

Vessel degraded capability

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Commercial pressures maybe at play... Has the vessel been given enough time within the contract to carry out routine maintenance?

Overview

A PSV was conducting DP operations in an open bus 2-way configuration. The vessel had two redundant groups, each with two generator and two azimuth thrusters.

The Worst Case Failure Design Intent (WCFDI), was stated in the FMEA as:

"No single failure as defined for notation XXX will have a greater effect on the vessel's ability to maintain position than the loss of one switchboard (REDUNDANT GROUP), resulting in loss of two thrusters (one fwd and one aft) and two generators. This design intent applies when the power plant is configured as two independent power systems. This design intent applies when each of the two power systems has generators connected."

The Worst Case Failure (WCF) identified from analysis of the DP system on the vessel is loss of the port engine room due to an auxiliary failure, this would cause the loss of the two generating engines, Switchboard, Azi 2 & BTT1, with BTT1 being the most forward thruster.

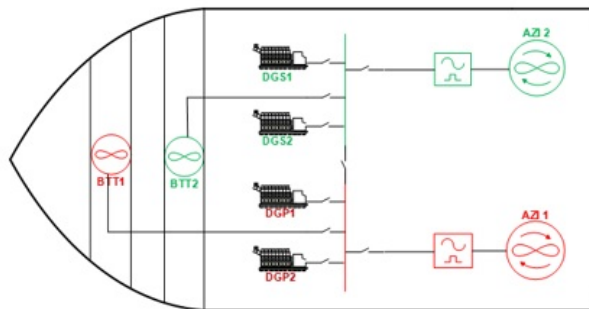


Figure 2-1 Thruster Setup

Figure: Thruster set-up

Observations

As demonstrated during the DP FMEA Proving Trials and subsequent Annual DP Trials, the vessel is effectively capable of losing one of the two redundant groups after a single failure. The vessel will then be able to maintain its heading and position within the remaining in-tact redundant group.

At the time of this particular operation there were deficiencies within both of the redundant groups:

- Azi 1 had hydraulic issues on the azimuth circuit which meant it was required to be in 'Fixed' DP Control mode.
- BTT2 was very sluggish in following the DP Command and was continually activating feedback alarms.
- Due to a leaking turbocharger, Generator DGP2 was only to be used in an emergency, and if used, not to exceed 50%

power.

All shore support personnel and vessel personnel were aware of the problems, but the client was unaware. Regardless, the vessel continued to operate in the vicinity of stationary structures.

Conclusions

The vessel is degraded in its intact and post failure capability, and is no longer single fault tolerant.

If the Port redundant group fails, the vessel will be left with a subpar bow thruster that could be lost from DP Control at any time.

If the Starboard redundant group failed, the vessel would be left with a subpar azimuth thruster that could be rejected by DP Control at any time. The port redundant groups generating capacity is severely constrained because there is no confidence in DGP2's ability to supply adequate power.

An in-depth evaluation could have been performed to determine post-failure capability, resulting in an update to ASOG. This would ensure client transparency, and DPOs would be fully aware of the vessel's reduced capability.

Additional comments

Commercial pressures maybe at play from both the vessel owner and client – Has the vessel been allotted enough time within the contract to carry out routine maintenance?

- Vessel crews should use decision support tools, such as the ASOG to manage station keeping risk.
- Vessel crews and managers should have a full understanding of their vessel's redundancy concept, post failure DP capability and the performance requirements following the worst case failure.
- Vessel crews and managers should be aware that when 100% power is not available from a single bus or generation of a group, the ASOG power limits and thruster percentage limits should be reduced to maintain WCFDI.
- The purpose of field arrival trials is to ensure satisfactory operation of the DP system. The checks should include full functional checks of the operation of the thrusters, power generation, auto DP and IJS and manual controls.

Related IMCA Guidance

The following IMCA Guidance would be relevant to this DP incident:

[IMCA M103](#)

[IMCA M117](#)

[IMCA M220](#)

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