The Importance of ECDIS Training and Good Watch-keeping Practices

Introduction

This Risk Alert supplements our earlier Risk Alert published in November 2014, **RA 43 - The Importance of ECDIS Training and Familiarisation and Good Watch-Keeping Practice.**

A cross channel Bahamas registered ro-ro passenger ferry operating out of Portsmouth, UK grounded on a charted, rocky shoal in the approaches to St Peter Port, Guernsey. There were no injuries, there was no pollution and the vessel continued its passage into the harbour. However, there was significant damage to the ships bottom plating resulting in flooding of double-bottom void spaces.

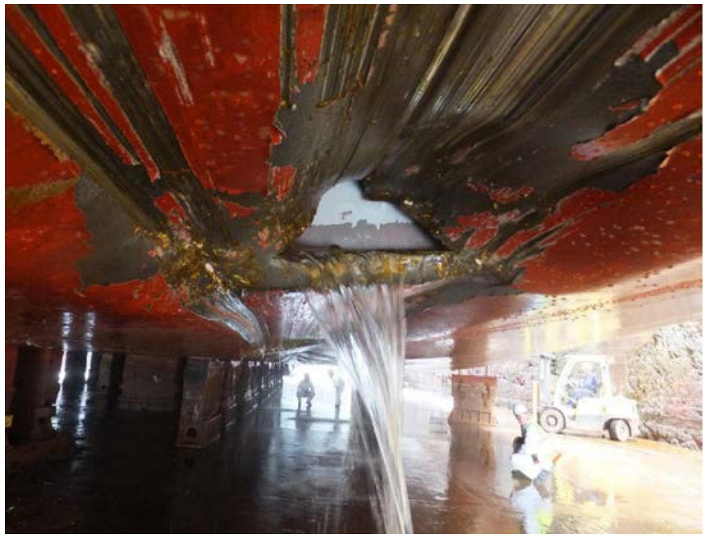
Full details and analysis have been published by the UK Marine Accident Investigation Branch (MAIB) (Investigation Report). The Club's Managers consider that a number of elements are of significant importance and worthy of bringing to Members' attention.

The investigation found that;

- There had been insufficient passage planning for the voyage in that restricted shallow waters, very low tide and the effect of squat had not been properly considered. This resulted in the bridge team being unaware of the limits of safe water available;
- Several course alterations intended to regain track were ineffective due to the tidal stream setting the vessel off course;
- There had been an absence of any alarm;
- Steering and propulsion had been responding normally, and;
- The master's conviction that there had been sufficient depth of water had led to a collective understanding on board that the vessel had not grounded.

When approaching Portsmouth, vibration experienced from shallow water effect was frequently encountered often prompting a reduction in speed., However, the rocky shoals in the approaches to St Peter Port meant the onset of squat was faster and not so apparent to the crew, leading to the possibility of squat being largely discounted when approaching St Peter Port.

The vessel grounded on a granite rock where it had been erroneously believed that sufficient depth of water would have been available. Had the bridge team produced a fully detailed berth to berth voyage plan, taking the chart accuracy into consideration, the area where the vessel grounded would have been identified as unsafe, and avoided at all costs.



Depth Calculation

The Master was aware of the charted 5.2m shoal and the company's requirement for a minimum Under Keel Clearance (UKC) of 1.0m. The Master was also aware of the height of tide of approximately 1.0m. Thus his appreciation of the navigational situation was:

Draught	+ minimum UKC	= 6.0m
Charted depth	+ height of tide	= 6.2m

Had squat been taken into account, calculation of a safety depth would have been:

Draught	+ minimum UKC	+ allowance for squat	– height of tide
5.0m	+ 1.0m	+ 1.2m	– 0.9m = 6.3m

The vessel should not have passed over any charted depth of 6.3m or less. Furthermore, if the +/- 1.2m source data accuracy of the chart is added to this equation then, for assurance of maintaining the minimum UKC, the vessel should not have passed over any charted depth of less than 7.5m.

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Teamwork

Teamwork on a bridge is vital, especially in pilotage waters where maintaining continuous, high levels of situational awareness is required and frequent decisions relating to navigational safety are being made. Key to effective teamwork is a common understanding of the passage plan. Pre-departure and pre-arrival briefings provide one method of delivering this.

Use of the Echo Sounder

The echo sounder's safety alarm depth was set to 0m so the alarm feature was ineffective. However, the system was switched on and the visual display was available to all on the bridge. Use of an echo sounder as a safety barrier during pilotage can be effective but relies on two conditions: the expectation of danger, and seabed contours that would show reducing soundings in sufficient time to react. In this case, neither of these conditions were present; the bridge team were unaware of the approaching hazard and the steep sided nature of the rocky pinnacles in the area would not have provided sufficient forewarning that the vessel was about to run aground.

ECDIS Audible alarms

ECDIS audible alarms on board the vessel had been disabled. However, an audible alarm is a mandated feature of an ECDIS; therefore, disabling it meant that the system was not compliant with IMO performance standards. Persistent ECDIS audible alarms are recognised as a significant distraction to bridge teams and there are situations, such as operating in pilotage waters with enhanced bridge teams, where silencing the audible alarm would be helpful.

However, accidents investigated by MAIB where bridge alarms were silenced have, unlike this accident, occurred outside pilotage waters and often with a lone watch-keeper. In such circumstances, audible alarms are critical and will alert all watch-keepers, including those otherwise distracted from danger.

Safety planning

The ECDIS safety depth setting was appropriate for the voyage, but the safety contour value of 5m was not. The safety contour could have been set at a higher minimum value of 7.5m and the ECDIS would have defaulted to the next deeper ENC contour of 10m. Such a safety contour would have given the impression that the passage was impassable. It would have been possible to draw a Limiting Danger Line (LDL) in ECDIS at that depth, which would have given the most accurate electronic picture of the safe water available. Although this facility was available and the crew had been trained in its use, it was not practiced on board. Whilst this method could have provided a more realistic ECDIS picture of the available safe water, it is a method that carries significant risk as the LDL value is unique to a specific height of tide value and would need to be adjusted if the planned time of the passage changed.

Cross track distance (XTD) errors

Although the company's approved route did not specify XTD values for use in ECDIS, the settings at the time of the accident were appropriate and had the vessel remained within the XTD, the grounding would have been avoided. The XTD error alarm (visual on the display, but not audible) was active in the final approach to the grounding, but the bridge team did not respond. Had the bridge team appreciated the significance of crossing outside the XTD then this alarm could have acted as a trigger to indicate that the vessel was heading into danger.

Safety frame

The ECDIS safety frame is a feature that offers forewarning of danger, primarily intended to prevent grounding, but this feature was switched off. However, the minimum width setting for the safety frame was 0.1nm (200 yards); this meant that the safety frame feature would have raised an alarm when the vessel was on track and in safe water as well as when it was unsafe (off-track). The safety frame feature would have been unable to discriminate between safety and danger.

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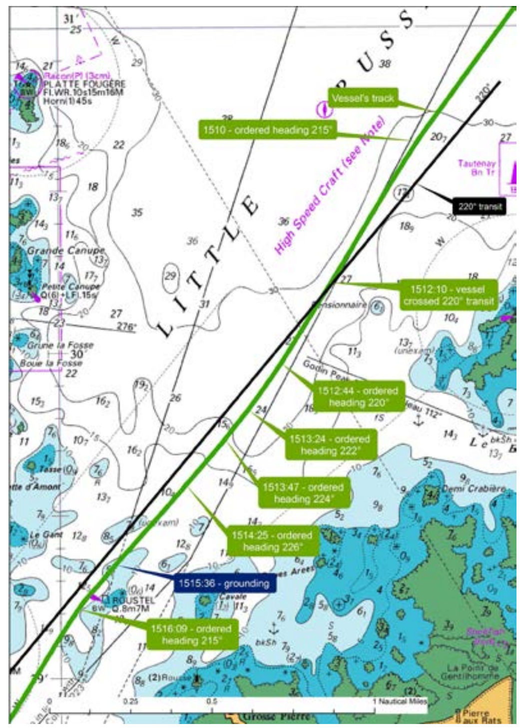
Safety issues directly contributing to the accident that have been addressed or resulted in recommendations

1. The vessel grounded on a charted, rocky shoal because insufficient passage planning had been undertaken. In particular, the extremely low tide and the effect of squat had not been properly taken into account.
2. Had all the factors affecting under keel clearance been accurately assessed, it would have been apparent that it was potentially unsafe to pass over any charted depth less than 7.5m with a draught of 5.0m.
3. The absence of sufficient passage planning meant that the bridge team were unaware of the limits of safe water so approached danger without appreciating the hazard. Furthermore, a safer course of action was available - use of the wider channel which would have made little increase to the overall distance of the passage.
4. Course alterations intended to regain track were insufficient given the strength of the tidal stream setting the vessel off course.
5. The repetitive nature of the vessel's schedule induced a degree of planning complacency.
6. Although the primary method of navigating in the channel was visual, ECDIS was not utilised effectively as a navigation aid. In particular, the safety contour value was inappropriate, the cross track error alarm was ignored and the audible alarm was disabled.
7. The layout of the central bridge console prevented the Chief Officer from utilising the ECDIS display to support the Master during pilotage.
8. The significant navigational risk routinely being taken by the crew of the vessel and the ECDIS non-conformity went undetected by audits and inspections.

The Club Supports the findings of this investigation and recommends to Members that the standard of passage planning by their bridge teams meets expectations including ensuring that;

- Proper account is taken of all factors affecting draught and available depth of water; in particular, an assessment of how such factors may affect the width of safe water available.
- Masters and company standing orders specify a system for control of ECDIS parameters.
- Master and officers are aware that ECDIS is an aid to navigation and that over reliance on ECDIS alone for navigational purposes is actively discouraged.
- The use of ECDIS safety features is improved, including adjustment of the safety contour relevant to the local conditions and observation of all alarms.
- The effectiveness and understanding of the safety features of the 'type specific' ECDIS is verified during audits of the bridge team.



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