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1 BSEE: Person injured when safety mechanisms failed

Applicable Life Saving Rule(s)

Line of Fire

What happened

The United States Bureau of Safety and Environmental Enforcement (BSEE) has published Safety Alert 455 relating to an incident in which a third-party contract operator sandblasting offshore was injured when a temporary air dryer used for sandblasting operations recoiled and broke the safety cable. A broken whip check and T-connection hit the worker and caused multiple cuts and abrasions to his head and shoulders.

The worker was refilling the sand pot with an abrasive material to continue sandblasting operations. After confirming the air supply valve from the temporary air dryer to the sand pot was shut-in, the worker attempted to disconnect the air supply valve (Figure 1 – Right Circle) from the air dryer. As he tried to access this coupling, he loosened the T-connection. The T-connection blew off and broke the braided steel whip check or safety cable which hit the worker causing injury.

Figure 1 – Temporarily installed air dryer with bull hose connections. Original whip check position (*Left Circle*) and the location of the injured persons hand placement on the air supply valve (*Right Circle*).

Figure 2 - Broken whip check from the incident.

What went wrong

BSEE inspectors identified the following contributing factors:

- *The baling wire involved in the incident was slightly corroded, potentially diminishing its overall integrity. Baling wire is used as an additional safety measure to ensure couplings are securely connected. It is often used in place of a cotter pin on crowfoot couplings;*
- *The failed whip check cable was improperly crimped. Crimping the whip check cable before placing it into service allows it to function correctly at its full rated capacity.*

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- *The bull hose configuration on the air inlet valve from the platform air compressor was installed in a horizontal position. This added weight caused the T-connection to be off-centre at the time of operation, adding stress on the associated couplings and baling wire. The added weight, combined with the worker's force when manipulating the air supply valve to the sand pot, resulAted in air escaping the inlet valve from the platform compressor, likely causing the connection to come loose.*

Figure 3 – Baling wire on coupling that released.

Figure 4 – 90-Degree fitting recommendation.

BSEE recommendations

- Ensure all risks and associated mitigations of this kind of task are fully understood;
- Install stainless steel tie wires in addition to whip checks on bull hoses to reduce the risk of disconnection;
- Install 90-degree fittings (see illustration) to eliminate the horizontal orientation of the supply hose, reducing the stress at each connection;
- Where practical, depressurize equipment prior to adjusting valves;
- Inspect all equipment and parts pre-job to ensure they are in adequate condition.

Members may wish to refer to:

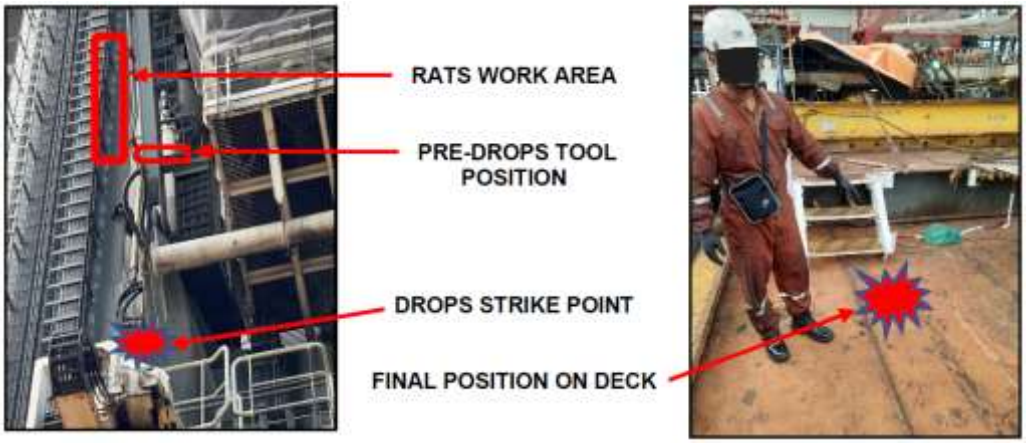
- Failure of a high pressure gas charging hose
- Air hose connection failure

2 Dropped spanner falls 15m

Applicable Life Saving Rule(s)

What happened

During work at height, a spanner became disconnected from its DROPS protection lanyard whilst crew were working in an area outside the installed protective netting. The spanner then fell to deck 15 metres below.



Protective netting had been installed for general maintenance on a pipelay system, which would be carried out by crew members and a third-party Rope Access Team. During work on hydraulic hose replacement, a member of the third-party Rope Access Team observed two hoses outside the netting protected area and proceeded to replace them. A spanner (60mm x 1.65 kg) was used, secured to the team member by a 1.2m DROPS prevention tooling lanyard, connected by threaded carabiners at both ends. During the replacement the carabiner threads became loose allowing the carabiner to open. The spanner fell 15 metres to the deck area below which was partially barriered off. No-one was injured. However, workers were nearby on deck.

What went wrong – investigation findings

- The third-party Rope Access Team identified additional hydraulic hoses to replace which were outside the area protected by the netting. This additional work was not authorised, and they claimed to be unaware of the received instructions to only work within the perimeter protected by the netting;
- The third-party Rope Access Team recognized that they may have neglected to secure the carabiner correctly. They reported that the spanner fell from the tower structure and when load was placed on the lanyard recoiled upwards causing the carabiner to disconnect and fall;
- It was noted that because there is no swivel in the wire lanyard, there was a risk of the carabiner opening if the carabiner thread was open. The carabiner threads were also found to be heavily worn and contaminated which compromised the locking mechanism. The pre-work inspection failed to identify the equipment conditions. The DROPS tool kits were not covered within the planned maintenance system;
- People were also observed crossing the barriers below the activity. This was not stopped nor reported to the supervisor. In addition, there had been insufficient assessment of the overall DROPS cone to account for the DROPS path or deflection.

Our member took the following actions

- Ensured all work teams were aware of the scope and limit of work activities and knew to not go beyond those limits without review from management;
- Ensured completion of pre-task inspection of tools/accessories for Working at Height;
- Subjected all Working at Height tools to regular inspection, maintenance and replaced defective parts as required;
- Considered barriers appropriate to the specific nature of the task – taking into account the DROPS cone;
- Properly manage barriers to ensure they are suitably positioned for the work, with sign-off to confirm purpose.

Members may wish to review:

- Dropped object: Failure of lump hammer
- Focus on third-party dropped objects
- Two serious dropped object near miss

Also the following videos:

- HSSE 039 *Technip DROPS*
- HSSE 042 *Saipem DROPS – choice not chance*
- HSSE 043 *Subsea 7 DROPS*

3 Equipment Damage: Dropped Object from tiltable lay system

What happened

A bracket weighing 10.5kg fell 16m to deck. The incident occurred during a function test of a tensioner on a pipelay system. The tensioner doors had to be moved into the firing line, closed, and then retracted to the parked position.

Applicable Life Saving Rule(s)

Bypassing Safety Controls

Line of Fire

As the tensioner doors were being closed, the port side door made contact with a hinged bracket that was part of an inspection manhole gate which had been left open. This resulted in the bracket, weighing 10.5 kg, dropping approximately 16m to the work table below.

What went right

Robust and stringent controls, restricting personnel from entering the drop zone, reduced the potential for harm. These included hard barriers at deck level directly underneath the work area, and additional temporary barriers to create a wider exclusion zone to take into consideration the dropped object cone of exposure. No personnel were in the line of fire at the time of the incident.

What went wrong – what were the underlying causes?

- Before this event, the inspection manhole gate had been damaged in a previous unreported incident. Subsequently some minor repair work had been undertaken which involved the removal of the grating from the gate/bracket. The hinged bracket was seized in the upright position and at the time it was not considered a dropped object hazard due to it being firmly secured to the TLS structure.
  - The seized bracket was not fully repaired following the original incident;
  - The latent hazard posed by seized bracket was not identified as a potential DROPS or as a clashing hazard.

Dropped bracket

(Right) Intact manhole door raised, showing bracket in upright position. The dropped object bracket was in similar position due to previous unreported incident.

Learning

- Although the first incident was recorded within the pipelay team handover notes, there was a failure to formally report it within the company incident reporting system - all damage incidents should be reported to ensure the correct level of investigation, and so that corrective and preventative actions are identified and implemented;
- The equipment design and layout failed to identify the clash points created when manhole gates were left in the open position.

Members may wish to refer to:

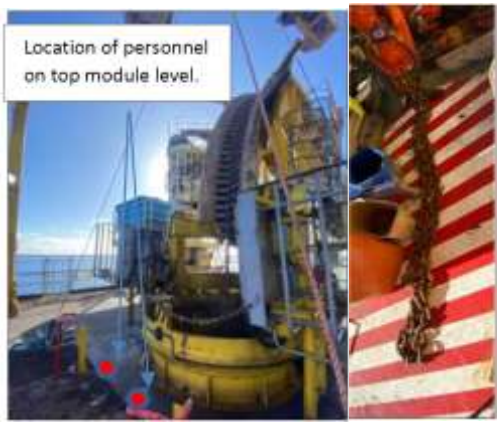
- Crane contact with pipelay tower resulting in dropped object
- Equipment on quay damaged when vessel started listing

4 Near Miss: Personnel nearly struck by rotating chain attached to flexible pipe

Applicable Life Saving Rule(s)

What happened

Crew were involved in the second end transfer of a 4" (10cm) production flexible up to the top module of the pipelay system. As the second end was being transferred, the tensioners were in the following position: upper tensioner – open, lower tensioner - closed. To allow the weight to be transferred onto the A&R wire the lower tensioners were opened. This then resulted in the production flexible rotating due to the residual torsion that had been built up within the line. A 16.5te chain used for the transfer of the second end was still attached to the pull-in head, as the flexible pipe began to rotate, this chain also spun. Two crew members who were observing the operation were stood nearby and were almost struck by the spinning chain.



What was the underlying cause?

- Key people involved were inexperienced in this specific activity and were not familiar with the task in hand
  - There was a failure to identify the risk posed from the chain still being attached to the flexible pipe.
- There was a language barrier:
  - Part of the team were unable to speak English;
  - The Task Risk Assessment for this operation was only available in English.
- The procedure did not identify when the chain should be removed nor other mitigation measures.

Learnings

- Ensure important documentation such as Task Risk Assessment, procedures and checklists are available in the languages of the crew doing the work;
- Ensure it is specified in procedures or checklists when rigging or any other items are to be attached or removed;
- Always remove the rigging after transferring loads to the A&R; when removal of rigging is not possible, suggest additional mitigation actions in the Task Risk Assessment.
  - One mitigating measure was to install a gate with signage restricting access to the top module.

Members may wish to refer to:

- Serious LTI – deck crew member struck by termination head/flexible
- Uncontrolled movement of a riser
- Sudden and uncontrollable move of A&R head

5 Near Miss – Messroom fridge fell over during rough seas

What happened

During transit through heavy seas, a fridge tore loose from the messroom wall and fell on its side. The incident occurred when the vessel was transiting out to the field and was experiencing 3-4m seas. During one large roll, a tall fridge in the messroom came away from the bulkhead after its primary securing brackets were pulled out of the bulkhead due to the motion of the vessel. The fridge swung on the last remaining fixing before falling on its side.

Although there were personnel in the messroom at the time there were no injuries reported and the potential for injury was unlikely. Minor damage was sustained to the fridge.

The fridge was secured to the deck with cargo straps and later returned to the upright position, inspected by the ships electrician and secured to the bulkhead with alternative suitable fixings.

What went wrong

- Inadequate primary fixings used to secure fridge to bulkhead;
- The strength of the bulkhead construction (a stud wall) not taken into consideration;
- No-one took into consideration, the potential failure of fixings during rough seas.

Learnings

- Could this happen on your vessel?
  - Identify and inspect heavy objects in the accommodation areas e.g. galley, gym, etc to ensure that the securing is robust enough to withstand rough seas;
- When securing items consideration should also be given to what these fixings are secured to, in this example the hollow stud wall was not considered when securing the fridge. The fixings are no stronger than what they fixed to!!
- Suitable fixings for hollow/cavity walls should be utilised for fixing equipment e.g. hollow wall anchors.

Members may wish to refer to:

- American P&I Club: Extreme bollard pull *[bollards were pulled right out of the ground of the dock]*