

Luff ram clevis failures

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A member has reported a number of incidents in which a luff ram has parted at the clevis.

What happened?

The first incident occurred during loading test of a remotely operated vehicle (ROV) system.

During recovery of the ROV whilst latched into the snubber, another luffing ram on the same launch and recovery system (LARS) parted in the same manner.

Subsequently, during an ROV launch of the same system, the replacement starboard luffing ram parted at the clevis. There were no injuries or damage to equipment.



Clevis pictured after failures



What were the causes?

An investigation identified the following:

Contributory factors:

- No evidence of anti-seize compound or other corrosion inhibitor in the rod end threads or on the rod threads.
- Dead space between rod eye and cylinder rod allows generation and collection of moisture/condensation.

Immediate causes:

- Excessive corrosion of each clevis (rod eye).
- Dimensional check shows clevis to be deformed.

The company notes that root cause analysis for multiple failures is on-going; however, the causes of the corrosion are in part attributable to a missed step during service and maintenance of the cylinders.

Actions

The following actions were taken:

- the planned maintenance system was updated with the manufacturer's recommendations for inspection of cylinder rod eyes:
 - while A-frame foot is approximately 1" from the hard stop so the luff cylinders are in tension, use a feeler gauge to determine if there is any gap between the faces of the rod eye and rod (there should be zero gap). If there is a gap, the cylinder should be removed, rod eye

removed and inspected

- verify that counterbalance valves are adjusted properly
- perform a visual inspection of the A-frame operation to focus on cylinder timing or excessive lateral movement
- perform a visual inspection of the rod eye surface for excessive signs of corrosion at point of rod entry.

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