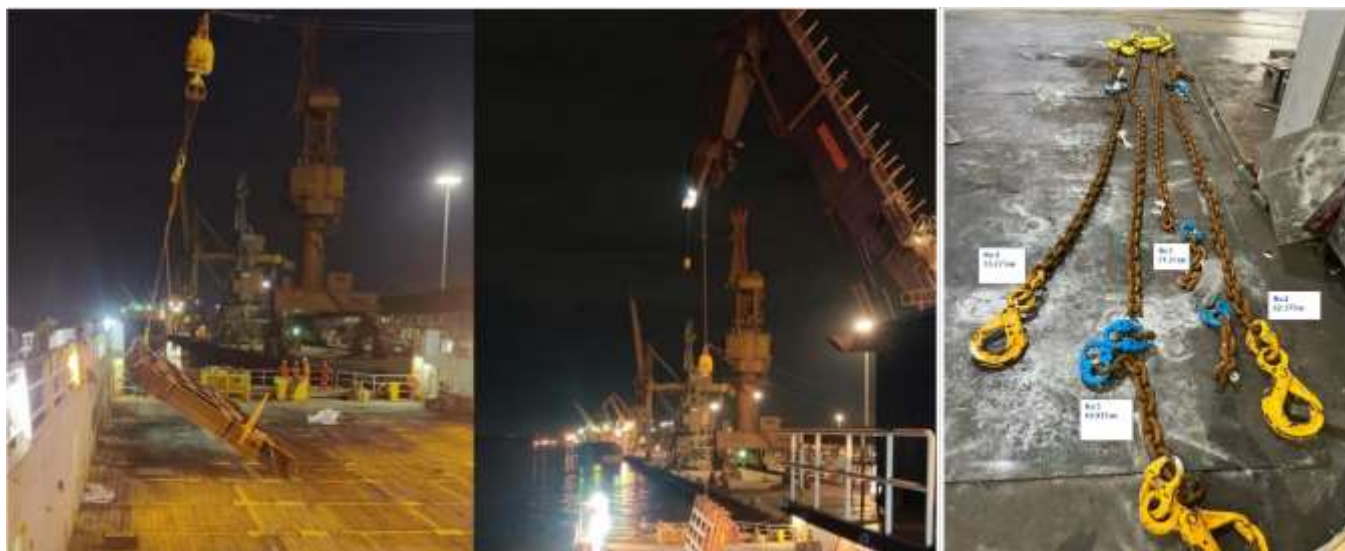


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1 Lifting chains parted – hydrogen embrittlement

What happened

Three of four lifting chains on a load parted while the load was being lifted. The incident occurred in the last lift of sections of grillage from a vessel involved in project demobilisation. At the time of the incident, the grillage was suspended, above the deck, by approximately 4m. Following a discussion between the Deck Foreman and the Crane Operator, the grillage was slowly lowered down to the deck. There were no injuries.



What went right?

- All the work was conducted in line with established risk assessments and with company lifting procedures;
- All the crew involved had the correct competencies;
- The rigging was only three months in use from purchase;
- The load was well below the SWL (Safe Working Load) of the chain;
- The chain was never deployed subsea and was stored in a rigging locker.

What was the cause?

Analysis by an independent third party, and the chain manufacturer, concluded that hydrogen embrittlement, causing pitting, exacerbated by the tensile load on the internal radius of the links caused surface corrosion cracking, leading to internal branch cracking and failure.

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Actions taken

The rigging was changed from a four-way bridle arrangement to slings and shackles, and the lift was completed safely.

Lessons and further information

- [UK HSE bulletin PM39 Hydrogen cracking of grade T and grade 8 chain and components](#)
- [Worksafe Western Australia Health and Safety Bulletin No. 1 Embrittlement - Serious risk to alloy lifting chain integrity when lifting loads in a corrosive environment](#)

2 Davit hook failures

What happened

A member reports two separate instances where a workboat davit hook, and life raft davit hook components, have failed.

- Incident 1: During a weekly inspection of lifesaving equipment, the workboat davit hook on one vessel failed resulting in the hook releasing and dropping the workboat to the sea. No persons were in the workboat at the time and there were no injuries. However, the workboat itself was badly damaged.
- Incident 2: A subsequent inspection of similar davit hooks on a sister vessel found the top shaft screw had sheared on a life raft davit hook, with the nut having dropped to deck. The shaft remained in place, holding the hook in position.



Image 1 - Davit Hook failed, releasing and dropping the workboat (vessel 1)



Image 2 - Davit Hook Top Shaft failed (vessel 2)



Image 3 - Failed Shaft (vessel 2)

What went wrong

- Incident 1: The failure of the workboat hook remains under investigation. Further information will be distributed when the review has been completed;
- Incident 2: The failure of the life raft davit hook was suspected to have been the result of an undetected crack in the threaded section of the hook top shaft screw. This allowed environment conditions to cause deterioration, resulting in the top hook shaft threaded section to shear off the body of the pin. Examination of the shaft showed that the fracture had developed over time.

Our member took the following actions:

- Halted all non-emergency launch and recovery operations using this type of hook until further notice;
- Inspected all similar davit hooks, paying particular attention to the top and bottom pin shafts and surrounding mounts, inspecting for cracks, deformation or fatigue. For this type of hook, the inspection included disassembly of the top shaft, loosening the securing screw, nut, shaft itself and the distance bush;

- Reviewed onboard maintenance regimes to ensure inspections of davit hooks include checks on the davit hook pins to identify any physical deterioration;
- Confirmed that the most recent annual inspection completed by the original equipment manufacturer (OEM) or third party included the opening of the hook and removal of the pin for inspection.



Members may wish to refer to

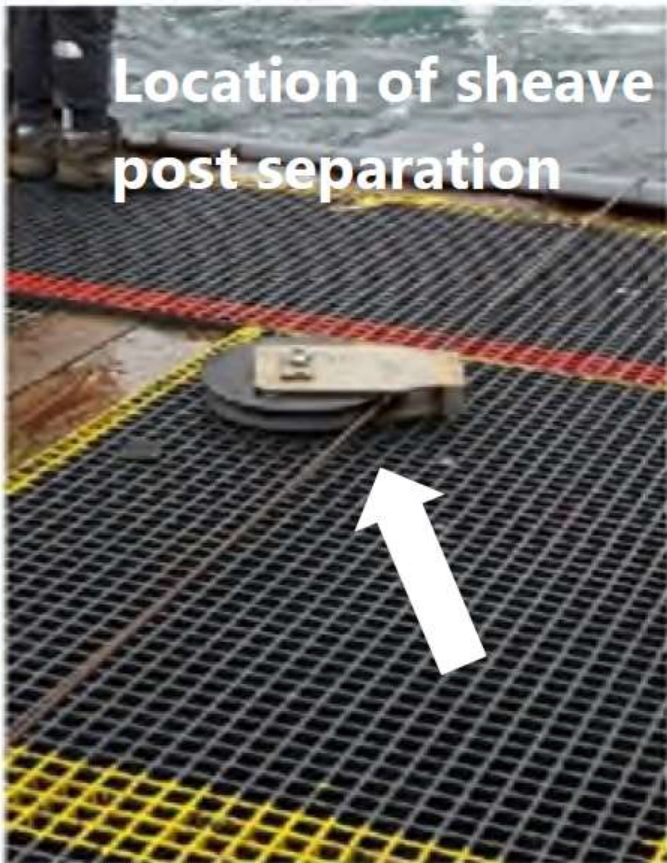
- [Two incidents relating to life-rafts/life boats](#)
- [Davit failures](#)

3 Sheave became detached during lifting operations

What happened

During recovery operations of marine geophysical sensors, a sheave parted from a swivel connection on the A-frame. The sheave fell approximately 6m to the deck below. No personnel were underneath the sheave, however had the sheave struck an individual, it could have caused serious injury.

<p>Applicable Life Saving Rule(s)</p>	 <p>Line of Fire</p>	 <p>Safe Mechanical Lifting</p>
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What went wrong

- Investigation revealed that:
 - Installation of the sheave and introduction of new components had not been subject to a documented management of change;
 - There were no written installation instructions provided with the sheave, with nothing detailing the configuration of the sheave to the swivel connection;
 - The person installing the sheave relied on verbal instructions and an incorrect understanding of the previous installation;

- When the sheave was installed, the secondary retention (securing sling) was considered unnecessary and removed - there was no independent verification / quality check (QC) carried out;
- Prior to the incident, there had been numerous opportunities including one by an independent (third party) inspector to identify that the sheave was incorrectly installed;
- There was inadequate development and control of the lifting equipment records / register.

Actions taken/recommendations

- **Equipment** - Design changes were made after the incident to remove the swivel connection and replace it with a pad eye thereby reducing the potential for incorrect connection;
 - Secondary securing slings were fitted to all sheaves. Additionally, a cable was installed between the A-frame legs to act as another barrier should primary and secondary retention fail. The sensor tow wire straddles this cable, so if the sheave falls it slides down the tow cable rather than drop (see image to the right).
 - Monitoring, tracking, inspecting, and provision of guidance for lifting equipment, accessories and rigging was improved.
- **Procedures** - Written installation and maintenance instructions should be provided with all equipment/sheaves.



Our member held a safety stand down wherein there was discussion relating to the need for and importance of:

- properly managing lifting equipment, accessories, and associated records / registers;
- carrying out post-installation quality assurance checks;
- installation of secondary securing - designed to restrain the item should the primary fixing fail;
- personnel remaining out of the line of fire;
- following established procedures and work instructions - where none exist, or if there is any doubt, **speak up** and request the required information.

Members may wish to refer to

- [Crane whip line parted during hook stop testing](#)
- [High potential near miss – unsecured sheave](#)

4 Near Miss: personnel transfer basket hit structure

What happened

During a transfer of two personnel to a platform using the vessel crane, the base bumper of the personnel transfer basket came into contact with the helipad netting rail of the platform. At the time of the incident, an unexpected wave caused the vessel to roll and resulted in the subsequent vertical movement of the vessel crane tip.

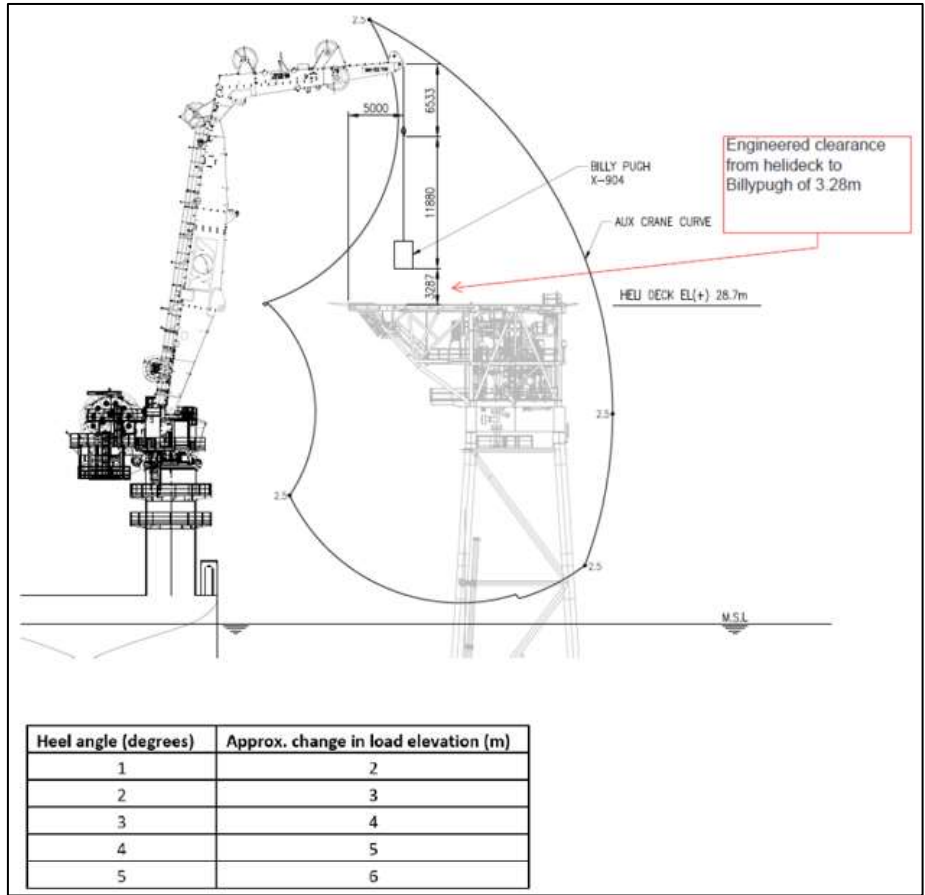
The contact was slight and there were no injuries nor damage to equipment reported, however, it was identified that a more serious incident could have occurred in different circumstances.

What went right

- A Permit to Work for the personnel transfer had been approved; this included a passenger toolbox talk and a risk assessment for the transfer;
- The sea state was considered within limits for personnel transfer basket operations;



- There were rigging personnel positioned at both departure and landing areas for the operation.



What went wrong

- Detailed planning for personnel transfer operations had failed to recognise the potential – notwithstanding the sea state being within limits for such operations - for vessel roll and subsequent vertical movement of the crane and personnel basket;
- Engineering drawings did not provide vertical movement detail for the personnel basket as affected by environmental conditions.

Root cause

Our member found that the root cause of the incident was insufficient detail in specified working limitations for the vertical movement of the basket when the vessel rolls, and that a minimum safe clearance height above the helideck had not been defined to avoid helideck contact whilst carrying out transfers within the operational limits of the crane.

Lessons/actions

Lift plan to include calculated basket vertical movements corresponding to vessel roll for crane operational limits. As per example drawing.

Members may wish to refer to:

- [Provisions Crane damaged by Main Deck Crane](#)
- [Equipment on quay damaged when vessel started listing](#)
- [Crane contact with pipelay tower resulting in dropped object](#)

5 BSEE: A warning on tagline entanglement

What happened

The United States Bureau of Safety and Environmental Enforcement (BSEE) has published [Safety Alert 461](#) relating to recent tagline entanglements which have resulted in several High Potential near misses.

Applicable
Life Saving
Rule(s)



Line of Fire

BSEE notes: “Since November 2022, there have been four incidents during offshore operations involving personnel becoming entangled in taglines and lifted with the load. Despite the high potential for injury surrounding the events and operations, none of the occurrences resulted in an injury. Similar situations were previously discussed in BSEE [Safety Alert 362](#), *Poor Tag Line Awareness Leads to Multiple Incidents*.



Figure 1: Worker entangled while moving toward a “Step Back Area”



Figure 2: Worker lifted with load after becoming entangled

The following is a summary of some recent incidents involving individuals entangled in taglines:

- January 2023: While lifting a welding machine from the deck, a crew member moved into the Step Back Area (see Figure 1) and stepped into the coiled tagline and became entangled. The crew member was able to grab the tagline while entangled and was lifted up and swung with the load approximately 4m off the deck (Figure 2). The Signaller relayed the crane operator to stop the lift, and the rigger and load were lowered to the deck;
- December 2022: After backloading a bundle of pipe onto a vessel, a deckhand attached the taglines to the crane hook to send up to the platform. When the taglines were lifted, he became entangled in the lines and was lifted approximately 1m above the deck onto a bundle of pipe where he was able to free himself without injury. A safety stand-down was conducted, and the importance of tagline safety was reinforced to the crews;
- November 2022: After completing multiple lifts from one deck to another, crane crews were sending a bundle of taglines to the top deck when a rigger became entangled in the lines on the main deck below. The rigger was able to grab and hang onto the tagline while being lifted approximately 3m. The flagger signaled an all-stop after seeing the rigger in the air and the crane operator was able to safely lower the rigger down without further incident;
- November 2022: After unhooking a load on the deck of an offshore vessel, a deckhand became entangled in a tagline and was lifted from the deck after the designated banksman signaled the crane operator to start the lift. When the lift began, the deckhand’s leg was lifted approximately 60cm off the deck, causing the deckhand to become unbalanced. Other crew members were able to support the deckhand’s upper body while the crane operator lowered him down to deck.

BSEE recommendations include:

- Using hands-free tools instead of taglines whenever possible (e.g., push poles, etc.). If hands-free tools are not available, use taglines marketed as tangle-free or anti-tangle;
- Ensure your taglines are in adequate condition (e.g., free of knots, absent of frayed strands, etc.)

- Using taglines that are long enough to position the rigger safely away from the load, but not so long that they could snag on an obstruction during the lift;
- LINE OF FIRE:
 - Do not straddle a tagline nor stand inside any coiled line.
 - Ensure the tagline remains where you can see it, in front of you;
 - Do not hold taglines in a manner that they cannot be easily released;
 - Do not wrap taglines around your hands, arms, legs, or body;
 - Do not secure taglines to, or loop them around, any other equipment, material, or other taglines;
 - Use boathooks to retrieve taglines near suspended loads to eliminate any line of fire hazard. If a worker loses grip and drops the tagline, do not chase it for retrieval;
 - Don't walk under a load to retrieve a tagline!
- Wear appropriate gloves when handling taglines;
- Keep the worksite tidy: ensure work areas are free of clutter and remove all excess debris around a load before it is hooked up for a lift. Make sure the load travel path, all workspace, and egress routes are clear before the lift begins;
- Discuss, agree and test communications (e.g., hand signals, radio) between the crane operator and other personnel before a lift.

Members may wish to refer to:

- [Leg entanglement from Tag Line during cargo operations](#)
- [Near-miss: Trapped tagline pins banksman against stanchion](#)