

Near-miss: ROV fuse bolt failure

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A Member has reported an incident in which a crew member was narrowly missed by the head of a fuse bolt which had been shot out of a remotely operated vehicle (ROV) manipulator arm at high speed.

What happened?

It occurred as normal pre-dive checks were being completed on the ROV. The manipulator arm being tested was cycled and, during the test, the fuse bolt securing the jaws of the manipulator failed. This caused the head of the bolt to shoot out of the manipulator arm at high speed. The head of the bolt passed close to an ROV technician who could have been severely injured had it hit him. There were no injuries.

The manufacturer's operating procedures recommend that personnel stay clear of the operational envelope of the manipulator during functional testing on deck. However, owing to the high levels of kinetic energy shown in this failure, additional caution should be exercised, for example, standing further back, cordoning off the area and ensuring that non-essential personnel are clear.

What were the causes?

Further investigation revealed that:

- The fuse bolt had failed under water during the previous dive.
- The manipulator had been exposed to heavy work during the previous dive and this had led to other components in the arm and wrist assembly being damaged sufficiently to lead to this second fuse bolt failure on deck.

Actions

The following actions were taken:

- The ejected fuse bolt was recovered and the manipulator and ROV made ready for dive.
- Additional controls were identified which would prevent a recurrence of this type of incident.
- CCTV footage of the failure was prepared as a safety presentation.

- The manufacturer of the manipulator arm (Schilling Robotics) was informed.
- The manufacturer developed and published a safety bulletin (attached).
- The fuse bolt was subjected to failure analysis to better understand why it failed so dramatically.

The following further actions are recommended:

- Manual operation of manipulator jaws to be conducted prior to energising hydraulics.
- ROV personnel should ensure when completing deck checks on ROV manipulators that the arm is pointing away (or even outboard) from personnel and assets in the immediate area.
- Access to the area immediately around ROV should be controlled during pre-dive deck checks.

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