement/ repair of parts of mast and substructure including the replacement of bottom DS & ODS 'A' frame and bottom section lugs. However, the job was not carried out till the date of incident.
- The painting inside the bottom box was not carried out which was evident as the investigating team observed heavy corrosion in the inside visible portion of the bottom box.

ROOT CAUSE OF THE INCIDENT

- Nonadherence to the OEM's recommendation as per joint inspection with the operator.
- No provision (like inspection window) for inspection of weld joints of Rear A-Frame lugs on Bottom Box.

RECOMMENDATIONS

- Level IV inspection of mast and substructure should be carried out every 10 years as per Clause 5.1 of OISD-GDN-202. Operator should formulate a policy for addressing the frequency of Level IV inspection of mast and substructure of the rig based on residual life assessment after rig has completed its design life.
- Level III inspection of mast and substructure should be carried out every 2 years as per Clause 5.1 of OISD-GDN-202. Operator should formulate a policy for addressing the frequency of Level III inspection of mast and substructure of the rig based on residual life assessment after rig has completed its design life.
- Level III includes NDT of critical areas. It may involve disassembly to access specific components and to identify wear & tear that exceeds the manufacturer's allowable tolerances. A thorough visual inspection of all load bearing components and members should be conducted to determine the condition of the rig equipment and documented. (Ref: Cl 4.3 of OISD-GDN-202).

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- In case of mast and structures, a thorough & intensive inspection (Level II inspection) of load bearing areas and sheaves for cracks, damage, corrosion, loose or missing components and premature wear is to be carried out (Ref: Cl 4.2 of OISD-GDN-202). This detailed inspection should be performed during rig up operations as per Annexure I of OISD-GDN-202.
- Organization should establish the procedure on learning from internal and external incidents. These high value learnings should be coupled with actions directed to prevent the similar incident happening at the facility. The Learning from incident (LFI) should be communicated to similar facilities within the organization. (Ref: Cl 7.9.1(c) of OISD-GDN-206).

  A procedure should be established to promptly address and resolve the findings and implement recommendations. Resolution and corrective actions should be documented. The procedure should address:

  - Tracking and monitoring of open, overdue and closed recommendation status
  - The validation of effectiveness of closed recommendation (Ref: Cl 7.9.1(e) of OISD-GDN-206).
- OEM should provide an additional openable inspection window for easy inspection of tubular and weld joints of Rear A-Frame lugs on Bottom Box for old rigs in operations.
- Recommendations for repair/ replacement by the inspection party should be complied in a time bound manner. Time bound action plan should be prepared for implementation of the recommendations and the same should be closely monitored in safety committee meetings.
- SOP for mast raising should be modified with inclusion of procedure of dumping of water from bottom box after mast raise or use of corrosion inhibitor in water. As per OEM recommendation, water should be drained during drilling operations.
- Periodic cleaning and painting of entire Mast, Sub-structure and of inside surfaces of water tank of Bottom Box below Rear-A-Frame should be carried out.

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