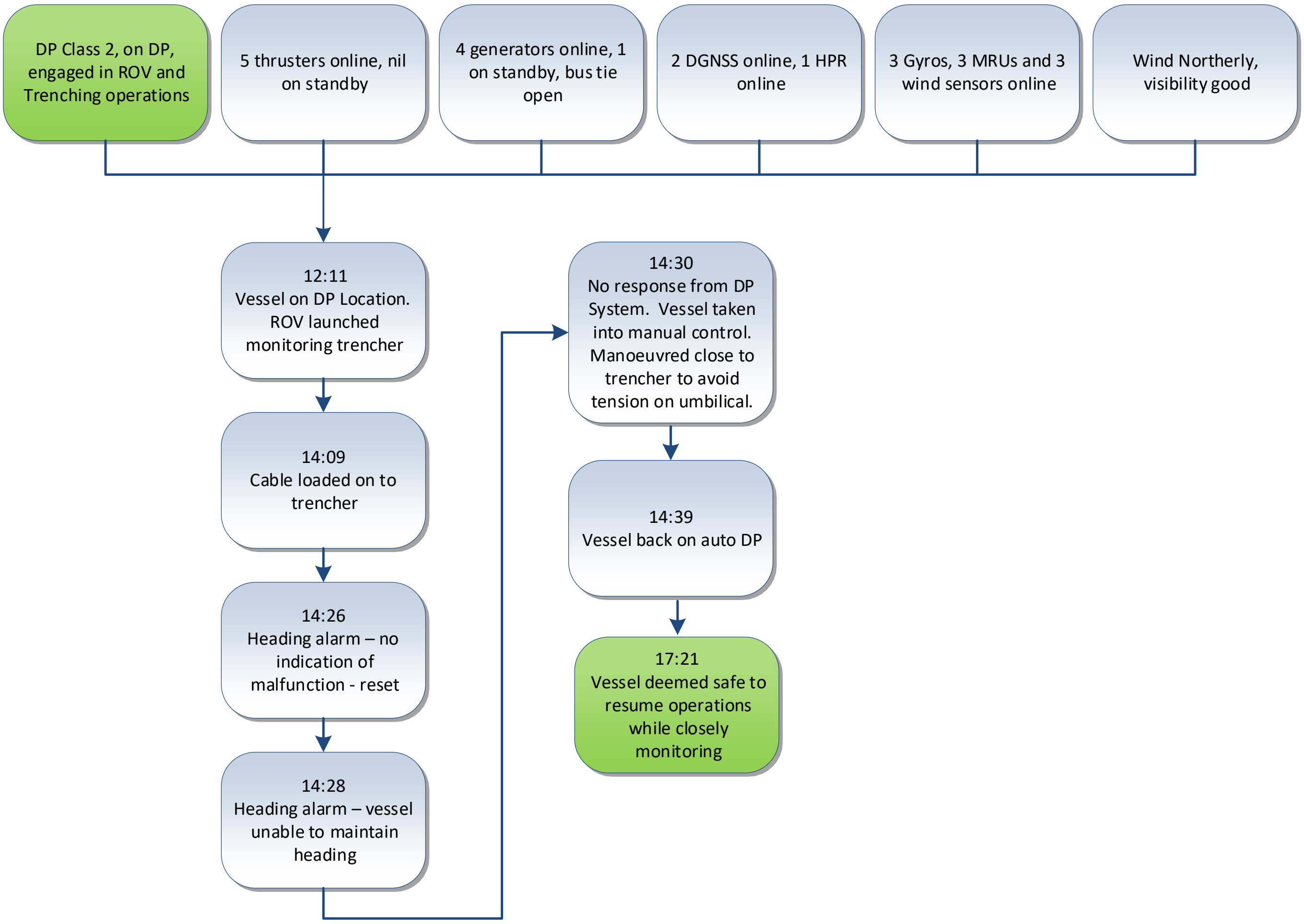
DP Event Bulletin

02/21 – June 2021

The following case studies and observations have been compiled from information received by IMCA. All vessel, client, and operational data has been removed from the narrative to ensure anonymity. Case studies are not intended as guidance on the safe conduct of operations, but rather to assist vessel managers, DP operators and DP technical crew in appropriately determining how to safely conduct their own operations. Any queries should be directed to IMCA at dpreports@imca-int.com. Members and non-members alike are welcome to contact IMCA if they have experienced DP events which can be shared anonymously with the DP industry.

1 Computer Error caused a DP incident



Comments from the report:

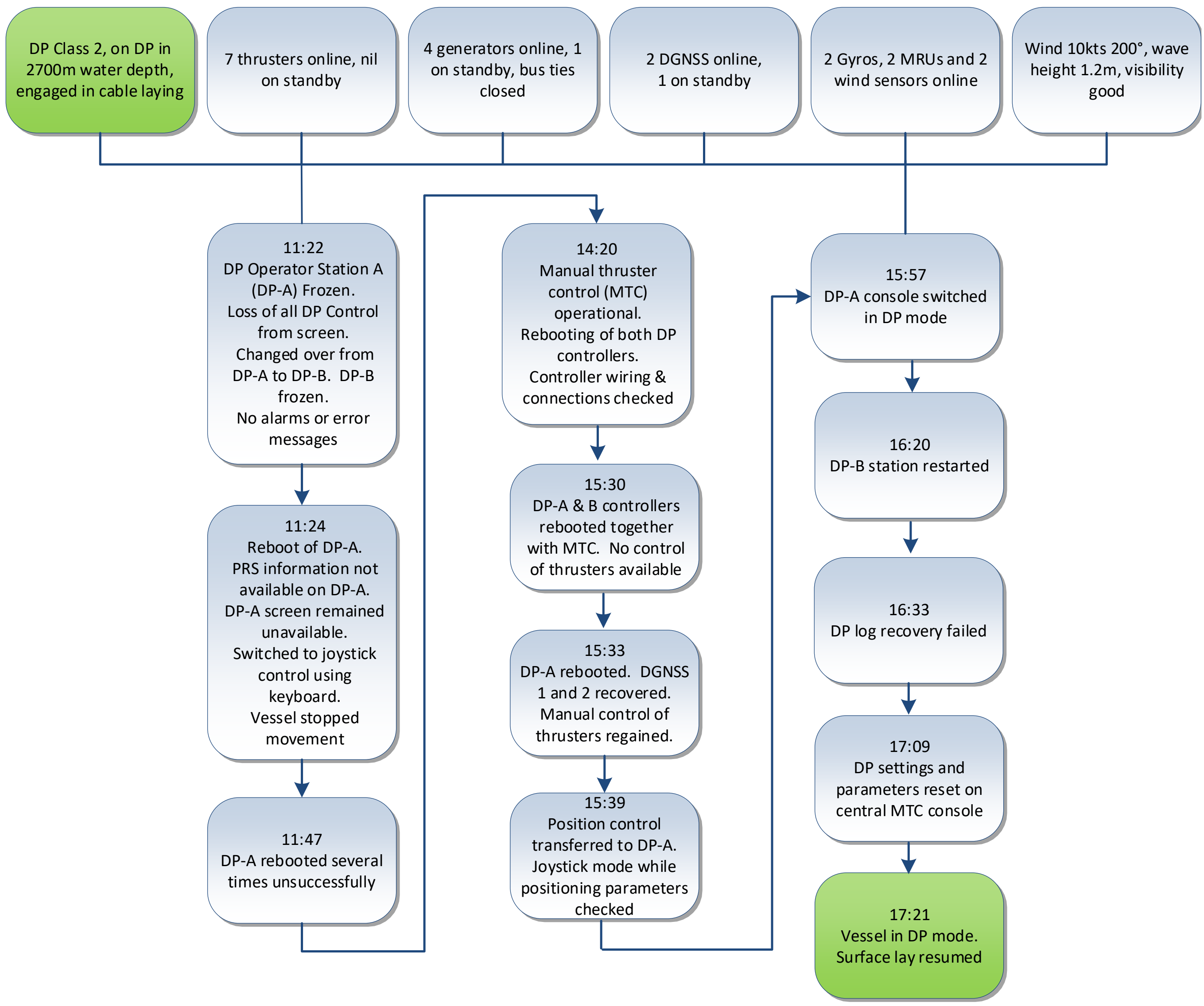
The vessel engaged the support of the DP system manufacturer for investigation on completion of the operation. The OEM detailed that the DP controller had been corrupted by "non-valid" data received from the Position/Heading change menu on operator station No.1. Attempts to replicate the failure within the OEMs facilities were unsuccessful. The software was therefore modified in a way such that data packets received from position / heading move dialogue function would go through an additional check to avoid the scenario.

Considerations of the IMCA Marine DP Committee from the above event:

1. It would be expected that the DP control system manufacturer should issue a service bulletin for all systems and software versions that could be vulnerable to the same single fault. It is also noted that a very similar fault has been experienced by a member company involving the same DP system manufacturer.

2. The event report did not highlight the use of activity specific operating guidelines nor any change to DP status during the incident. Although not detailed in the report, the DP committee questioned the use of manual thruster control instead of Independent Joystick mode which may have aided station keeping during investigation works.

2 Human Factor caused a DP Undesired Event



Comments from the report:

The report detailed that there was a “bug” in DP-A station. To resolve the issue DP-A and B as well as MTC stations were stopped at the same time, so to avoid the restarting station copying corrupted information from an online controller affected by the bug. The report highlighted that there had been no regular software updates executed and the equipment was getting older with more frequent reboots while in operation.

Considerations of the IMCA Marine DP Committee from the above event:

This event highlights the need to ensure a robust management of change process around software and software updates. The event report did not highlight the use of activity specific operating guidelines nor any change to DP status during the incident. Although not detailed in the report, the DP committee questioned the use of manual thruster control instead of Independent Joystick mode which may have aided station keeping during investigation works. Although not related to the event the number of references seems inadequate. IMO MSC Circ 645 and IMO MSC.1 Circ 1580 guidance documents state that for DP 2 or 3 operations:

- There is a requirement for 3 sensors serving the same principles when the vessel is fully dependant on these signals (eg, 3 gyros)
- There is a requirement for 3 independent position references simultaneously available during operation based on two different principles.

Again, although not related to the event, the report notes that the vessel operates "closed bus". Reference can be made to IMCA M 166 Guidance on Failure Modes & Effects Analyses (FMEAs) for failure considerations related to closed bus operations.

3 DP2 Service Operations Vessel (SOV) DP Incident

Case narrative

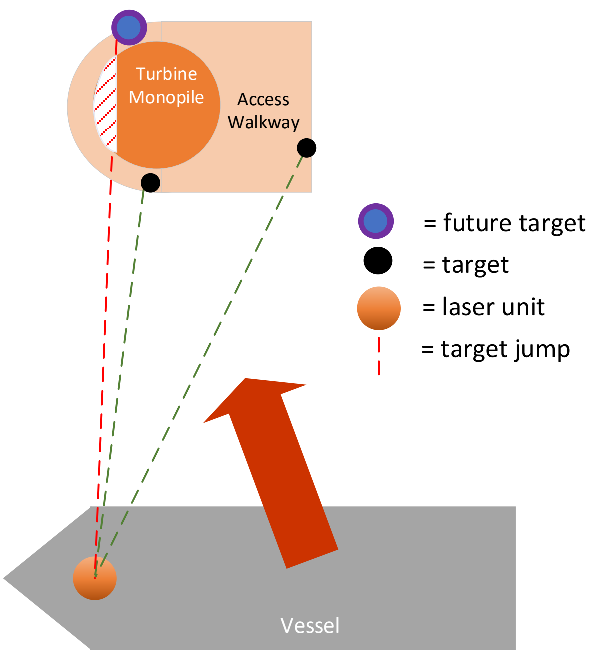
A DP2 walk to work vessel was operating inside an offshore windfarm manoeuvring into position to permit transfer of people and cargo to a wind turbine by means of a motion compensated gangway system. The DP current at the time of the event was 1.8 knots - 190 degrees and the wind force was 20 knots - 114 degrees. All thrusters were selected online and three of 4 generator were also online, the 4th ready and on standby. There were two separated redundant groups. Two DGNSS, one laser, 3 gyros, 3 VRS and 3 wind sensors were also online.

Note that the vessel was equipped with the following additional references:

- Taut wire - this was not permitted to be used infield due to placing clump weight on the seabed;
- Acoustic position reference - not permitted to be used due to placing equipment on the seabed;
- Microwave reference - transponders not installed prior to approach due to the impracticalities associated with high number of wind turbines.

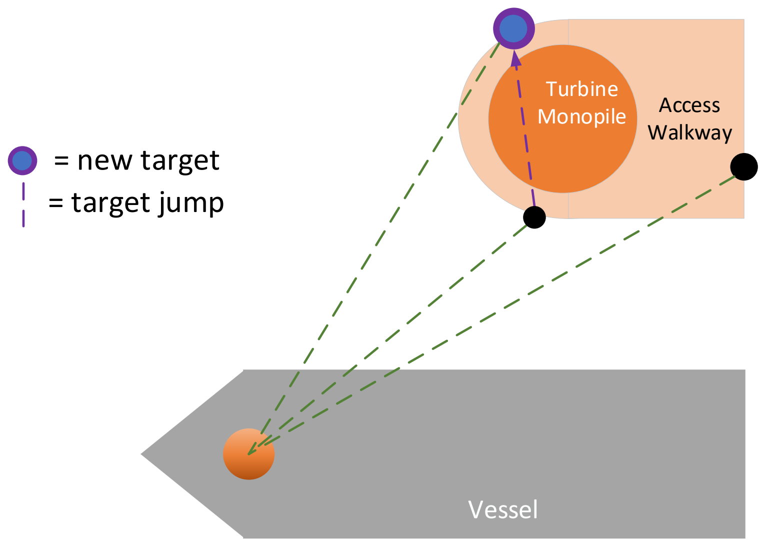
During the handover of the watch, the SDPO took control and commenced with the DP handover checklist. The vessel was stopped in all movements, outside the 50m radius - abeam from the wind turbine. The laser position reference sensor was operating and set on a target, but not yet enabled in DP. The SDPO initiated a 20m move in order to move slowly inside the 50m radius of the turbine. On finalising of the 6 hourly DP handover checklist, the laser position reference was selected to DP. All reference systems were online and were enabled in DP. The laser position reference was set on "auto tilt" and brightness filter at 60%, blanking zones were set.

VESSEL APPROACH



The distance to the tower was 40m when the SDPO commenced a move of the vessel towards the tower in order to get the vessel alongside for walk to work operations. After the move was completed, the SDPO deselected the laser position reference from the DP desk in order to change the laser target. The SDPO changed the selection of the target because it would get obstructed by the railings of the walkway around the turbine when the vessel would move closer. The 'new' selected laser target had a clear sight with the laser position reference transponder/receiver unit. Once the laser signal was stable the SDPO enabled it back in DP. Shortly after, the vessel arrived in final position and the SDPO informed the walk to work management team.

VESSEL IN FINAL POSITION



When the SDPO was looking to the reference system main view, he saw that the DGNSS were at the bottom on the edge of the median test line and that the laser reference had disappeared from the view (view range set to 5m). At this time, the DP system alarmed, “Reference prediction error Laser”, and, “Reference median deviation laser”. The SDPO informed the walk to work management team to standby. As the SDPO could clearly see that both DGNSS were operating well, he disabled the laser reference from DP. As expected the vessel started to accelerate towards the tower and the SDPO deselected the sway axis to stop the movement towards the wind turbine.

The DPO controlled the vessel’s speed for sway axis with the joystick and moved 10 meters away from the wind turbine. Sway axis was selected on DP again and an assessment was made in order to use the laser reference again. The blanking zones of the laser reference were slightly adjusted, in order to prevent accidently “jumping” onto false targets. After the laser reference looked stable again, it was enabled on DP and the vessel was moved back in position for walk to work operations. Walk to work operations were completed with no further station keeping issues.

During the station keeping event, the maximum position excursion towards the wind turbine was around 2 meters and heading deviation around 2 degrees.

The Lessons:

1. The fast acting response of the crew undoubtedly prevented this event from becoming more significant.
2. The planning of the use of position references is of key importance in such an operation where there is a relatively small target area such as a monopile of a wind turbine. The smaller the area, the more challenging the risk of target jumping becomes. The number and placement of targets is of paramount consideration.
3. The use of difference sensor technology may have avoided this event. For example, microwave position references.
4. The event report did not highlight the use of activity specific operating guidelines nor any change to DP status during the DP event.

This case study demonstrates the importance of careful selection and planning in the use of position reference sensors and the potential consequences therein.

4 DP Emergency Drill Scenario

DP emergency drill scenarios are included to assist DP vessel management and DPOs/Engineers and ETOs to conduct DP drills onboard. The intent is that the template can be used on any DP vessel so specific details regarding the technical outcome are not included. The benefit from using this template is to monitor and learn from the human reactions of key DP personnel. It is also important that the crew are familiar with various DP system setups including their failure modes.

EXERCISE SCENARIO	**ACTION REQUIRED DURING A DRIVE OFF FROM POSITION**

Objective:

To identify risks and impacts of this occurrence, possibilities to reduce that risk and suitable actions to be taken if such an occurrence happened.

Method:

With the vessel in full auto DP control; power plant configured according to the vessel's DP operations Manual (and respective decision support tool); all other vessel equipment and systems including position & heading references set up in accordance with applicable DP checklists:

1. Vessel in a safe location. Simulated location and activities agreed and communicated to all participants.
2. This scenario can be accomplished by initiating a large position move while in auto position at a high speed. Once the vessel has developed headway the DPO should demonstrate both bringing the vessel under control and moving the vessel away from danger using the IJS or DP Joystick or the Manual controls. Another option could be to take a thruster to local control at the thruster room and generate maximum thrust i.e., by operating the CPP pitch control valve or manually controlling the drive.
3. Check that appropriate alarms are generated and that DP equipment temperatures and functions are within acceptable/ normal limits.
4. Check the vessel DP crew ability to manage the situation in a controlled manner.
5. Discuss the results and determine how the risks could be mitigated / managed.

Prior to executing, discuss the expected results:

- Is the methodology appropriate to gain the best outcome of the exercise?
- Who will be involved with the exercise and what roles will individuals have?
- What equipment will be impacted / lost?
- What are the risks of the exercise?
- Is the exercise scenario appropriately documented?
- What will be the communication channels during the exercise?
- Who will observe and accurately record exercise data including the DP system configuration pre exercise?
- What is the anticipated loss of position?
- Are there any secondary failures expected, for example, mission equipment?

Observations During Exercise:

1. Is the DP emergency drill procedure being followed?
2. Is the equipment performing / reacting as expected?
3. Are those individuals directly involved in the exercise reacting appropriately given their assigned duties?
4. Are those individuals indirectly involved reacting in an appropriate manner?
5. Is the degree of participation and diligence as expected?
6. What is the actual loss of position?

EXERCISE SCENARIO	ACTION REQUIRED DURING A DRIVE OFF FROM POSITION

7. What is the duration from commencement to concluding a safe outcome for the vessel?
8. Was the communication effective during the drill?

Actual results witnessed:

EXAMPLE:

The vessel maintained accurate station keeping with remaining online equipment.

The DP system reacted well maintaining station keeping as did the crew's reaction and response to the failure….

The vessel DP system regained control returning to original position.

Discussion Points (Post exercise):

Human Factors

- What are the potential risks due to "multi-tasking" during DP operations that may directly lead to the scenario outlined during this drill? (Examples include managing / monitoring deck operations, radio traffic, etc.)
- What are the potential risks due to distractions in the workspace (i.e., Bridge, Engine Room) that may directly lead to the scenario outlined during this drill? (Examples include routine maintenance procedures, social media, personnel interactions, etc.)
- Discuss the alternative actions/reactions that may occur in response to a similar scenario. Are there multiple paths to a successful resolution or is there a preferred solution? Why?
- Following a review of the simulated exercise and the vessel and crew's reaction, what different operator (Bridge and/or ECR) reaction(s) might be warranted if faced with a similar situation during operation?

Review of DPO and other key DP personnel reaction

- What potential gaps in the existing DP Familiarisation program have been highlighted as a result of the exercise?

  What changes/revisions should be considered for the training and familiarisation procedures?

Review the applicable checklists (ASOG CAM/TAM/DP operations Manual/bridge and engine room checklists/ FMEA/DP Annual Trials programmes/etc.)

- What additional necessary actions and considerations should be addressed?
- What potential changes should be made to make the checklists more appropriate?
- What additional necessary operating conditions and parameters should be considered?
- What potential changes should be considered to make Decision Support Tools more applicable to the vessel and her equipment?
- How would these changes improve/affect the vessel's capabilities and limitations?

Conclusion:

Based on the results of the exercise and related discussions before and after, any suggestions for follow up including any corrective actions deemed appropriate should be accurately detailed and managed to close out.

Handling of vessel in the correct manner requires knowledge of the DP specific equipment, how the DP system reacts to scenarios and their respective alarms and the human intervention required if necessary to ensure station keeping. Items to consider include:

a. Appreciation of the potential to stop a thruster in emergency cases using the emergency stops
b. How quickly would it be determined that this scenario constituted a "red" situation within the ASOG

EXERCISE SCENARIO	ACTION REQUIRED DURING A DRIVE OFF FROM POSITION
	c. DP system reaction to multiple failures d. What to look for on the operator stations e. What event and alarms indicate any system failures f. Methods of fault finding and investigation g. Appropriateness of communication h. Training requirements