

UK HSE: Offshore crane boom hoist failures

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The UK HSE (Health and Safety Executive) have published an alert relating to two incidents that occurred offshore, involving the failure of crane boom hoist ropes, resulting in the crane booms falling onto the deck below.

Click [here for the alert](#).

What happened?

Two separate incidents occurred on offshore installations as a result of the failure of a crane boom hoist rope. In both incidents the boom hoist rope came off a sheave; this was undetected and the consequential severe damage to the ropes ultimately resulted in their catastrophic failure.

Although no-one was injured in either incident, the falling crane booms (together with the loads being lifted at the time), resulted in structural damage to the crane booms. Both incidents had the potential to cause death or serious injury to the persons involved in the lifting operations and to other persons on the installations.

Background

On one crane the rope came off a sheave in the 'A' frame and then dropped down onto an adjacent sheave bearing housing. This caused considerable wear and damage to the bearing housing.

On the other crane, the rope climbed out of a sheave in the boom tip and dropped down into the gap between this sheave and boom tip side plate. This also resulted in the rope being forced up against a structural member in the boom tip structure. The rope then cut a groove almost fully through this structural member.

Failure during lifting

The HSE notes: *“Consequently, both boom hoist ropes suffered such serious damage that they eventually failed whilst the cranes were undertaking lifting operations. In both cases, the said ropes may have come off a sheave due to one of the following reasons:*

- *If too much slack rope is allowed to form between the 'A' frame sheaves and the boom tip sheaves when a crane boom is stowed in the boom rest, it is possible that strong winds could cause the rope to whip up, onto and over, part of the rim of a sheave in the 'A' frame. When the boom is raised again out of the rest, this could cause the section of rope over the sheave rim to pull up against the sheave rope retention bar and to squeeze through the gap between the sheave rim and the retention bar leaving it completely off the*

sheave.

- The way in which the crane boom is hoisted and lowered may result in some bouncing of the boom. Bouncing of the boom may lead to slack forming in the boom hoist rope, allowing it to jump up, onto and over, part of the rim of a sheave in the 'A' frame. It is possible that this section of rope over the sheave rim would then pull up against the sheave rope retention bar. If the rope subsequently managed to squeeze through the gap between the sheave rim and the retention bar it would then be completely off the sheave.
- During the rope installation process, it is possible that a twist could be introduced into the new rope as it is installed. If the new rope is being pulled on by the old rope and if the swivel system on the rope connections is not functioning correctly any twist in the old rope could then be transferred into the new rope. It should also be noted that if the rope fleet angle between the new rope reel stand and the reeving sheave is sufficiently large then the rope could roll down the side of the reeving sheave groove during installation. This rolling action may also introduce a twist into the rope.

Any twist would be locked into the rope and during service this would work its way back towards the fixed rope anchorage in the 'A' frame. If the crane boom is placed into the boom rest and slack rope is allowed to form, with no tension now in the rope, it would try to untwist. As it untwists, the rope may climb up in the groove of the last sheave in the boom tip before the rope anchorage, resulting in the rope being positioned over the rim of this sheave.

When the crane boom is subsequently raised out of the rest it is possible that the rope may become nipped between the sheave rope retention bar and the rim of this last sheave. If Nylon sheaves are fitted, should this occur, the rope may cause subsequent damage to the said sheaves.”

Actions

- Ensure that when high winds are forecast, the positioning, and if necessary, the securing of crane booms, is in accordance with the relevant crane manufacturer's guidance.
- If manufacturer's guidance outlines that the boom should be stowed in the boom rest, slack rope should not be allowed to form between the sheaves in the 'A' frame and those at the boom tip or bridle assemblies.
- Ensure that cranes are operated in a controlled and smooth manner to reduce, so far as is possible, any bouncing of the crane boom.
- Inspect sheave rope retention bars (if fitted) to ensure these are in a good condition, and that the distance between the retention bars and the sheave rims remains within the maximum limit specified by the original equipment manufacturer.
- Ensure crane pre-use checks include the requirement to verify that all the ropes are correctly seated and running in the rope sheaves.
- When new boom hoist ropes are fitted that the method of installation reduces the possibility of a twist being introduced into the new rope.

Members may also wish to refer to:

- [IMCAHSS019](#) Guidelines for lifting operations
- [Short videos](#) – Are YOU prepared to work safely? Lifting Equipment;

Lifting operations

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