MARINE ACCIDENT INVESTIGATION BRANCH

MAIB

SAFETY DIGEST

Lessons from Marine Accident Reports 2/2018

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No 2/2018

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October 2018

MARINE ACCIDENT INVESTIGATION BRANCH

The Marine Accident Investigation Branch (MAIB) examines and investigates all types of marine accidents to or on board UK vessels worldwide, and other vessels in UK territorial waters.

Located in offices in Southampton, the MAIB is a separate, independent branch within the Department for Transport (DfT). The head of the MAIB, the Chief Inspector of Marine Accidents, reports directly to the Secretary of State for Transport.

This *Safety Digest* draws the attention of the marine community to some of the lessons arising from investigations into recent accidents and incidents. It contains information which has been determined up to the time of issue.

This information is published to inform the shipping and fishing industries, the pleasure craft community and the public of the general circumstances of marine accidents and to draw out the lessons to be learned. The sole purpose of the *Safety Digest* is to prevent similar accidents happening again. The content must necessarily be regarded as tentative and subject to alteration or correction if additional evidence becomes available. The articles do not assign fault or blame nor do they determine liability. The lessons often extend beyond the events of the incidents themselves to ensure the maximum value can be achieved.

The Editor, Jan Hawes, welcomes any comments or suggestions regarding this issue.

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MARINE ACCIDENT INVESTIGATION BRANCH

The role of the MAIB is to contribute to safety at sea by determining the causes and circumstances of marine accidents and, working with others, to reduce the likelihood of such causes and circumstances recurring in the future.

Extract from
The Merchant Shipping
(Accident Reporting and Investigation)
Regulations 2012 – Regulation 5:

"The sole objective of a safety investigation into an accident under these Regulations shall be the prevention of future accidents through the ascertainment of its causes and circumstances. It shall not be the purpose of such an investigation to determine liability nor, except so far as is necessary to achieve its objective, to apportion blame."

INDEX

Glossary of Terms and Abbreviations

AB - Able Seaman
ARPA - Automatic Radar Plotting Aid
BNWAS - Bridge navigational watch alarm system
C - Celsius
CCTV - Closed Circuit Television
COSWP - Code of Safe Working Practices for Merchant Seamen
CPR - Cardio-Pulmonary Resuscitation
ECDIS - Electronic Chart Display and Information System
ENC - Electronic Navigation Chart
ERV - Emergency Response Vehicle
GRP - Glass Reinforced Plastic
GPS - Global Positioning System
HSFO - High Sulphur Fuel Oil
kts - knots
LPG - Liquid Petroleum Gas
LSMGO - Low Sulphur Marine Gas Oil
m - metre
"Mayday" - The international distress signal (spoken)
MCA - Maritime and Coastguard Agency
MES - Marine Evacuation System
nm - nautical mile
OOW - Officer of the Watch
PFD - Personal Flotation Device
RHIB - Rigid Hulled Inflatable Boat
RNLI - Royal National Lifeboat Institution
RYA - Royal Yachting Association
SOLAS - International Convention for the Safety of Life at Sea
VHF - Very High Frequency
VTS - Vessel Traffic Services
VTSO - Vessel Traffic Services Officer

Introduction

If you are reading this introduction it is likely that you are already one of the converted who 'gets' safety. However, as many of these articles show, not everyone does. So, when you have finished with this edition of the MAIB's Safety Digest, could I ask you to pass it to someone you feel will genuinely benefit from reading these articles. If you are accessing this on-line, then send on the link: there is no limit to the number of people who can learn from the experiences of others.

One team of people who definitely 'get' safety are this edition's introduction writers. I am delighted that Sir Alan Massey, Sheryll Murray MP and Theo Stocker have agreed to write the introductions to the merchant, commercial fishing and recreational craft sections of this digest. All three have written from both their professional and own personal perspectives, and their words are very powerful. If you read nothing else in this issue, I would encourage you to read the section introductions.

Anyone who knows me will already be aware that I like simplicity. There is seldom anything simple about a marine accident, but to my mind there are usually three recurring components: an underlying weakness or vulnerability in the system (which includes the people); a trigger event or additional stressor that exploits an existing weak spot to cause an accident; and the aftermath, or how it is dealt with. As I was reminded as I approached my first sea command, "it is not what happens that matters; it is how you deal with it".

Like so much in life, safety is about preparation, and doing things today instead of putting them off until tomorrow. Many of the underlying weaknesses that create the pre-conditions which allow an accident to happen involve matters that ought to have been addressed, but have been left unattended for one reason or another. Just this month another fishing vessel has been lost due to downflooding because leaking seals on a couple of through-deck hatches had not been replaced. However, what is striking about this edition is the number of cases where shortcuts and work-arounds have become part of normal business, with the result that essential safety barriers such as alarms and limits were not set, or were disabled or ignored.

At the other end of the accident timeline is the aftermath: the crew's ability to deal with an emergency situation. Anyone who has experienced a flood, fire, explosion, man overboard, or any other emergency will be determined not to let it happen to them again. They will make an effort to learn their ship's systems and procedures, and how to locate and use the emergency equipment. They will also, often, be frustrated with those who see safety as an unnecessary and time consuming chore. It's an old adage, but if you think safety is expensive, try having an accident!

Be safe,

Andrew Moll
(Interim) Chief Inspector of Marine Accidents

October 2018

Part 1 – Merchant Vessels

'*Nothing happens by accident*'. Franklin D Roosevelt may have been talking about politics when he said those words, but the adage works for seafaring too. As you read these fifteen, concise case studies of marine 'accidents', you will quickly spot the chain of judgments, decisions and events that led to the unhappy outcome in each instance. None of them deliberate, for sure, yet almost all of them clearly having some human factor in the causation. Which means – bluntly – that if people had acted differently, these incidents would in all probability never have happened. Hindsight allows us to draw such conclusions. But what we can now see as fundamental errors were, at the time, normal operational decisions – of the kind that you and I make, every single day.

In the MCA, as the UK government's maritime authority, we are constantly challenged to regulate less and educate more; to make new rules only where the risks are greatest; and – where we can – to encourage safer behaviours by guidance rather than legislation. I completely support that approach and, for the most part, it works extremely well. Even if in some cases, more regulation eventually proves to be the most effective answer.

Yet accidents still do happen, and we know that human behaviours are most frequently at the root of them. The MCA is proud to have been one of the four commissioning bodies for the recent book, '*Being Human in Safety-Critical Organisations*'. We did so because we believe there is much more to be learned and understood in that behavioural dimension if our maritime sector is to succeed in reducing its rate of avoidable accidents; an outcome that we would surely all love to see.

Learning that flows from the experiences of others is an invaluable gift. I believe we could do more to embed the lessons of hindsight into effective training, education and guidance – underpinned by proportionate regulation, where necessary, in order to improve foresight, situational awareness and the confident practice of good seamanship.

So in your reading of this excellent little Digest, and your thinking about what might have broken the chain leading to each of these fifteen incidents, I would ask you to keep three simple questions in mind: *would different rules or procedural guidance have helped*?; *would you have acted any differently in the circumstances*?; *will your learning from what happened have any effect on your own future behaviours*? Perhaps the most powerful contribution to safety that this Digest could make would be a resounding answer of 'yes!' to at least that last question.

Alan Massey

SIR ALAN MASSEY
CHIEF EXECUTIVE, UK MARITIME & COASTGUARD AGENCY

Since 2010, Sir Alan has been Chief Executive of the UK Maritime & Coastguard Agency: the UK's maritime regulator, administrator of the British merchant fleet and seafarers, and maritime emergency responder. This appointment followed a career in the Royal Navy during which he commanded numerous major warships, including in combat operations, and learned a great deal about how things can go wrong at sea.

During his time with the MCA, Alan has taken Her Majesty's Coastguard through a complete overhaul of concept, technology and manning; revitalised the UK Ship Register to make it more business like and competitive; consolidated and modernised all airborne search and rescue in the UK and its waters; and transformed the Agency's vessel survey and inspection capability. The MCA's vision is to be the best maritime safety organisation in the world; and these multiple change programmes have sought to bring that vision closer to reality. Sir Alan will step down from his position in October this year.

CASE 1

Listen Carefully, I'll Say This Only Once

Narrative

A large bulk carrier was approaching a laden oil tanker in a traffic lane of a traffic separation scheme. With a speed of 16kts, the bulk carrier was the overtaking vessel, and as both vessels were heading for a turn in the lane, the bulk carrier's master ordered the OOW to hail the other vessel to ascertain its intentions.

Accordingly, the OOW, who was Chinese, hailed the oil tanker. Although irritated by the call the Indian master of the oil tanker responded. During the conversation the Indian master agreed to allow the bulk carrier to overtake on his starboard side. Unfortunately the Chinese OOW misunderstood, and informed his own captain that the oil tanker would not allow a starboard pass. The master, who had not been listening to the conversation, accepted the second officer's explanation.

Reluctantly, the bulk carrier's master altered course to overtake the oil tanker on its port side. Shortly afterwards, when the vessels were just 655m apart, the oil tanker's master ordered an alteration to port to increase the sea room between his and another vessel that he was overtaking. No check for sea room astern was made and the master was unaware that the overtaking bulk carrier was now on his own port quarter.

The bulk carrier's master was alarmed to see the oil tanker alter to port across his bow at such close range. Unsure of what to do, and thinking that he had been instructed to pass to port, the bulk carrier's master made a series of helm movements in a vain attempt to avoid a collision. However, due to the proximity of the vessels (see figure) there was nothing that could be done to avoid the accident. Both vessels were severely damaged but there were no injuries and no pollution.

The Lessons

1. **Communications should improve understanding; they should not muddy the waters. In this case, the conversation was carried out in neither party's native language, and confusion arose when an assumed action was not verified. The use of standard marine communication protocol might have enabled the information to be passed in a clear manner.**

2. **Manoeuvring should only be carried out once you are fully aware of what is around you. Assumptions should not be made, and checking sea room ahead and astern is not only good practice but it should also be common sense.**

3. **Good bridge team management is a vital tool in any navigational situation. Ensure that every member of the team is aware of the plan, their role in it, and that they are empowered to monitor the actions of others in the team.**

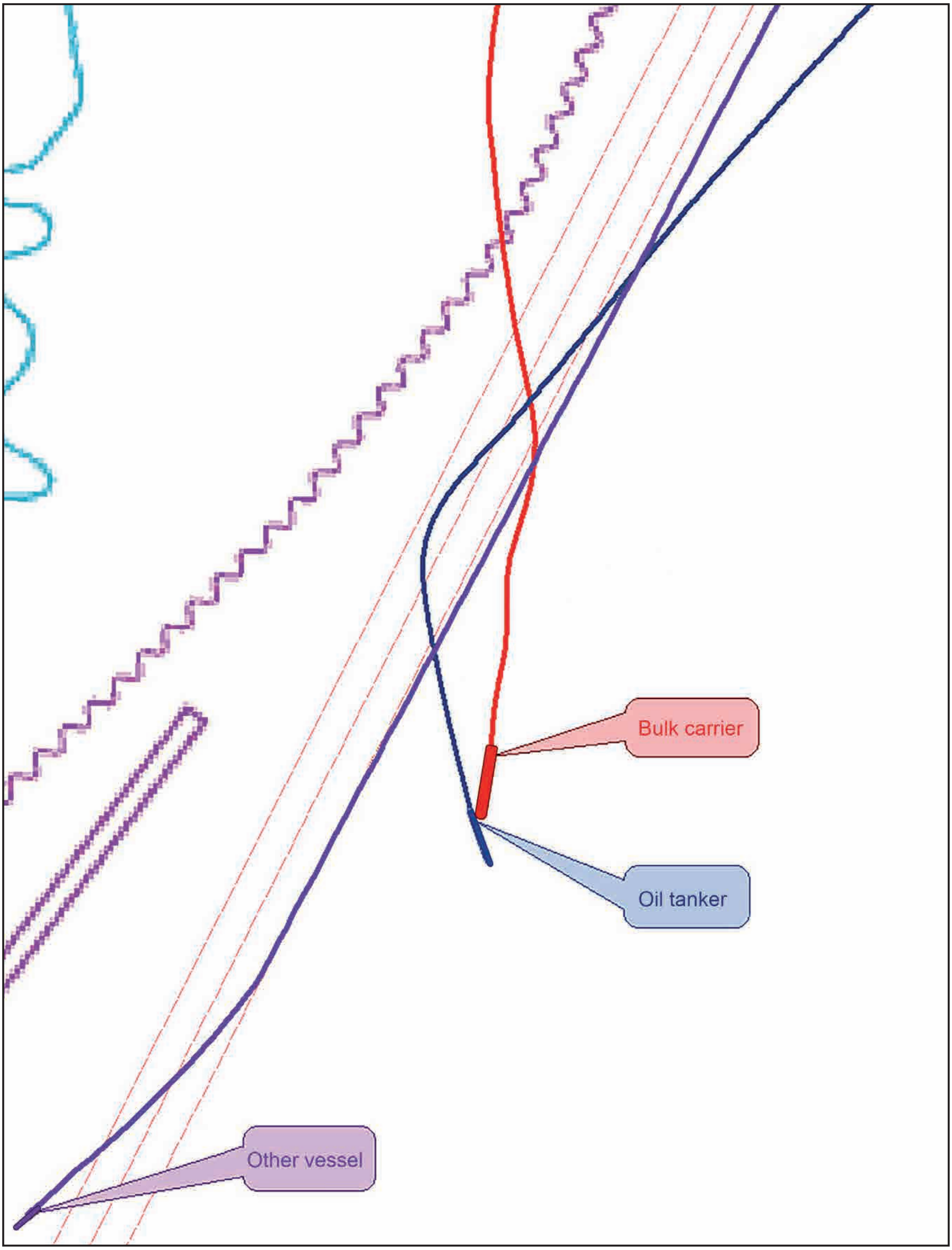


Figure: Tracks of the vessels leading up to the collision

No Alarm Bells

Narrative

A small bulk carrier grounded on a sandbank. The vessel had been following a planned track in the ECDIS but the ECDIS alarms had been turned off. The ship remained aground for 6 days and was refloated by salvors.

The second officer had taken over the bridge watch from the master at midnight. The vessel was heading 146° in autopilot at 11kts, but during the watch handover the master told the oncoming OOW to shorten the planned route by moving it further to the west. After the master retired to his cabin, the OOW amended the passage plan by 'dragging and dropping' several waypoints on the ECDIS. The route was checked visually but the results of the automatic check route function were not inspected. The vessel's heading was then adjusted to follow the revised route. The OOW then settled into the watch accompanied by a lookout. Both were seated, with the OOW able to monitor the ECDIS and the ARPA displays (Figure 1). Traffic was light and the visibility was good. It was not busy.

About 2½ hours into the watch the vessel's speed suddenly and rapidly decreased. The OOW did not know why, and immediately called the master and chief engineer. The OOW also 'zoomed in' on the ECDIS display. The chief mate and many of the crew were also woken by the change in the ship's movement. When the master arrived on the bridge he immediately realised that the vessel was aground, and put the engine telegraph to stop. The grounding checklist was started and, as soon as the master was sure there was no water ingress, he attempted to manoeuvre clear of the shallows. But without success. The vessel remained aground until it was refloated by salvors 6 days later.

Subsequent inspection of the ECDIS indicated that the system's 'safety frame' or 'look ahead' was inactive and that its audible alarm had been disabled. Consequently, no alarm was generated when the vessel passed over the safety contour (10m) (Figure 2).

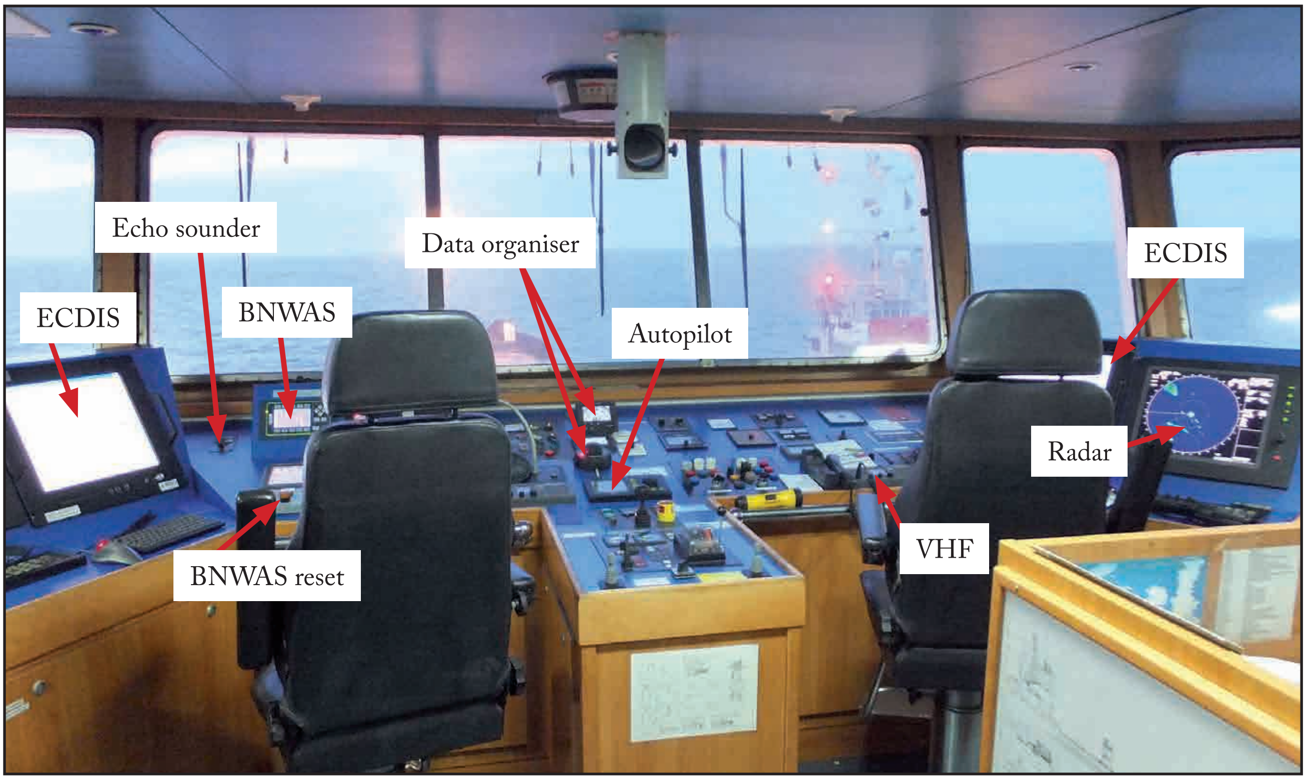


Figure 1: Bridge layout

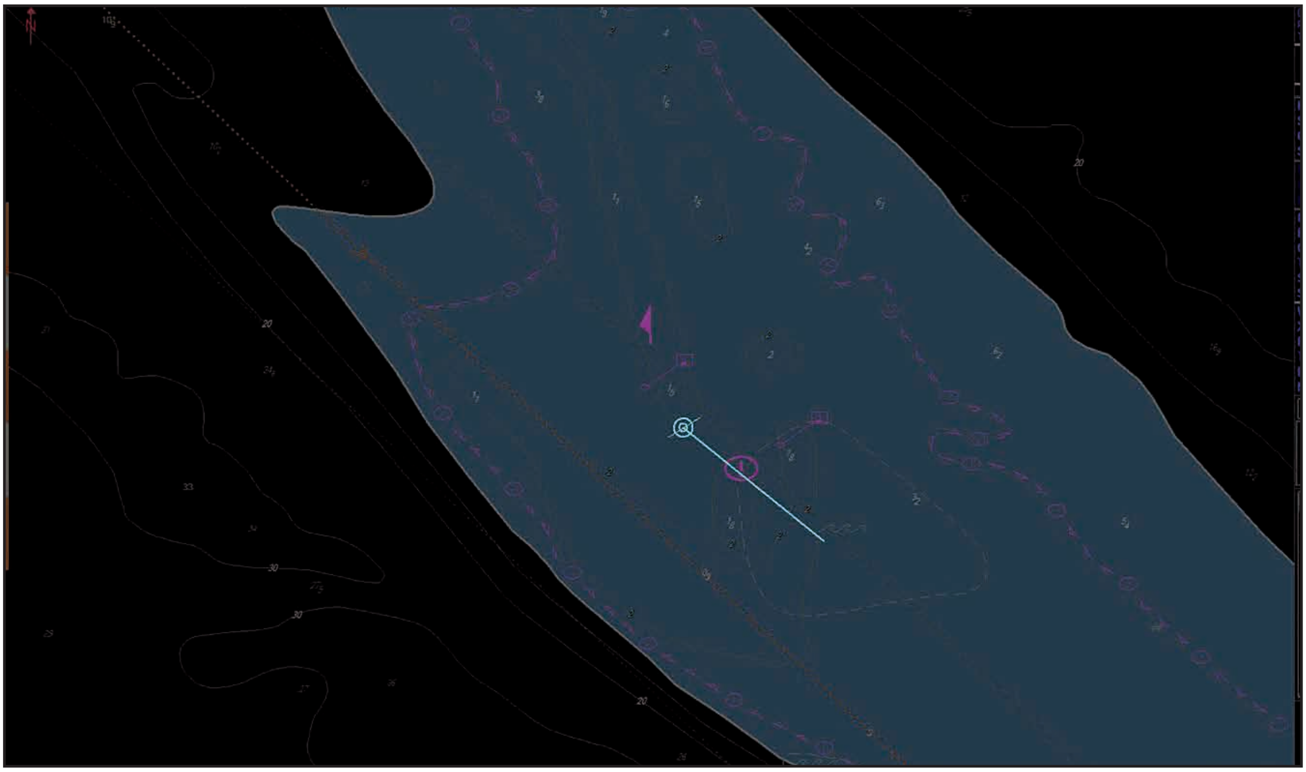


Figure 2: Reconstruction of ECDIS display (zoomed in and 'all')

The Lessons

1. In recent years, a number of groundings have resulted from revised passage plans not being checked thoroughly. Although changes to such plans are frequently made at short notice and less than ideal situations, the bypassing of the usual checks and controls is fraught with danger. Shortcuts might be expedient, but a second pair of eyes remains priceless.

2. Amending a route in ECDIS is very quick and easy, but checking that the revised route is safe still takes time. It is important that visual checks are made on larger scale ENCs and that the automatic check is utilised.

3. Many of the alarms that ECDIS generates can appear unhelpful in pilotage waters where close attention is being paid to a vessel's position and likely risks. In such circumstances, the alarms do not tell a master or an OOW something they are not already aware of. However, in coastal and open waters, where focus on the effective monitoring of the ship's position is generally reliant on the bridge watchkeeper alone, the ECDIS alarms are potential lifesavers. Preventing alarms from being an annoyance and a distraction, but having them available when needed, relies on their effective management. Disabling them completely is not the answer.

4. Research has shown that alertness and performance tend to be at their lowest in the early morning when the human circadian rhythm is synchronised with the normal pattern of daytime wakefulness and sleep at night. This puts the 0000-0400 watchkeepers at most risk, particularly when the watch is very quiet and boring. Therefore, don't remain seated for long periods, and do try to stay active.

Brake Failure

Narrative

The wheelhouse of a small water jet propelled passenger ferry was severely damaged when the ferry overshot its intended berth and ran under a pier (Figure 1). The skipper suffered minor abrasions from the impact but the two other crewmen and the 15 passengers escaped injury.

It was dark and the 1½ mile crossing had been uneventful. As usual, when the ferry was about 100m from its berth, which was on the inner side of a pontoon attached to a pier, the skipper reduced the engine speed by operating a morse lever with his left hand while using a joystick controller with his right hand to steer. The ferry was parallel to the pontoon, which was off its port bow, and was heading downwind and down tidal stream. As the ferry neared the end of the pontoon, the skipper moved the joystick to change the direction of the water jet drive to astern. When the ferry did not slow as expected, the skipper increased the engine speed, but the ferry accelerated ahead towards the pier. The skipper had just enough time to shout a warning to the crew, who then told the passengers to "*brace*" just seconds before the top of the ferry's wheelhouse struck the underside of the pier.

The force of the collision demolished the wheelhouse (Figure 2) and covered the skipper in debris. None of the passengers were injured as they had remained seated as instructed during a safety brief given before departure. Following the collision with the pier, the passengers donned lifejackets and the skipper used a hand-held VHF radio to inform the local VTS that the ferry was wedged (Figure 2). Nearby vessels arrived quickly to evacuate the passengers and the crew ashore.

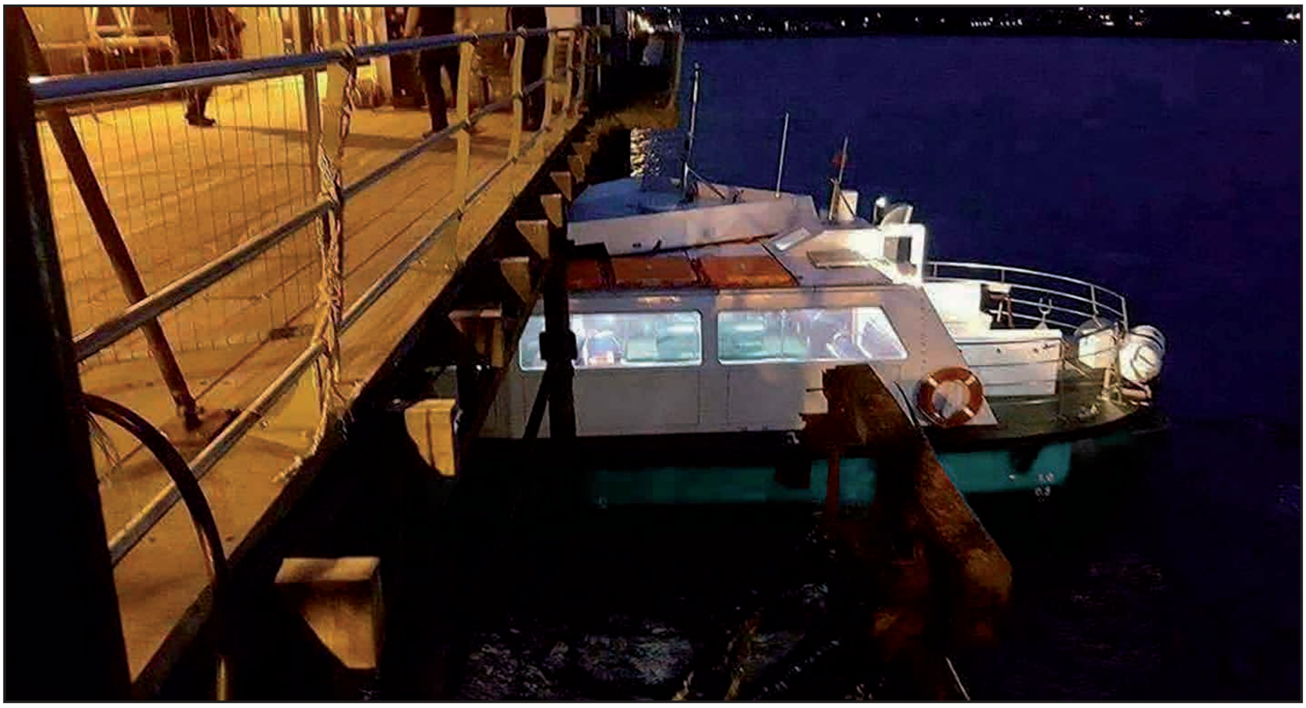


Figure 1: Vessel wedged under pier


Figure 2: Ferry post-collision showing the demolished wheelhouse

The Lessons

1. On short ferry crossings, some passengers are keen to disembark quickly. Controlling the movements of such passengers, while they are making for an exit before the vessel has been fully secured alongside, can be challenging. That in this case all the passengers followed the crews' instructions and remained seated shows the value of safety briefs and periodic reminders in preventing passenger injuries.

2. By their nature, ferry operations are routine and the procedures and practices for arrival, departure, berthing and unberthing may hardly vary. However, the approaches to some berths have few abort options and allow little time or sea room to recover from a mechanical malfunction, a lapse, or an error of judgment. The dangers associated with routine tasks are difficult to avoid, but no matter how familiar or competent a skipper might be, asking 'what if?' before each berthing can prompt a greater consideration of the manoeuvre and the potential effects of the environmental conditions.

Hot Water Pockets

Narrative

A second engineer on board a chemical/products tanker was badly scalded while carrying out a routine external inspection of the vessel's main engine. The vessel was alongside and engaged in cargo operations at the time and the second engineer was being assisted by a third engineer.

During the course of the inspection, the second engineer stepped off the walkway and squeezed between two cylinder head covers (Figure 1). As he did so, his boiler suit pocket became snagged on the operating lever of a jacket water vent valve (Figure 2). As the lever moved, the valve opened and pressurised water, at 75ºC, was released through the vent and sprayed over the second engineer.

The confined location prevented the second engineer's escape, but the swift actions of the third engineer, who managed to close the valve, saved him from further scalding injuries.

Following the accident, the company took immediate action to remove the vent valve operating levers on all its vessels with similar engines. This was a temporary measure until proper securing or blanking arrangements could be put in place.

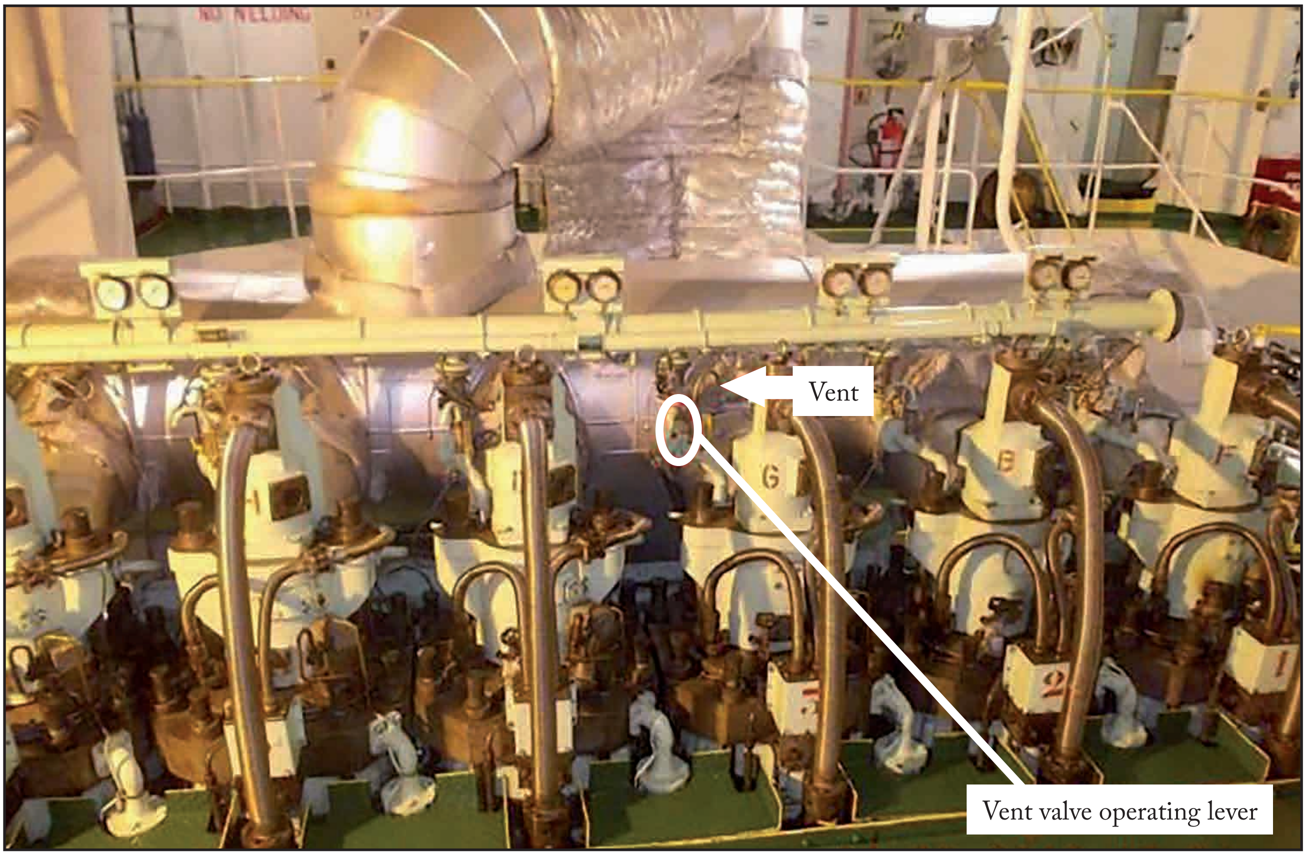


Figure 1: View of main engine cylinder heads

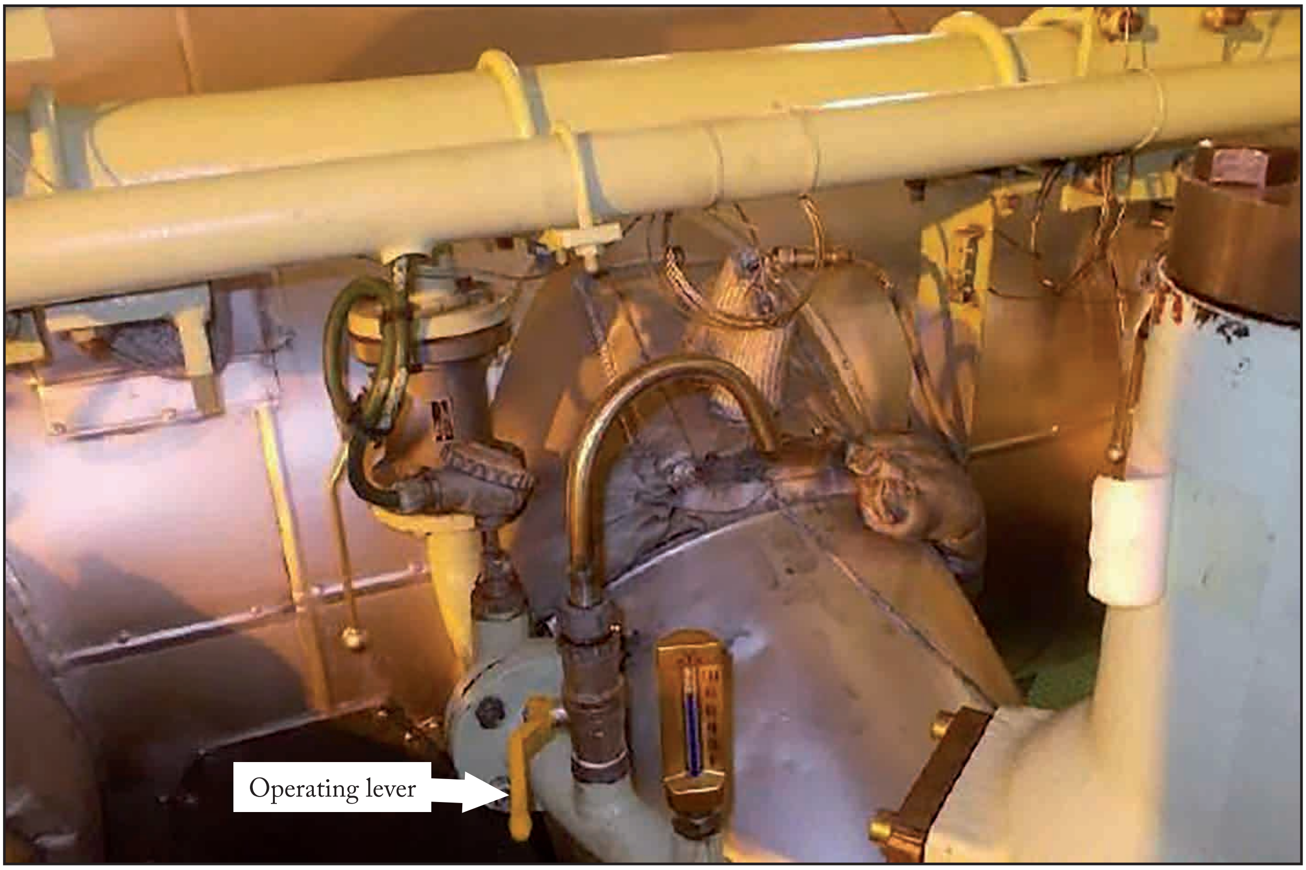


Figure 2: Vent valve operating lever

The Lessons

1. Single valve isolation of a pressurised hot water system, with an open-ended connection, is an incident waiting to happen, particularly in a vibration-heavy environment. In such circumstances, the open ended pipes or valves should be plugged or blanked off.

2. Lever-operated ball valves and cocks are susceptible to inadvertent operation and should be installed in such a way that the operating lever does not protrude into walkways or working areas.

3. It is always good practice to install lever-operated ball valves that can easily be locked in both the open and closed positions.

Overflow in an Instant

Narrative

An LPG carrier was at anchor awaiting a berth when instructions to take bunkers were received. A bunkering plan was completed by the ship's crew prior to the bunker barge arriving alongside.

A pre-bunker meeting was held with the barge representative and ship's crew and it was agreed to bunker low sulphur marine gas oil (LSMGO) first followed by high sulphur fuel oil (HSFO). A verbal 'stop' instruction was agreed as the emergency stop signal, with two-way communication maintained on a dedicated VHF radio channel.

The valves were aligned for receiving LSMGO and the transfer was commenced, completing about an hour later with the hose being disconnected. The HSFO hose was then connected and the bunker plan and checklist completed. The valves were lined up to receive HSFO into two tanks simultaneously, and pumping was started.

An hour later, the deck watch sighted oil overflowing from the vents of the overflow tank and another tank that was not supposed to be receiving any HSFO (see figure). The order to stop bunkering was given and the vessel's emergency response team was activated, but they were unable to prevent HSFO escaping overboard through a freeing port.

Roughly 1 tonne of HSFO was recovered from on deck, and six drums of contaminated soak up material was discharged to the garbage boat. Although difficult to estimate, up to 2000 litres of HSFO were lost overboard.

It was subsequently discovered that two valves aligned to another fuel tank were not fully closed. One valve was jammed with some debris and the other not fully tightened, which allowed fuel to flow into a tank that was already 80% full, eventually causing it to overflow.

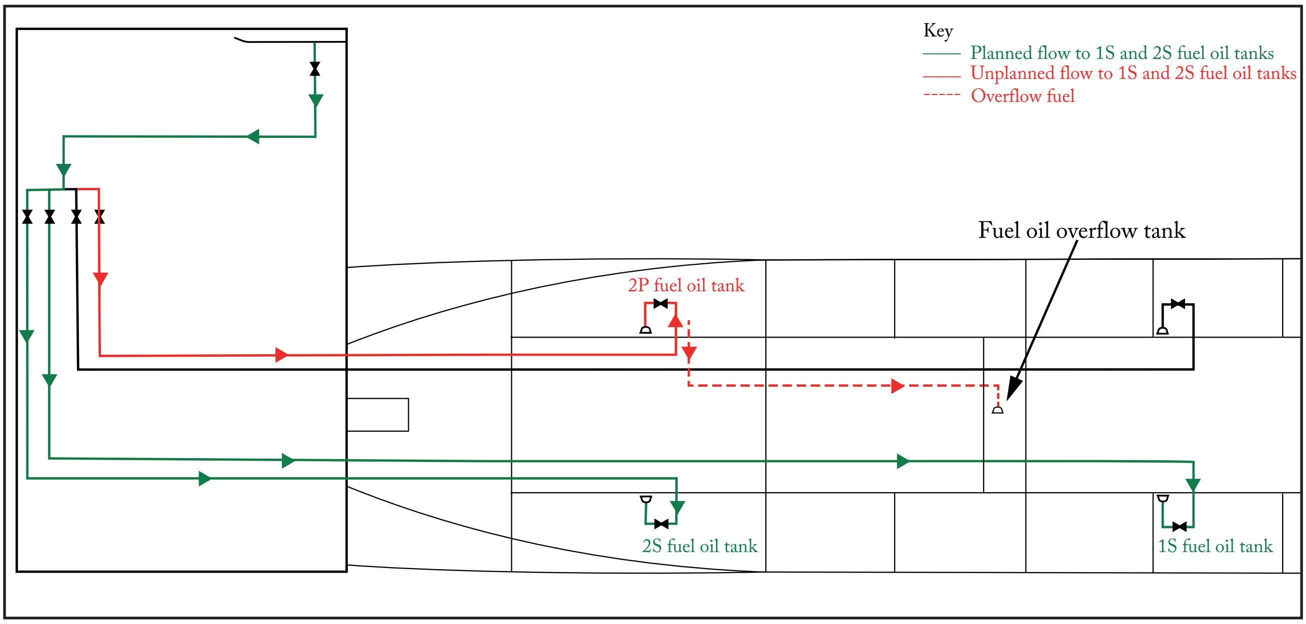


Figure: Illustration to show the flow of fuel oil at the time of bunkering

The Lessons

1. Remain disciplined, and don't get into a 'tick box' mentality when completing checklists. Make sure that the items on the checklist have been completed. In this case one of the two isolating valves could have been closed fully if it had been checked.

2. It is vital that all tank levels, as well as the tanks being filled, are monitored during bunkering to check that fuel is flowing as intended. Don't assume because a valve appears shut that it is holding.

3. In this instance the bunker tank high level alarm (90%) and overflow tank (10%) sounded in the engine room and engine control room. Both were acknowledged but no action was taken by the crew. Two vital indicators that something was wrong were ignored. Clear communications and instructions are essential to ensure crew have a common understanding of the operation and the role they play.

4. The deck included freeing ports to allow water to be readily shipped overboard. However, there was no means of closing off the freeing ports during cargo/bunkering operations. This simple last line of defence could have prevented polluting the marine environment and the extensive clean-up operation that subsequently took place.

What Was That?

Narrative

It was a fine summer's day and passengers on board a ferry were taking in the sights of a city while enjoying a scheduled river and canal cruise. As the ferry made its way towards a lock entrance, the bridge team were called by radio with the request that the ferry's approach be delayed by a few minutes to allow an outbound vessel to clear.

The ferry's master reduced speed and told the mate, who was on the helm, to steer towards the eastern side of the channel to give the outbound vessel plenty of sea room. Entering the lock was 'business as usual', and the ferry's master and the mate on the helm chatted as the distance to the lock decreased and the ferry moved to the eastern side of the navigable channel as planned. The bridge team were familiar with the area and were navigating by eye.

By the time the outbound vessel was clear of the lock entrance, the ferry was much further to the east than usual, and the mate was quick to apply starboard helm to line up the ferry for its approach. Seconds after the ferry had started to turn, the crew and passengers felt the vessel vibrate and heel to starboard. The ferry's engines stopped, so an anchor was immediately let go to prevent the ferry from drifting towards dangers. After the engineer managed to re-start one of the engines, the ferry was manoeuvred alongside and the passengers were disembarked. There were no injuries.

The ferry had run over the submerged remains of a mooring dolphin, which was the northerly-most of several charted derelict dolphins on the eastern side of the approach to the lock (Figure 1). The ferry's port propeller, shaft, stern seal and rudder were damaged by the contact (Figure 2).

Figure 1: View of exposed dolphins

Figure 2: Damaged propeller and rudder

The Lessons

1. For most of the time, voyages are routine, but when things change and tried and tested plans are modified, the margins for error frequently decrease. In such situations, a few minutes taken to look at the chart and think through the ramifications of any change of plan or 'doing something out of the ordinary' is usually time well spent.

2. Navigating by eye in a narrow channel is common practice, but it can be misleading - even in familiar waters. Therefore, when passing close to underwater hazards or shoal water, the use of more accurate navigation systems, such as electronic charts, provides good assurance.

3. Being prepared to act quickly and positively in an emergency is just as important as preventing an accident in the first place. Realistic drills, well-considered and rehearsed procedures, and occasionally thinking 'what would I do if?' are key to instinctive actions if things go wrong.

From the Frying Pan Into the Fire

Narrative

In preparation for a short coastal passage, a small general cargo ship left its berth, in ballast, and proceeded to an anchorage approximately 1½nm offshore to layover for a few hours. Although the master was new to the ship, he was familiar with the area and had used the anchorage before. It was slack water and, as he had done with his previous ship, the master anchored using 3 shackles of anchor cable. He then handed over the bridge watch to the chief officer at around midnight.

The chief officer spent his time completing chart corrections and did not monitor the ship's position. As the tidal stream increased, the ship began to drag its anchor towards the north-west. A little over 2 hours later, the ship was almost aground on a sandbank. The impending danger was spotted by a local Vessel Traffic Services operator (VTSO), who called the ship via VHF radio.

After being alerted to the situation, the chief officer called for the assistance of two ABs and the ship's engineer to weigh anchor and move the ship into safer water. After the engine was started and the anchor recovered, the chief officer navigated the ship into deeper water to the south. He was navigating by eye, occasionally putting a fix on the chart and communicating with his crew and VTS.

As the ship continued to head to the south, the VTSO soon became concerned that it was closing the shore, and repeatedly advised the chief officer to alter course. However, although the chief officer acknowledged the VTSO's warnings, he took no action. It was dark, and the chief officer had become overwhelmed by the situation and had lost track of the ship's position. The ship grounded at a speed of 7kts on a falling tide and remained high and dry for 12 hours (see figure).

Figure: The cargo ship aground

The Lessons

1. In exposed anchorages prone to high winds or strong tidal streams, a ship can remain safely at anchor only as long as there is sufficient scope on the cable and the anchor continues to hold. Therefore, deciding how much cable to use has to be based on the actual and forecast weather conditions, and the predicted tidal stream and tidal range; not simply on what has worked before. Anchoring is definitely not a one size fits all operation.

2. An anchor watch is inevitably quieter than a navigational watch underway and it is tempting to use the time to get on with other jobs. However, it is not a time to take your eye completely off the ball as a ship's position needs to be checked regularly to make sure that the anchor is not dragging. If the GPS or ECDIS has an anchor watch facility, this should also be set.

3. If dragging is detected or suspected, bridge watchkeepers may have to take immediate action themselves. Depending on the proximity of dangers, bringing the engine to immediate notice, preparing to let out more cable, letting go the second anchor, or weighing anchor, are all appropriate responses to bear in mind. However, although the initiation of immediate actions might be warranted, calling the master cannot be overlooked. Don't be tempted to go it alone, otherwise the benefit of the master's knowledge, experience and a second pair of hands to share the workload is lost.

CASE 8

'Under' Pressure

Narrative

A multi-cat vessel was transiting between two Scottish ports when the engine room supply fan flaps closed. The exhaust fan flaps remained open and the engine continued to draw combustion air from within the machinery space. As a result, a vacuum formed in the compartment.

The vessel had been supplied from the builder with the ventilation fan flap support brackets in different orientations on the exhaust and supply systems. The brackets were designed to allow the flaps to be closed quickly in the event of an engine room fire to isolate the compartment. An unrecorded modification to the supply fan flap support brackets had been carried out by the vessel operators to align all the brackets in the same orientation. This had been completed without consulting the ship builder.

The vessel was relocating from one port to another in preparation for a new contract. Weather at the time was poor but within the vessel's operating limits. As a result of the sea conditions the vessel was rolling and pitching. The vessel's motion resulted in the supply fan flap arms dropping out of their support brackets, which allowed the flaps to close. The subsequent vacuum within the engine room ensured that the flaps remained tightly closed. The vessel was operating with an unmanned engine room.

As the available air in the compartment was consumed, the engine efficiency dropped, resulting in rising exhaust temperatures and a consequent increase in the compartment's ambient temperature. The rising temperatures activated a high exhaust temperature alarm on the engine and a high compartment temperature alarm for the engine room. With both alarms sounding, the master sounded the general alarm and mustered the crew.

The master and the offshore manager identified the problem and discussed potential solutions. These included lifting the main deck access hatch to the engine room, attempting to open the supply fan flaps, or opening the main access door to the engine room located within the vessel's stores area.

Opening the engine room hatch or supply fan flaps was ruled out as the weather was now making access to the outer decks too hazardous. Therefore, it was decided to open the internal engine room door.

It was assessed that the pressure differential would be reasonably low and that three people could adequately control the inward opening door. On arrival at the door it was apparent that available space would only allow two people to control the opening. Nonetheless they decided to proceed. As the door latching mechanism was released, the door opened violently inwards and the two crew members were sucked into the engine room, both striking structure and machinery as they were dragged in. Both of the crewmen remained conscious and were able to exit the engine room unaided.

The engine and compartment temperature returned to normal operating parameters and the vessel proceeded into port, where the casualties were evacuated for medical assessment and treatment.

The Lessons

1. Some of the ventilation fan flap support brackets were incorrectly orientated when the vessel was supplied, and this was compounded by an inappropriate modification undertaken by the vessel operators to provide consistency. Any modifications need to consider all aspects of the application being altered. In this case, the modification did not take account of the full operational functions of the vessel and inadvertently allowed the supply fan flaps to close under adverse environmental conditions.

2. The vessel's power plant could have consumed more than a cubic metre of air every 3 to 4 minutes. The decision to relieve the pressure differential in the engine room by opening an internal door took due consideration of the environmental conditions on the upper deck but underestimated the differential pressure between the ambient atmospheric pressure and the induced vacuum within the engine room.

All the Right Notes – Just in the Wrong Order

Narrative

A crew transfer vessel was on passage from a windfarm to its base port. The vessel's speed was 21kts and on board were the skipper, a crewman and eight wind turbine technicians. When the port engine oil temperature alarm sounded, the skipper brought the port engine to 'idle' and sent the crewman to investigate. The crewman found nothing untoward with the port engine and returned to the main cabin. By now, the oil temperature alarm had reset and so the skipper decided to resume passage on both engines.

Several minutes later there was a loud bang from the port engine and the port engine space fire alarm activated. On the CCTV monitor by the control console, the skipper saw flames and smoke coming from the engine. He immediately stopped the starboard engine, alerted the passengers to the fire and told them to prepare for evacuation. He also stopped the port engine space's ventilation fan.

Within 2 minutes of the port engine failure, the crewman had closed the flap on the engine space's supply vent on the aft deck (Figure 1), and activated the fire extinguishing system. The extinguishing medium filled the port engine space, obscuring the flames from view on the CCTV, and a white gaseous cloud billowed from the port engine space's natural air vent (Figure 2). Meanwhile, the technicians mustered on the foredeck and the skipper broadcast a "Mayday" via VHF radio. In response, other crew transfer vessels in the immediate vicinity closed to assist.

Figure 1: Aft deck

The technicians were soon transferred onto another vessel, but by then plumes of black smoke were coming from the port engine space's natural air vent. As a result, the deckhand had to lean through the smoke to operate the port engine's remote fuel shut-off (Figure 3). The skipper then sealed the port engine space's natural and exhaust vents. A hose was also rigged on the aft deck to provide boundary cooling if required.

Minutes later, the CCTV showed that the smoke in the port engine space had cleared and flames were burning across the engine's top. The fire was short-lived and within minutes had extinguished, partly due to the smothering effect of shutting the engine space vents but also because there was no more combustible material to burn.

Figure 2: Fire extinguishing powder billowing from the natural air vent

Figure 3: Deckhand shutting off fuel supply

The Lessons

1. The fixed fire extinguishing system did not extinguish the fire because the system was activated before the engine space had been fully closed down and the engine fuel supply isolated. Consequently, although the fire-fighting medium initially dampened the flames, it quickly escaped through the natural air vent and its effect was lost. The correct actions were taken, they were just taken in the wrong order – a crucial mistake that regular and comprehensive drills, the adherence to emergency check off cards, and clear signage could have helped avoid.

2. Engine alarms are intended to give warning of a defect or a developing problem. Although they can be spurious, it is risky to assume that all is well if the reason for the alarm is not apparent. It is better to err on the side of safety and use the machinery affected only after the all clear has been given following a thorough technical investigation.

3. The early broadcast of a "Mayday" enabled the technicians to be evacuated quickly off the vessel, taking them away from danger and enabling the crew to focus on the fire and vessel safety.

Stuck in the Mud

Narrative

Having completed cargo discharge, a suction hopper dredger got underway. The master was in control of the ship at the port bridge wing console. It was about 2½ hours after high water and the tidal stream was ebbing south; there was a gentle breeze in fine, clear daylight conditions.

Using propulsion, the rudder and bow thruster, the master turned the dredger at rest in preparation for the outward passage along the adjacent narrow channel (Figure 1). With the turn nearly complete, the master moved to the centreline of the bridge and went through the procedure to transfer control of the ship from the port bridge wing to the centre console. The master stopped the swing to starboard using the bow thruster and then increased speed to head down the channel. As the dredger gathered headway, the master realised that the rudder was not responding - steering control had been lost.

In response to the loss of control, the master reduced speed and attempted to steer the ship using the bow thruster. The master then repeated the procedure for transferring steering control between the consoles, which resulted in regaining control of the rudder from the centreline. However, the recovery of steering control came too late to prevent the dredger grounding gently at about 2kts on the mud bank opposite the berth and a short distance downstream (Figures 1 and 2). The dredger was undamaged and refloated at the next high water.

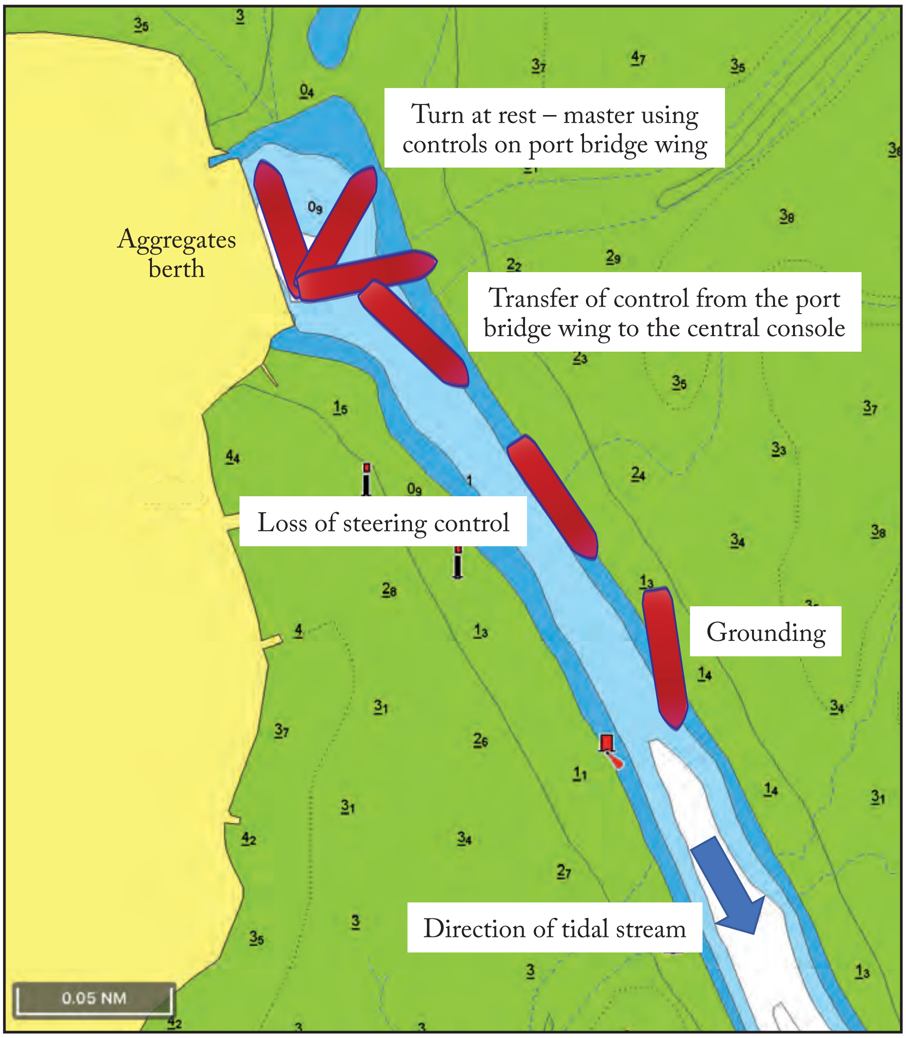


Figure 1: Chart showing the unberthing, turn at rest and grounding position

Figure 2: The dredger aground on the bank opposite the berth

The Lessons

1. Loss of steering occurred during the transfer of control between the consoles. The procedure included a requirement to acknowledge the transfer by pressing an 'accept' button on the receiving console. However, there was no indication on the panel that control had been successfully transferred. The procedure also took a few moments to complete as there were separate transfer buttons for propulsion, steering and bow thruster controls. There was also no procedure to immediately test that control had been successfully transferred. As a result, the master was unaware that the transfer of steering control had failed at a crucial moment in the transition from unberthing to heading down the channel.

2. Transferring control between bridge consoles always involves a brief moment without immediate control of the ship. The time to do this should be chosen carefully, ideally at a point in the passage plan where there is sufficient sea room to recover from any delay in completing the procedure. In this case, there was very little sea room and the tide was falling, so it might have been more appropriate to delay the changeover. Alternatively, the unberthing and transition into the channel could have been controlled from the centre console with an additional crewman on the bridge to call out distances to the berth from the port bridge wing. This would have eliminated the risks associated with changing consoles.

3. When the MAIB made some enquiries about this accident, it became apparent that this was the third grounding of the vessel in the same channel in just over 3 months. The dredger had been recently introduced into service and it was larger than the company's previous vessel. When the navigational situation changes in this way, it is important for the company and the harbour authority to work together to update the risk assessments and pilotage plans, taking into account the characteristics of the new vessel. In this case, the tidal 'window' needed to be adjusted for safe entry and exit of the dredger along the shallow and narrow channel to the aggregates berth.

Fast and Furious – a Descent into Danger

Narrative

A vessel was secured alongside in port undergoing scheduled maintenance. Part of the work included deployment of the marine evacuation system (MES) in the presence of an MCA surveyor, to satisfy a statutory certification requirement. In addition to the MCA survey, the vessel owners had arranged to carry out evacuation trials to evaluate the performance of a particular survival suit. The supplementary trials were hastily planned once the opportunity had been identified, and were intended to be carried out by shore staff.

The MES slide included two individual tracks that were open to the elements and separated by a non-rigid fabric partition. The slide inflation tubes and the centre partition were of dissimilar materials with differing coefficients of friction.

Ship's staff had expressed concerns relating to the trial as previous descents of the MES slide by personnel wearing survival suits had resulted in injuries. This was believed to have been due to the lack of friction between the suit and the slide, leading to high speed descents and subsequent impact injuries as individuals hit the MES raft inflation cylinders. It was therefore agreed to use shock (coir) mats to mitigate against this risk as the trial participants entered the raft.

Environmental conditions at the time of the trial were light winds and dry. However, there had been an early morning frost followed by light rain, which had left residual moisture on the surface of the slide.

The MES was deployed to the satisfaction of the MCA surveyor and seven test subjects descended wearing normal working clothes using their feet and elbows to control their speed. One of the seven suffered a minor knee injury as he entered the raft, following which additional coir matting was added. All the test subjects reported that it was difficult to control the speed of descent.

The trial then moved to the second phase, with test subjects dressed in survival suits. Two subjects descended without incident, although they found they had very little control over speed due to the lack of friction. They also found that trying to control their speed by forcing feet and elbows into the inflation tubes and central divider caused them to twist as they were descending.

As the third test subject began his descent, pressure applied through one elbow, lifted him up, further reducing friction and causing a rapid increase in speed. As the subject entered the raft his feet became entangled in an overlap between the coir mats, causing him to flip forward and fall face-down into the raft. The force of his body turning against his trapped feet resulted in a fractured ankle.

The trial was abandoned and the injured person transported to a local hospital.

Figure 1: Deployed MES

The Lessons

1. The SOLAS regulations for an MES with an inclined slide state that it shall be installed such that the angle of the slide to the horizontal is within the range 30 to 35 degrees when the vessel is upright. On the day of this accident, the slide angle was measured between 41 and 43 degrees. The installation of the MES did not fully comply with SOLAS requirements as the vessel's high freeboard resulted in the slide angle being too steep once the unit had been deployed.

2. The MES design concept was to accommodate mass evacuation of passengers wearing normal clothing. While 'normal clothing' will have varying coefficients of friction, the survival suits being tested were known to have a low coefficient of friction. The late decision by the owners to supplement the statutory deployment with an in-house trial did not allow sufficient time to fully assess all of the hazards involved. Furthermore, they did not fully take into account the experiences of ship's staff relating to previous accidents.

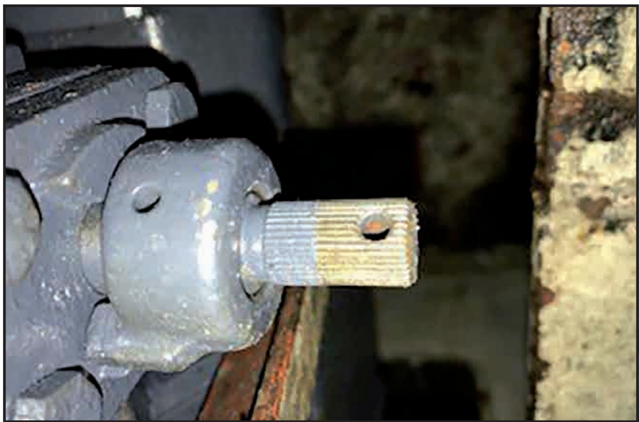
3. The use of coir mats to mitigate the risk of injury was an unsatisfactory control measure that would have been unnecessary had the MES been deployed as required and used as designed.

The Missing Link

Narrative

A passenger vessel with 37 people on board was approaching a pier. The master ordered astern movement on both main propulsion engines while the vessel's speed was 4.5kts ahead. The vessel did not respond to the engine movements and continued to drive ahead, making contact and bouncing off the pier several times. The master brought both engines to a stop, but not before the vessel had grounded. A diving boat pulled the vessel back to the landing stage and all the passengers disembarked. Fortunately, there were no injuries and damage to the vessel and pier was minor.

An inspection by a local engineering company discovered that the linkage between the starboard engine gearbox and the gear shift mechanism had disconnected, so the crew were unable to alter the direction of drive (Figure 1). The port engine, having reversed, applied reverse thrust while the starboard engine continued to apply ahead thrust. This caused the vessel to swing to port and make contact with the pier. Unfortunately, the console with the remote controls for the engines did not have any indications for propeller direction (Figure 2) so the master was unable to understand why the vessel was not responding as he had expected.



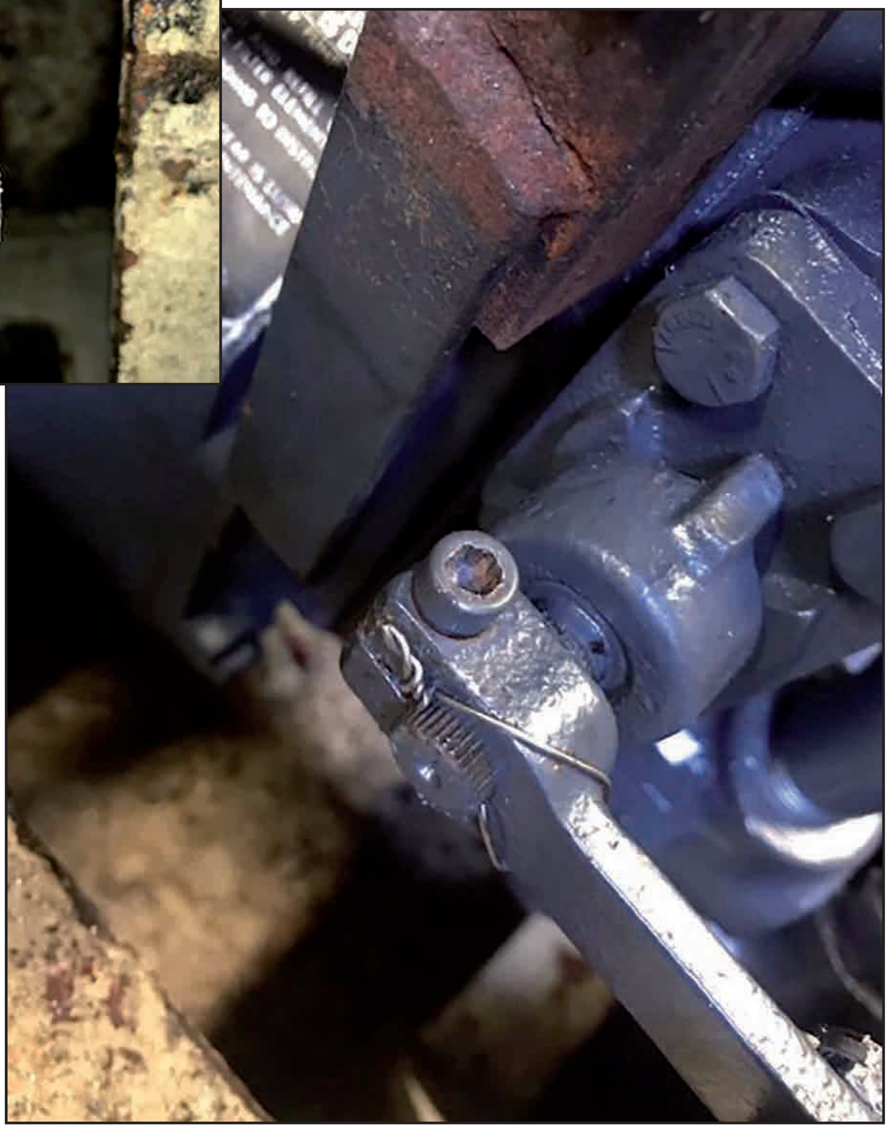


Figure 1: Gear shift mechanism linkage (inset: linkage disconnected in service)

Figure 2: The wheelhouse console

The Lessons

1. Mechanical linkages are prone to detach or fail, especially when used repeatedly. Check and tighten them as required. Where possible, use self-locking nuts and split pins to prevent such incidents.

2. Simple instruments or gauges in the wheelhouse showing the running direction and speed of rotation of the propellers can provide immediate feedback to the person manoeuvring the vessel.

3. If you have twin screw propulsion, include the loss of one engine in your risk assessment and consider how you may be able to recover from such a situation in an emergency.

Loose Lashings and Broken Bones

Narrative

A laden container ship was heading into an increasingly heavy sea when an alarm sounded on the bridge indicating a fire in the forecastle store. As the chief officer was the OOW on the bridge, the master and the bosun went forward to investigate; they were dressed in foul weather clothing, boots and were wearing lifejackets. Once forward, they discovered that the alarm was false, there was no fire; however, they did find some minor flooding of the forecastle store and an electrical fault as lighting was not working. They also spotted that the sea lashings on the port anchor cable had worked loose in the rough conditions. The master and bosun then decided to go back inside the ship and prepare for the separate task of tightening the loose lashings.

The master, chief officer and the bosun discussed the plan to return to the fore deck; they assessed the risks and held a 'toolbox talk'. The plan was for the master, the bosun and an AB (for dedicated communications to the bridge) to go forward and tighten the loose lashings.

As the master and bosun started working next to the port anchor cable (see figure), the vessel pitched into a very large wave, which resulted in a full bore of water rushing violently up the port hawse pipe. The master was thrown back by the force of the water and struck in the face by the loose hawse pipe cover. The master sustained a broken leg and facial injuries. The bosun was also knocked over by the force of the water and suffered a back injury.

The AB, who was standing clear and was uninjured, immediately raised the alarm by calling the bridge on the radio. A first-aid party was rapidly on the scene and aided the injured crewmen back to the accommodation area for treatment; both were later evacuated to hospital by a rescue helicopter from the nearby coastal state. The ship continued its passage with the chief officer in command.

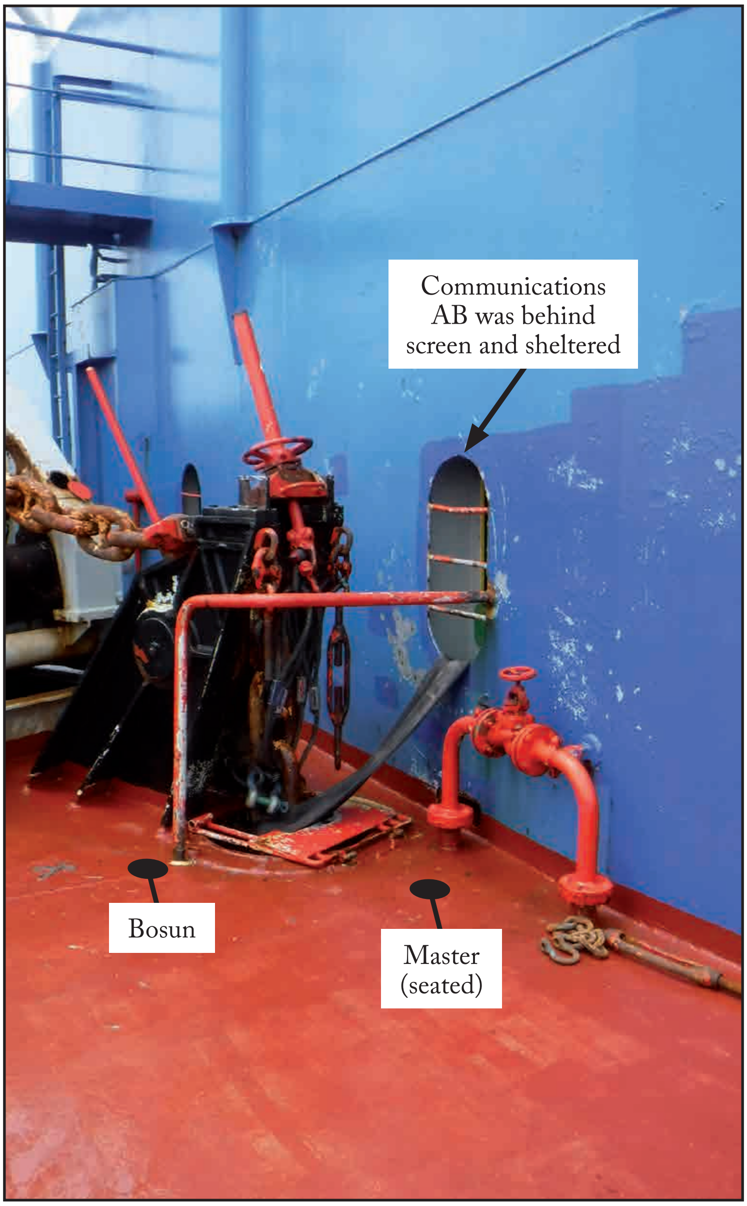


Figure: Fore deck area around the port hawse pipe showing the locations of the crew at the time of the accident

The Lessons

1. Working on deck in heavy weather is always going to be a hazardous activity. The MCA's Code of Safe Working Practice (CoSWP) states that '*no seafarers should be on deck during heavy weather unless it is ABSOLUTELY NECESSARY for the safety of the ship or crew*'. Should work on deck be absolutely necessary in heavy weather, CoSWP recommends that the risk assessment should give consideration to factors including: availability of rescue services, adjusting the vessel's course and speed, rigging lifelines, working in pairs and good communications with the bridge.

2. There was undoubtedly an urgent requirement to investigate the fire alarm. However, once it had been established that there was no emergency situation, the crew considered their priorities for dealing with the situation that had been found. Their risk assessment considered options for ensuring the safety of the crew on deck in heavy weather, including avoiding lone working and maintaining good communications. However, altering course or speed to reduce the risk of ploughing into a large wave was not considered and could potentially have reduced the risks further.

3. Always be ready to deal with an emergency situation. When the crewmen were injured, the alarm was raised quickly, and a rescue team was on the scene, rapidly ensuring the master and bosun were back inside the ship as fast as safely possible and without further injury.

Gulp! Gulp! Who Removed the Plug?

Narrative

On a winter's afternoon, an offshore emergency response vessel (ERV) was tasked to stand by while the crew of an oil drilling platform were conducting a hazardous task. The ERV, which was approximately 7 nautical miles away at the time, deployed one of its two daughter crafts to the platform. After approximately 30 minutes the daughter craft - with its three crew members - entered the exclusion zone and took up position approximately 400m away from the platform, with both engines running. There was a 3m swell and strong winds at the time.

Shortly after arriving near the platform, the daughter craft started to settle by the stern, and a little while later both engines stopped without warning. The bilge alarm did not sound and the crew decided not to use the second electric bilge pump or the two manual hand pumps as they concluded that the water ingress was so severe that bilge pumps would not cope. They raised a distress call over the VHF.

An offshore supply vessel responded to the distress call and rescued the crew using their fast rescue craft. Attempts to prevent the daughter craft from sinking proved futile and the vessel sank approximately 4 hours after it had been launched.

The owners of the ERV carried out an extensive investigation and tests, and concluded that the most likely cause of the accident was that the three drain plugs on the hull of the daughter craft were not in place when it was launched (see figure). The automatic bilge pump had worked correctly, but it did not have a running light indication. The tests conducted with identical daughter craft demonstrated that all the bilge pumps operated together could cope with the ingress of water from three open drain plugs. Subsequently, the company blanked off the drain plugs of all the daughter craft in its fleet.

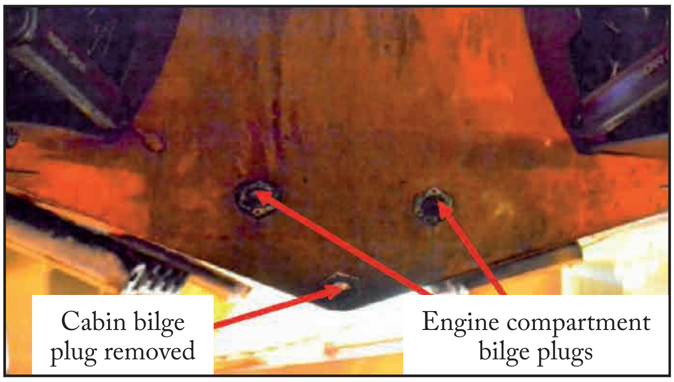


Figure: Plugs on the hull of the ERV

The Lessons

1. During a flooding incident, use all the pumps at your disposal to pump out the water. Depending on the rate of water ingress, you may be able to save your vessel, and the reduced rate of flooding will buy you time for other actions.

2. Fit a running indication light for automatic bilge pumps. If the pump cuts in and out too often, or remains on all the time, the light will alert you to water ingress at an early stage.

3. Bilge alarms should always be tested before small crafts are launched into the water. An alarm at an early stage of flooding can make all the difference.

4. Assess the risks associated with drain plugs on your crafts and blank them off if they are not considered necessary for your operation.

Whoops, Wrong Way

Narrative

On a calm, summer's day during a routine departure from harbour, an historic passenger vessel struck the dock wall when the engines were mistakenly operated ahead rather than astern. The resultant damage led to the vessel being removed from service for several weeks of repair in a dry dock.

The vessel was about to leave the berth, with the master on the bridge conning the vessel and the chief officer on the wheel. In the engine room, the chief engineer was operating the engine controls and a crew member was completing the log (Figure 1).

The master's plan, which he had used many times before, was to drive ahead against the fore spring to bring the stern off the jetty before letting go the remaining lines and making a stern board into open water. With the first part of the manoeuvre complete and the stern clear of the jetty, the master gave the order for the fore spring to be let go, and rang 'half astern' on the telegraph.

However, the master noted that, rather than moving astern, the vessel was continuing to move ahead. Concerned, he ordered 'double ring full astern' (an emergency order). This had no effect; the vessel continued to move ahead. A further 'double ring full astern' was ordered by the bridge, followed swiftly by 'stop' on the engine telegraph and a third 'double ring full astern'. At the same time, the chief officer tried to contact the engine room using the voice pipe, but without success.

In the engine room, the chief engineer had become distracted while operating the engine controls and was assessing whether a recent

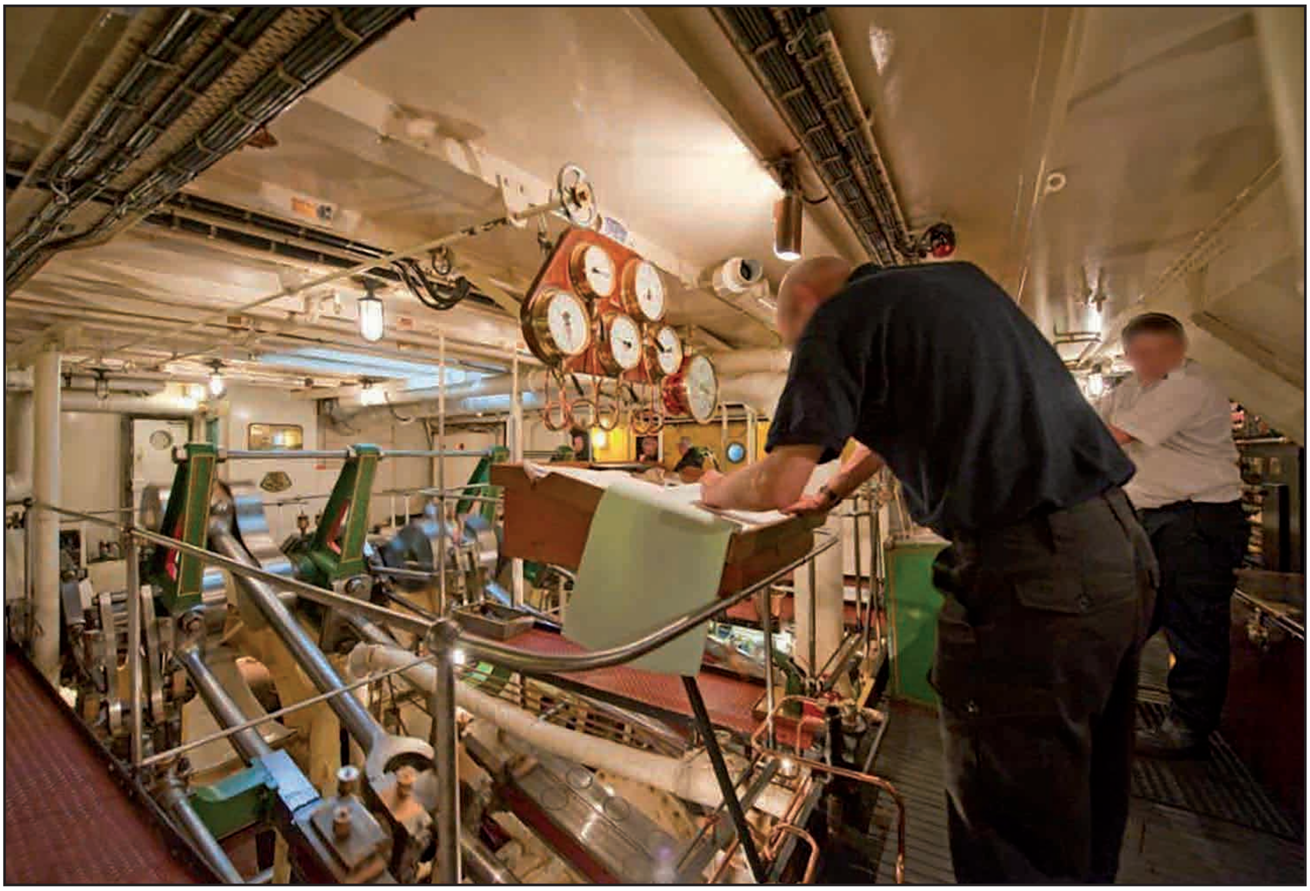


Figure 1: Engine room configuration showing the crew member (left) and chief engineer (right) with the engine telegraph between the two of them

engine repair was holding up rather than concentrating on the telegraph. Relying on what he could hear rather than see, he misinterpreted the 'double rings', thinking that the bridge required more power - rather than a change of direction from ahead to astern as indicated visually by the telegraph.

The passenger vessel was now moving ahead rapidly, and it struck the dock wall (Figure 2).

The vessel's engines were stopped and the crew inspected the damage. They discovered that although the vessel's watertight integrity had not been compromised, it needed substantial repairs (Figure 3).

Although this accident occurred on board an historic vessel that had little or no automation, there are lessons that can be learned for all bridge and engine room teams. Manoeuvring vessels in confined waters is a hazardous activity, and effective crew resource management is fundamental to minimizing risk of collisions, contacts and groundings.

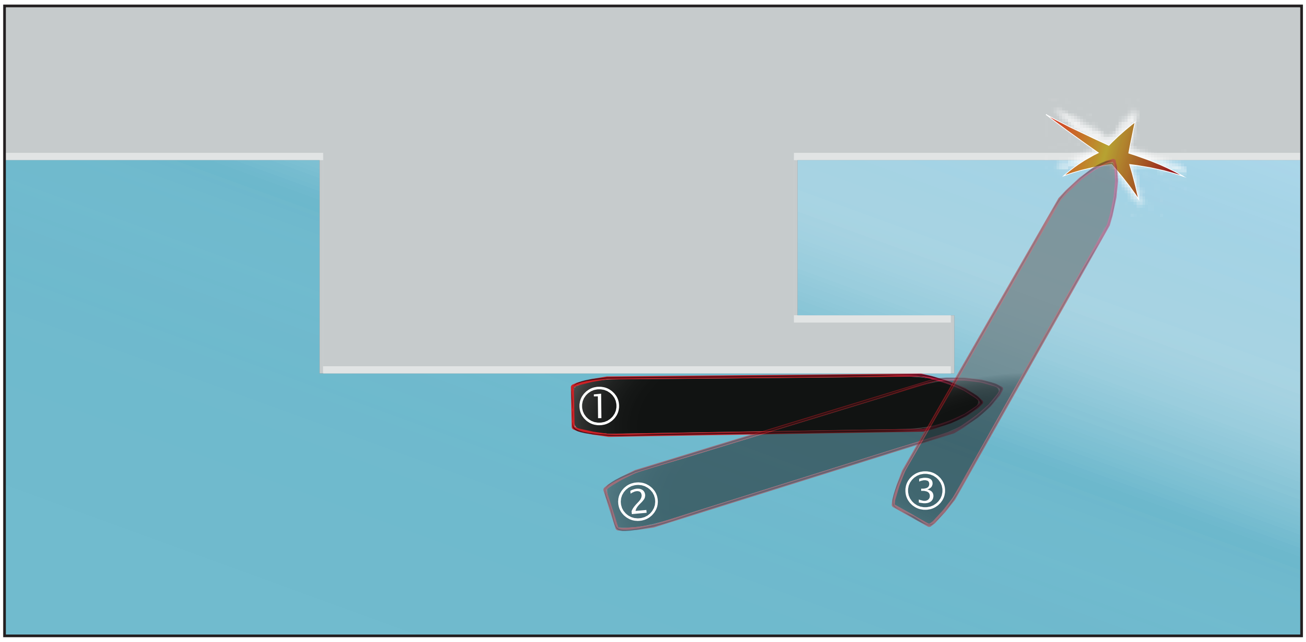


Figure 2: The engines mistakenly put to full ahead rather than full astern cause the ship to strike the quay

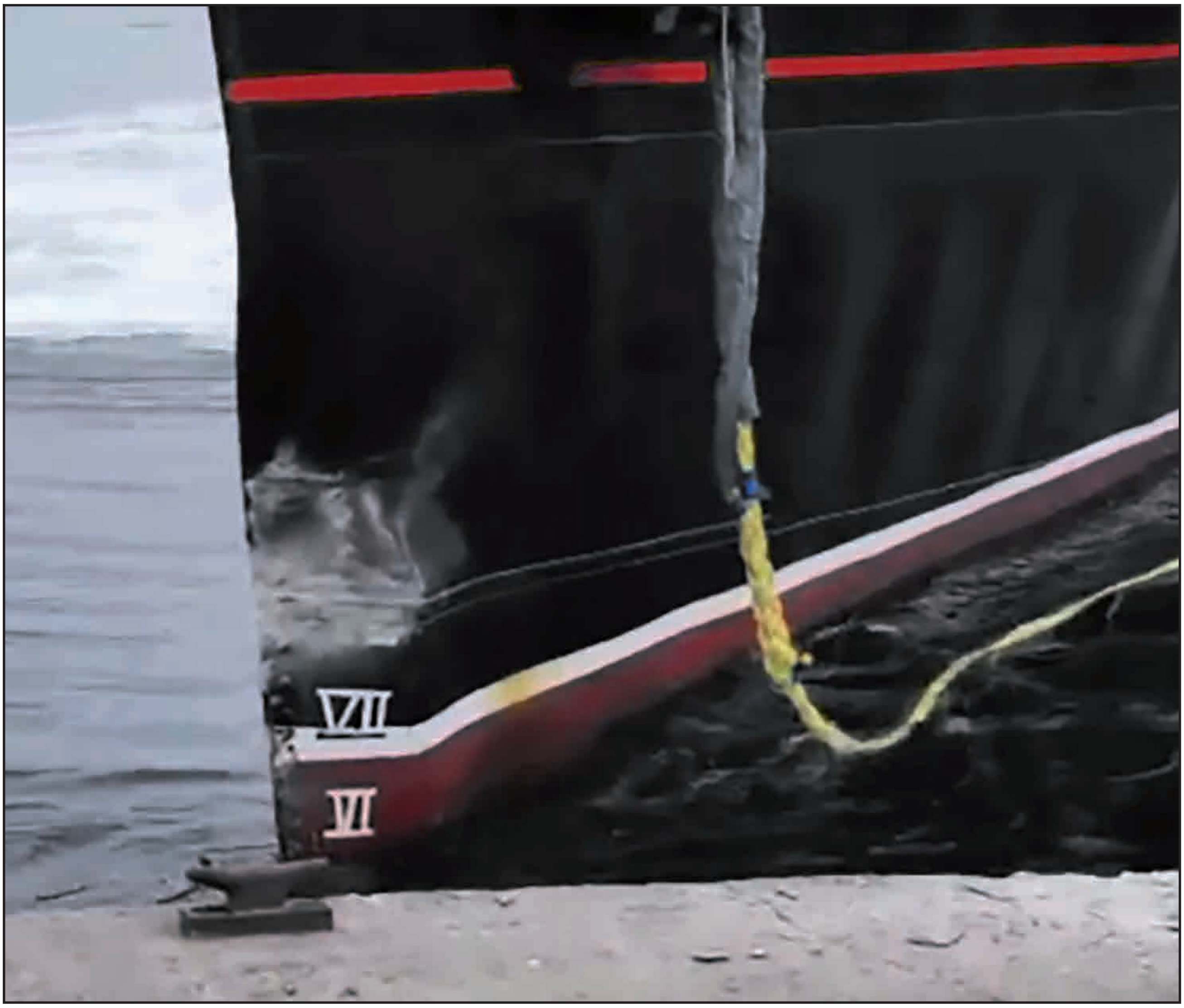


Figure 3: Damage to the bow post collision

The Lessons

1. When operating propulsion machinery manually it is essential that both bridge and engine room personnel remain vigilant at all times and closely monitor telegraph orders, machinery position indicators, dials and gauges. Concentrate on the task in hand and avoid distractions.

2. When given an engine order or a course to steer, that order should be repeated back to ensure that it has been properly received and understood. Furthermore, once the order has been actioned, the new setting should also be reported back. This will not only confirm the engine room team have taken the correct action, but it will also help the bridge team to identify when an erroneous order has been given or an order has been received in error.

Part 2 – Fishing Vessels

Fishing has been a major influence on my life for over 25 years and had provided a reasonable standard of living for my family.

When I first met my fisherman husband I became very involved in the fishing business and assisted where I could. I was always interested in the operation of the boat and soon learned the "jargon". I became involved in responding to consultations about new Government Legislation and, when the concerns of fishermen were not taken seriously, took part in protests at local and national level to make sure the fishermen's voice was heard.

My late husband Neil was a very safety conscious person, particularly when working aboard his vessel. He always had his equipment checked and indeed took part in safety videos for HM coastguard and the RNLI.

He also took out scientists from CEFAS to ensure that they were able to sample his catch composition. I remember him purchasing a portable toilet for a female scientist to use when she accompanied him on fishing trips.

For my part, I became the Secretary of the local Fishermen's Association and attended meetings to represent the local fleet when they were at sea. I felt it was essential for their voice to be heard.

I was also invited to join other organisations like the Sea Safety Group, the predecessor organisation which eventually became the National Coastwatch Institute. Whilst technology has advanced, I still feel that the eyes and ears from these local coastal stations are of vital importance to all seafarers.

I also believe that technology has a vital role to play, particularly in enabling a boat to be located or a man overboard to be reached very early in order to increase the risk of survival.

I know from experience that my late husband was thought to be miles away from the search area used by relying on his fishing pattern. I also know that his boat may never have been found had he not had Automatic Identification System (AIS) transponder fitted to his vessel. This is one reason why I am asking the Government to consider some financial help to enable small boat fishermen to invest in this equipment. Some boats now have receivers but do not invest in the transmitter. I would urge the owners of small commercial fishing boats to have one fitted and if they feel they cannot afford it, I am urging the Chancellor to help.

Personal Location Beacons, sometimes integrated into a flotation jacket are also a good idea.

I decided to call on the Shipping Minister at the time to provide financial assistance to purchase safety stop buttons that could be fitted to deck equipment which could well have prevented the fatal accident that my late husband suffered. Grants are now available for this.

The MAIB treated the investigation into my late husband's accident in a very sensitive way and I know that some of the recommendations made at the time could very well save the life of another fisherman.

Whilst reading the cases in this digest is not easy for fishermen who put to sea, but it is definitely worth it and I would urge all fishermen to do so and heed the advice that is given.

I do not want another fisherman's family to go through the pain and heartache of my own family if it can be prevented.

Sheryll Murray

SHERYLL MURRAY
MEMBER OF PARLIAMENT FOR SOUTH EAST CORNWALL

Sheryll was born in the village of Millbrook, South East Cornwall, where she went to school before continuing her secondary education at nearby Torpoint Comprehensive School. Sheryll was a member of the Governing Body of the school for nine years. Sheryll lives in Millbrook with her fiancé, Bob. Before becoming an MP she worked for the NHS at a local doctors surgery. Sheryll has two grown up children. Her daughter Sally is an officer in HM Forces and her son Andrew works in marine electronics. Sheryll is proud of her South East Cornwall roots which can be traced back across many generations.

In Parliament Sheryll has worked in the Departments of Culture, Media & Sport; Energy & Climate Change and Environment, Food & Rural Affairs as a Parliamentary Private Secretary. Sheryll is currently a member of the Environment, Food & Rural Affairs Committee and serves on the 1922 Executive. Sheryll is the Co-Chairman of the All Party Fisheries Group. Sheryll has also steered two Private Members Bill successfully through Parliament namely the Marine Navigation Act 2013 and the Deep Sea Mining Act 2014.

One for the Road has a Fatal Consequence

Narrative

The crew from a fishing vessel that was in port and moored alongside had spent Saturday evening ashore socialising and drinking in a bar close to the harbour. The weather during the day had been poor, with rain and strong winds. Conditions had improved early in the evening but left wet conditions and a residual swell in the harbour.

After 1½ hours in the bar, during which time they had consumed several large whiskies, three of the crew returned to the vessel, leaving one crewman still drinking in the bar. Shortly before closing time the final member of the crew began walking back to the vessel. He was recorded on CCTV and seen to be walking unsteadily along the quayside.

The fishing vessel was moored outboard of another boat and was accessed by first climbing over the quayside safety rails before crossing the deck of the inboard boat (Figure 1) and climbing over the guardrails of the two fishing vessels (Figure 2). Due to the swell in the harbour, the two vessels were moving relative to each other, with the gap between the guardrails varying considerably.

One of the crew had remained in the vessel's wheelhouse talking on his phone and awaiting the return of his colleague. He saw the final member of the crew cross from the quayside, but lost sight of him as he reached the rail adjacent to his vessel. CCTV footage showed the crewman on the deck of the inboard vessel. Shortly after this, the crewman in the wheelhouse heard a noise and went out on deck to investigate, where he realised that his crewmate had fallen between the two vessels. He immediately called the rest of the crew from the accommodation, collected a torch, and began to search for his colleague.

After a few minutes of searching, the crew located the missing man and secured him using a lightweight boathook with a large hoop specifically designed for manoverboard recovery. He was recovered to the deck of the inboard fishing vessel where CPR was commenced, and one of the crew phoned the Fishermen's Mission to report the accident.

CPR was then paused as the casualty was carried to the mission, where it was resumed following the arrival of local lifeboat crew and coastguard rescue team members. Following a 999 call from the Fishermen's Mission superintendent, an ambulance arrived and medical care was passed to the emergency services.

Despite the efforts of his rescuers, the crewman died in hospital several days after the accident.

Figure 1: Mooring arrangement

Figure 2: Vessel to vessel access

The Lessons

1. A documented risk assessment for boarding and leaving the vessel had been carried out. It listed five hazardous areas/activities including 'crossing other boats' and 'quayside'. It went on to identify a hazard of slippery surfaces and falling into the water leading to hypothermia or drowning. As mitigation it listed the wearing of PFDs and hard hats, which reduced the risk level to low. The risk assessment focused on the working environment and did not recognise the additional hazards associated with crew living on board. Crew living on board in port places additional safety and social responsibilities on vessel owners, and a consequent need to address all additional risks associated with such occupation, including access to and from the boat for recreational purposes.

2. There were no boarding gates or removable sections of guardrail on either of the vessels. This meant that although only a short step was required to pass between the boats, particularly around amidships where the decks of the two boats were level, access still required climbing over the guardrails of both boats. Balancing on a vessel's coaming or fish plate to climb over guardrails is inherently hazardous, and the risk of a slip or fall is increased at night, in wet and slippery conditions, and when the vessel is moving, whether or not the individual has consumed alcohol.

3. The crewman had used the same method for boarding the vessel many times previously. However, on this occasion the combination of adverse environmental conditions and the level of alcohol in his system is likely to have adversely affected his risk perception, reaction time and co-ordination, which caused him to fall.

Fothering… What's That?

Narrative

A skipper and his crewman set sail at daybreak in their 10 metre long wooden clinker-built fishing vessel (see figure) from their home port on the north-east coast of England. During the morning they hauled, re-baited and laid several fleets of lobster pots a couple of miles offshore. In the early afternoon, as they were motoring across to their next fleet of pots, the boat developed a catastrophic leak forward and it flooded quickly.

As the boat was flooding, the skipper started the boat's electric bilge pump, increased the engine to full speed and steered towards his home port. As the water level continued to rise, the skipper used his VHF radio to broadcast a "Mayday" distress call, which alerted the coastguard to his predicament. Within a couple of minutes, the engine cut out and the boat stopped. With the boat awash and about to sink, the skipper and his crewman donned their solid foam emergency use lifejackets and jumped into the water. They were quickly rescued by a nearby fishing boat that had responded to their "Mayday" distress call.

Despite the trauma of their ordeal, the skipper and crewman were unharmed and both made a full recovery.

The skipper had purchased the boat about 5 months prior to the accident after a condition survey had been undertaken. As a commercial fishing boat, it had been surveyed and regularly maintained throughout its life, with certification issued by the MCA. The most recent survey prior to the accident had not highlighted any significant areas of concern.

Throughout the morning's fishing, the bilges of the boat had remained dry. The flooding was sudden and was observed to come from the forward part of the boat, and was most likely due to a sprung hull plank. Although the boat was fitted with an electric bilge pump that was started straight away by the skipper, the volume of incoming water soon overwhelmed it and the boat sank.

Figure: The wooden clinker-built fishing vessel

The Lessons

1. Both crewmen were saved because they had enough time to collect and don their emergency use lifejackets, and because the skipper raised the alarm and provided rescuers with an accurate position. The boat was equipped with inflatable lifejackets for use while working on deck and on the quayside, but these were not worn. Had the men not been able to collect and don their emergency use lifejackets, and had help not been close at hand, the outcome for them might have been very different. Always wear a lifejacket when working on open decks; it can save your life.

2. The boat sank because the bilge pump was overwhelmed by the volume of water coming in. With a plank sprung forward, it is possible that motoring at full speed into the sea further increased the inflow of water.

SeaFish provides a checklist in its Vessel Safety Folder scheme for Hull Damage. It states:

- Check for damage
- Identify the location of water ingress
- Cut off electrical power in the immediate area
- Shore up area, turn off seacocks or use a fothering sheet to reduce ingress
- Use auxiliary pumps and bucket to remove water
- If necessary prepare to abandon the vessel in enough time not to get caught with the vessel.

Skippers should ensure that they and their crew are prepared for foreseeable emergencies, that they have undertaken drills to practise their emergency response, and have suitable equipment identified and to hand if needed.

Too Cold to Swim

Narrative

The backline of a string of pots fouled the starboard propeller of a small potter while shooting away. The vessel was effectively anchored by the backline, which the crew attempted to cut for over 30 minutes. However, they could not reach it, even with a knife cable-tied to the end of a broom handle, and the line was too taut to pull inboard with a grapple. As the vessel's skipper was arranging for a nearby fishing vessel to assist, one of the vessel's two deckhands took off his wellington boots and oilskins and jumped overboard to cut the backline with a knife. He immediately started to struggle and was carried away from the vessel by a 2kts tidal stream.

The skipper tied a polysteel mooring rope to a lifebuoy (see figure) and threw it towards the struggling deckhand. It fell short, so the skipper put both engines ahead at fast speed, which parted the backline. He then drove the vessel close to the deckhand, who was now face-down and motionless. The lifebuoy was again thrown, but the deckhand did not respond. In desperation, the second deckhand jumped into the water to assist, but he too got into difficulty quickly and started to lose his strength. He was not wearing a lifejacket and was being weighed down by the polysteel rope from the lifebuoy, which he had used as a lifeline. The skipper recovered the deckhand who was attempting the rescue; by then, the first deckhand had disappeared from sight.

The lost crewman had possibly been using recreational drugs that were found among his personal effects on board, and he had jumped into the water despite the skipper instructing him not to do so. He and the other deckhand almost certainly suffered from cold water shock following immersion.

Figure: The lifebuoy and polysteel rope

The Lessons

1. Fishermen tend to work long and unsociable hours in arduous conditions, which makes the use of recreational drugs appealing to some. However the effects on behaviour of drugs such as amphetamine are potentially lethal on board fishing vessels. At sea, illegal drug users put the lives of others at risk.

2. Cold water shock is a killer, and it can take effect in waters at a temperature of 15°C or below regardless of a person's fitness, physique or swimming ability. Nobody is immune to its effects, and without a lifejacket to keep the head clear of the water death can occur within minutes.

3. Lifesaving equipment is seldom effective unless it is immediately at hand and ready for use. However, over time it frequently gets damaged, misplaced, or goes 'out of date'. Relying on routine surveys to identify what lifesaving equipment is missing or unserviceable is a risky path to tread.

Lucky Escape After Capsize

Narrative

The skipper of a 5m open boat launched from the beach to tend to his pots. The weather was fine, with a light breeze and good visibility. The boat was propelled with an outboard motor, but it also had a small second engine that drove a hydraulic pot hauler, enabling the skipper to recover his pots more easily.

As the skipper hauled one of his pots it came fast on a seabed obstruction. Normally, if the pot hauler was heavily loaded the engine would cut out, but on this occasion the engine continued to haul and the skipper was unable to release the rope from the pot hauler before his boat's gunwale was submerged and the boat capsized.

The skipper jumped clear and swam to the boat's stern. After several attempts he managed to climb onto the upturned hull using the outboard motor as a step. The skipper then used his phone to call a friend, and tried to get a message through. Recognising the phone number and knowing where the skipper was, the friend raised the alarm and local lifeboats were launched to assist.

The skipper and his boat were recovered and taken ashore, where an ambulance tended to the skipper who, apart from ingesting some sea water, was uninjured.

The Lessons

1. Automatic cut-offs and other such devices provide a measure of safety, which over time can be taken for granted. Maintenance and regular testing of such devices will ensure that they function when needed. Do not simply assume that automatic cut-offs will always work.

2. The skipper carried a lifejacket on board his boat, but he chose not to wear it as he found it awkward to work when wearing it. The skipper was fortunate that he entered the water in a conscious state and was able to swim to the back of his boat. A PFD or lifejacket is useless unless worn. While some are bulky and inconvenient, plenty of models are designed for fishermen and do not hinder the wearer. Capsize normally occurs rapidly; expecting to have time to don a lifejacket or PFD is not practical.

3. It is fortunate that the skipper was carrying a waterproof mobile phone. However, although he managed to send a message to his friend, reception was poor. The skipper had a flare pack and VHF radio in a box on his boat, but after it capsized he could not reach them. If fishing alone, a personal locator beacon is a very effective way of raising the alarm. As a minimum, carrying a portable waterproof VHF radio will enable the coastguard to be alerted. A mobile phone should be carried only as a backup.

4. The skipper was also very fortunate that his boat had built-in buoyancy to ensure that it remained afloat. An open boat with no internal buoyancy will sink rapidly after capsizing. If your open boat doesn't have sufficient buoyancy to stay afloat when swamped, consider adding buoyancy to ensure your boat can act as your liferaft during an emergency.

Don't Get in a Tangle

Narrative

A deckhand working on board a small potter died after becoming caught in the backrope and then being dragged overboard. His left leg became snared in a loose bight of the running backrope, which quickly tightened, and the weight of the shooting pots dragged him through the shooting door and under the water. Another deckhand grabbed the backrope, but he was unable to hold on to it. The potter was stopped in the water and the pot hauler was used to pull the submerged deckhand to the surface. However, he had been underwater for about 15 minutes and was lifeless.

The skipper broadcast a "Mayday" on VHF channel 16, which the coastguard immediately acknowledged, but the deckhand then remained suspended from the pot hauler by his left leg until lifeboat assistance arrived over 40 minutes later. Although the remaining crew held the unconscious man's head clear of the water, they were unable to lift him over the gunnel. After the deckhand was lowered into a lifeboat, he was transferred to hospital by helicopter, where he was declared deceased shortly after his arrival.

When shooting a fleet of pots, the deckhand usually remained in a 'safe area' behind pound boards (see figure) until about five or six pots remained on deck. The deckhand could then walk over the relatively clear deck towards the wheelhouse to complete the shooting process by dropping the fleet's remaining anchor and marker buoy. This time, the deckhand left the 'safe area' without apparent reason, and attempted to cross over the running backrope while about 20 pots and their associated lines remained on deck.

Figure: Typical set-up when shooting pots

The Lessons

1. The significant forces at play when shooting pots make the chances of survival after being dragged overboard very, very slim. They are also easily underestimated. Most victims are dragged overboard so quickly that there is no time to cut the backrope, and the weights of the pots exceed the buoyancy provided by PFDs. Casualties are then quickly dragged underwater. The time taken to halt the shooting operation and recover the already deployed pots means that unless the individual can release themselves from the gear they will likely drown.

2. Self-shooting arrangements, which in this case included the fitting of a shooting door and pound boards, reduce the risk of entanglement with the running line. However, a degree of self-control is still required to keep all crew separated from the backrope and pots as they run out.

3. Recovering a person from the water is one of the most challenging tasks that a seafarer can face. Fortunately, it doesn't happen too often, but it is critical that things go well when it does. There are many innovative systems on the market to help with this, and good advice from the RNLI is readily available. Think about which method is best for your vessel, and practise before you need to do it for real.

Part 3 – Recreational Craft

Reading the cases in this edition of the MAIB Safety Digest Recreational Craft section, it strikes me that both motor craft and sailing yachts are far closer to living beings than material possessions. They depend on us, to be understood and minutely cared for. In turn, we depend on them to function properly to transport us and keep us safe.

All of the incidents in this issue of the Digest involved the vessels' crews being caught by surprise, twice because of sudden and catastrophic equipment failure, once because of a small modification changing handling characteristics, and once because no carbon monoxide alarm was fitted.

The case of the maxi-yacht on which a winch failed, breaking the wrist of the crewmember, was particularly sobering. Having bought a used yacht earlier this year, winch failure is only too familiar. I knew the winches were old and needed a service, but to have the drum come off in my hands as I sheeted in, still caught me by surprise and we were lucky that there were no injuries.

The maxi-yacht was also a recent purchase and the condition of the winches' inner workings was unknown. A load-bearing pinion's sudden failure, putting the full load of the headsail sheet back through the grinder handles, was a stark reminder that all the equipment on board needs treating with great love, care, and respect, especially winches.

Similarly, the case of a Sigma 38 losing its mast not because its newly-replaced standing rigging failed, but because of the failure of a weld hidden behind solid GRP below decks seems unfortunate in the extreme. The skipper's response to losing the mast over the side appears to have been exemplary. This case seems to prove that no matter how well you look after your vessel, it will always have the potential to surprise you.

Being prepared is therefore a vital part of ensuring safety on board. To have thought through every eventuality, to have devised a plan of action, to have practiced and briefed for it, and to carry the right equipment to deal with it is the sign of a wise skipper and a seaworthy boat – an accolade we would all aspire to.

Having prepared our boats and ourselves, how we handle our vessels at sea is the other aspect of safe seamanship. The case of the speedboat accident, in which a high-speed craft flipped, is even more surprising than the other incidents. While alcohol may have been a contributory factor, it would be unwise to take the moral high ground here – who hasn't made decisions they would have regretted, had they not got away with it? The skipper seems to have been experienced, and taken appropriate precautions like wearing his kill cord properly, a step that significantly reduced the danger of an already serious incident.

He had fitted a new propeller, and was sensibly out testing its performance and handling. It appears to have changed the boat's handling at speed, which he discovered suddenly and dramatically when the boat flipped. At speeds of up to 60 knots, split seconds count, and perhaps call for a little more caution when changing parts of the boat's setup.

The fourth case in this edition is tragic because two lives were lost but could have been saved, had only a carbon monoxide alarm been fitted to the boat. Silent, odourless, carbon monoxide is one of the most potent potential dangers on any boat.

Anyone who has skippered a boat, of any kind, will have had humbling experiences at some point. The only way to proceed in the marine environment, it seems, is with caution. Not so much as to prevent setting out in the first place, or to spoil enjoyment once out on the water, but enough to guard against complacency.

Our vessels are living beings, which we do our best to control. The environment through which we voyage makes no pretence of being tamed. Taking care of our boats, preparing ourselves and our crews against surprises, and proceeding with sensible caution is therefore essential to good seamanship.

Theo Stocker

THEO STOCKER
EDITOR, YACHTING MONTHLY

As editor of Yachting Monthly, the country's leading magazine for cruising sailors since 1906, Theo Stocker brings together practical, entertaining and up-to-date articles about sailing skills, boats, gear and cruising stories from an array of experts. With each issue he finds he still has much to learn as a keen amateur sailor who cruises a Sadler 29 yacht out of Chichester Harbour. He has been a writer and editor at Yachting Monthly for several years, with previous experience as an officer in the Royal Navy and as a sailing instructor.

A Flip Too Far

Narrative

On a calm, clear springtime Saturday afternoon two friends - a driver and navigator - launched their racing powerboat (see figure) at a public slipway. The plan for the day was to test the boat by sprinting around some nearby navigation buoys. The boat was due to be racing competitively the following weekend and the crew wanted to try it out with a new style of propeller that had just been fitted. After a few trial runs, the crew went to a nearby beach where they met up with a friend, who was there with his RHIB. The three of them then enjoyed some drinks together at the pub by the shore.

The driver and navigator then headed back out to continue testing the boat around the nearby buoys. After about 15 minutes of laps, the driver started to turn the boat at high speed around one of the navigation buoys when it instantaneously flipped over, throwing both occupants into the sea. The boat landed upright with the engine stopped; both crew were in the water about 5 metres away, injured and disoriented.

The accident had been witnessed by the crew of a nearby yacht and the friend at the beach. The yacht made a "Mayday" call on VHF radio and the friend immediately left the beach in his RHIB and went to the scene. The yacht crew managed to recover the driver out of the water, and the friend in the RHIB recovered the navigator out of the water. Realising that the navigator was seriously injured, his friend drove the RHIB at full speed to the local RNLI station. By this time, the RNLI lifeboat had been launched and ambulance paramedics had arrived at the RNLI station. The driver of the racing boat was transferred to the lifeboat from the yacht and also taken to the RNLI station for first-aid treatment.

The driver suffered three broken ribs and was discharged from hospital later that day. The navigator had suffered a very deep laceration to his ankle and, unfortunately, his foot was later amputated.

Figure: The racing powerboat (not during the accident)

The Lessons

1. Kill cords save lives. The driver of the racing boat was wearing his kill cord, which resulted in the engine cutting out when he was thrown out. This almost certainly prevented further injury or accident as the boat was stopped when it landed back on the sea. Nevertheless, in the rapid capsize with both occupants being hurled out, and despite the kill cord cutting out the engine, it was very unfortunate that the rotating propeller struck the navigator's ankle in mid-air.

2. Alcohol and powerboating are bad travelling companions. Even a small amount of alcohol can have an effect on co-ordination and impair judgment. In a racing speedboat, travelling at up to 60kts, decisions are taken in split seconds. There was insufficient evidence in this case to determine whether or not the driver's alcohol consumption was a causal factor of the accident; however, there is no doubt that alcohol consumption should be avoided prior to driving any boat, particularly a powerful racing boat.

3. It is vital that there is a means of raising the alarm. When the driver and navigator were participating in competitive races or operating further offshore, they normally carried a VHF radio. However, on this occasion there was no radio on board the boat. It was fortunate that the accident was witnessed by the yacht crew and the friend at the beach, resulting in the rapid rescue that almost certainly saved the navigator's life. It does not matter how close you are to potential rescuers, every boat should be properly equipped for dealing with an emergency - including being able to raise the alarm.

4. When new equipment is being tested, caution should be exercised until full confidence has been established. This was the first day the boat had been to sea with its new propeller, and the crew were testing it at full speed. The boat's driving characteristics were different with the new propeller, so it might have been appropriate to build up speed incrementally to gain confidence before proceeding at maximum power.

The Cyclic Effect

Narrative

During a training passage on the south coast of England a 38' commercially operated sailing yacht suffered a catastrophic rigging failure that led to it being dismasted. There were no injuries and the mast was subsequently cut free (Figure 1) and released overboard.

The yacht, a Sigma 38, was built in 1989 and had been owned and operated as a training school vessel for a number of years. It was coded to operate commercially in Category 2 waters and had previously completed a number of international passages.

The yacht was on passage with a skipper/ instructor and six students on board undertaking RYA competent crew training. There was a moderate breeze, smooth sea and good visibility. The vessel was sailing on a port tack with the main and headsail up, when a loud bang was heard, and the mast fell over the starboard side of the vessel.

The skipper checked the welfare of the students, assessed the damage and informed the coastguard. He then cut the remaining rigging free, dropping it to the seabed, and returned to port under engine power.

The Sigma 38 was a popular design, with 125 boats built during its production life, of which many are still in use today - both commercially and recreationally. The yacht's shrouds (rigging) were secured via stainless steel tie bars that spanned between the deck and the hull structure (Figure 2). The investigation into the cause of the failure found that the weld between the tie bar and lateral retaining member embedded within the GRP of the hull structure, had failed (Figure 3).

Figure 1: The rigging being cut

Metallurgical testing of the failed tie bar found that

- The weld fracture occurred as a result of cyclic loading
- The weld was not a full penetration weld
- Surface corrosion was found close to the point of failure but was not considered a causal factor.

This boat had been in commercial ownership for a number of years and had covered a lot of miles. The cyclic loading on the tie bar would therefore have been high, and ultimately led to the failure of the welded joint.

Figure 2: The starboard tie bar intact and in-situ

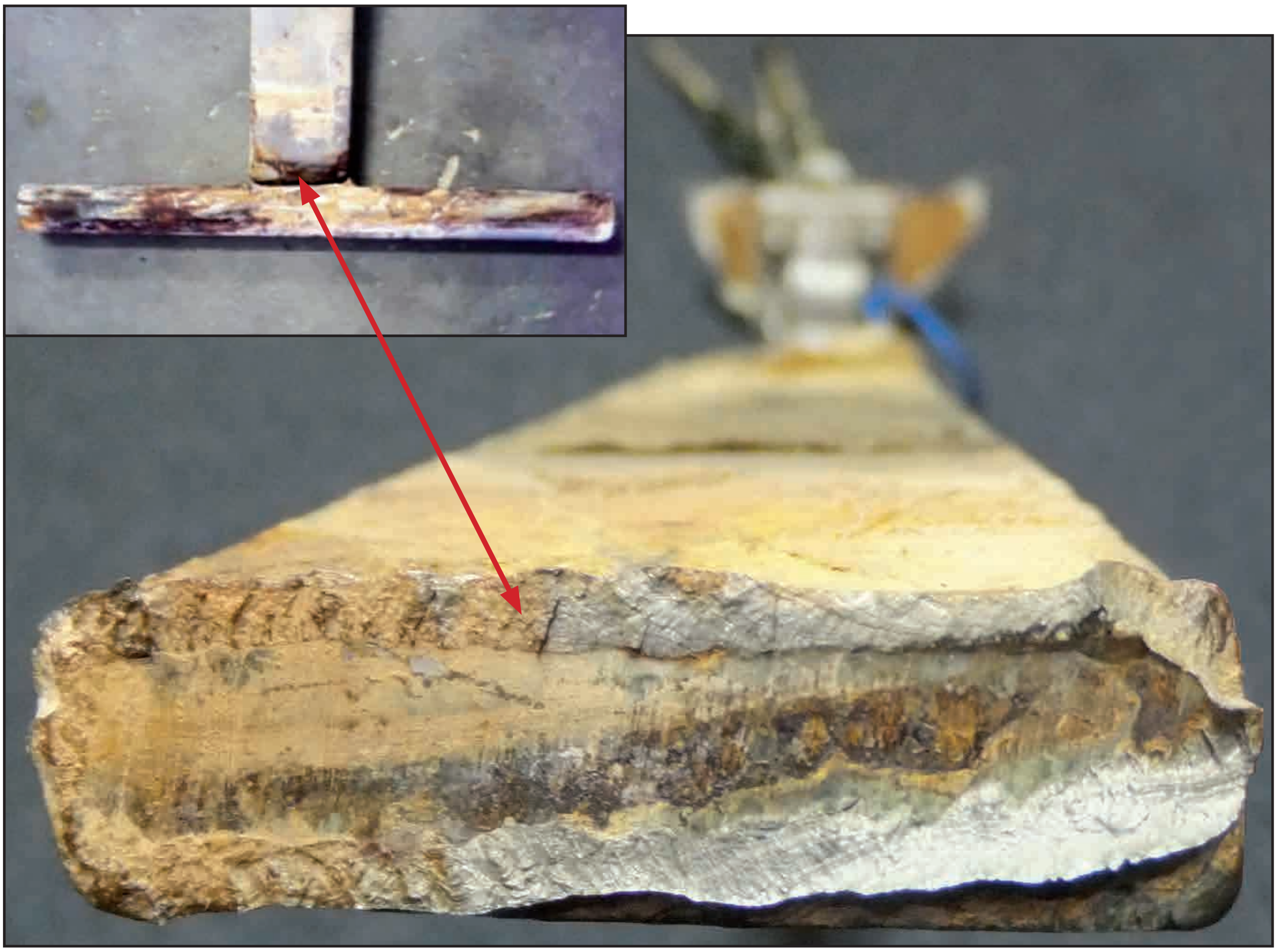


Figure 3: Tie bar fracture close up (inset: the overall tie bar)

The Lessons

1. This vessel recently had all of its standing rigging renewed; it was not deemed practical to inspect the tie bar securing point as it was inaccessible without removing a significant amount of the internal fixtures. However, owners and surveyors should carefully consider the risk of a failure such as this occurrence given a yacht's age and usage when deciding which critical elements of structure should be examined.

2. In this case, there were no injuries and the vessel was able to continue on to port, having contacted the coastguard. This case demonstrates the benefit of having well practised emergency procedures.

3. The skipper was able to cut the rigging to jettison the mast before motoring safely into port; having the ability to cut the rigging was critical for this. Had the vessel not been carrying wire cutters, this might have been much more difficult. Consideration should be given to having an appropriate level of emergency equipment on board a yacht to deal with emergencies.

CASE 23

Broken Gear, Broken Wrist

Narrative

A privately-owned, 52-year-old maxi-yacht was at sea and the crew was training for a forthcoming race; conditions were ideal, in sheltered waters: a steady breeze, calm seas and good visibility.

On its coach-roof, the yacht was fitted with two pedestal-style winches (Figure 1), known as coffee-grinders. The winches were operated by two crewmen working together to turn the pedestal handles, which mechanically rotated the winch used to control the headsail. The winches had four speeds available that delivered increasing leverage using internal gears. There was also a mechanical ratchet inside the winch drum, which meant that it could only turn in one direction.

During the sail training, two of the crew were working together turning the starboard coffee-grinder to heave in the headsail when there was a sudden change of the handles' direction. The ferocity and instantaneous nature of the winch's failure resulted in both the crewmen suffering broken wrists.

Post-accident examination of the gearing system inside the starboard winch drum identified that a load-bearing pinion on the central spindle had catastrophically failed. This had resulted in the tension in the winch drum being instantly released back up through the pedestal to the handles, causing their violent, hazardous reversal of direction.

The failed pinion was formed of two parts, whereas the same component on the port side winch was a single part (Figure 2). The coffee-grinders were assessed to be original to the vessel and there was no paperwork to support or explain their installation, maintenance or any repairs.

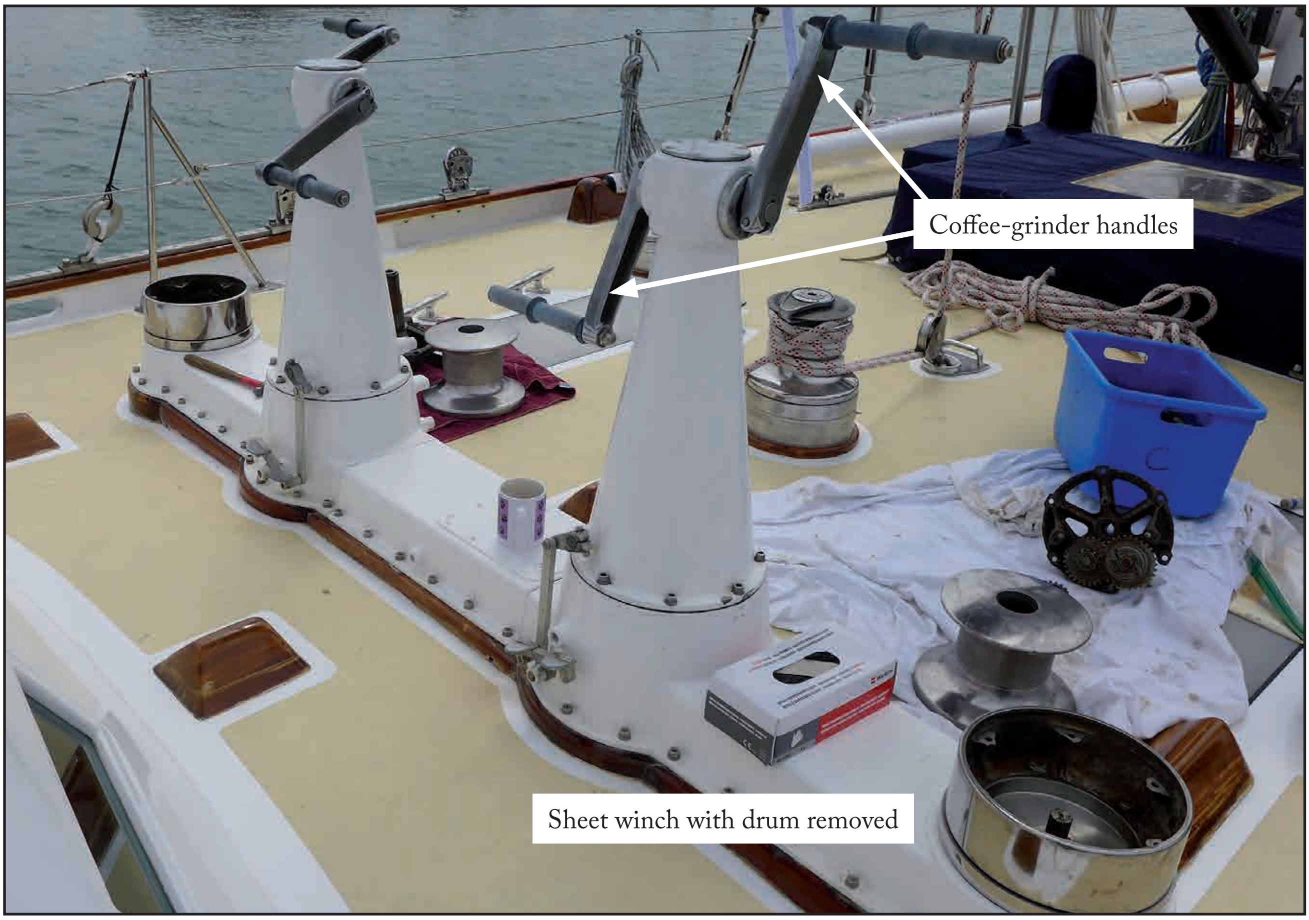


Figure 1: Pedestal winch system

Figure 2: Port and starboard side winch pinions

The Lessons

1. Deck winches on yachts are exposed to very high tension forces and need to be maintained, operated and repaired safely.

2. It is evident from examination of the failed component (Figure 2) that it was either a replacement part or, more likely, had been subject to a repair. This is because the same component on the other winch was a single, machined part. As a load-bearing pinion, it would also not make engineering sense to be constructed in two parts. Therefore, this was either a sub-standard repair or a replacement part and the details could not be traced, probably due to the yacht's age and the fact that ownership had recently changed hands.

3. Should any part of a load-bearing, high tension system such as this winch require a repair or a replacement part, it is vital that the new component meets the manufacturer's design specification. If necessary, original drawings should be checked or specialists in the area consulted in order to minimise the risk of subsequent failure, equipment damage or crew injury, especially for old or bespoke systems.

4. Routine maintenance of yacht winches should include a detailed visual inspection of all the component parts. The coffee-grinders on this yacht were elderly and possibly a unique design. Therefore, it was particularly important to check for wear, especially cracks that could indicate fatigue.

Carbon Monoxide – the Invisible Killer

Narrative

An inland waterways motor cruiser was moored alongside a jetty when a local boat owner became suspicious of the lack of activity on board. He moored his boat alongside the jetty ahead of the motor cruiser and went to investigate. He banged on the roof and shouted to attract attention, but there was no response.

Moving to one of the motor cruiser's windows he saw a person lying motionless on the forepeak bed. He called to a passing barge for assistance and the owner moored nearby. The two men then entered the aft canopied area (Figure 1) of the motor cruiser.

They saw a woman and a dog on the forepeak bed and a man slumped in the foot well at the bottom of the steps leading from the cabin to the helm area. All three appeared to be lifeless. One of the men then called the emergency services using his mobile phone.

About 30 minutes later the emergency services arrived. The rear canopy was unfastened and a firefighter tested the atmosphere. Ambulance personnel then examined the two occupants and confirmed that they were dead.

The post-mortem examination showed that the owner and his partner had died of carbon monoxide poisoning.

Figure 1: Configuration of the canvas canopy

Figure 2: Diagram showing 'station wagon effect'

The Lessons

1. The motor cruiser's owner was most likely charging the boat's batteries by running the engine while alongside. Carbon monoxide from the wet exhaust then entered the accommodation through gaps in and around the canopy (Figure 2).

2. Exhaust fumes can enter a boat at any time depending on wind direction and airflows. Ensure that the accommodation area is well ventilated when the engine is running.

3. Ensure that a carbon monoxide alarm is fitted to the accommodation area of the boat. Check the alarm is working – test it according to the manufacturer's guidance.

INVESTIGATIONS STARTED IN THE PERIOD 1/03/18 TO 31/08/18

Date of Occurrence	Name of Vessel	Type of Vessel	Flag	Size	Type of Occurrence
01/03/2018	*Celtic Spirit/* *Atlantic Explorer/* *Celtic Warrior*	Cargo ship | Solid Cargo | General Cargo Service ship | Research ship Cargo ship | Solid Cargo | General Cargo	UK Panama UK	2840 gt 1420 gt 2842 gt	Collision
24/03/2018	Failure of a throw bag rescue line during a boat capsize rescue drill				
27/03/2018	*Celtica Hav*	Cargo ship | Solid Cargo | General Cargo	Bahamas	1537 gt	Grounding
16/04/2018	*Finlandia Seaways*	Cargo ship | Solid Cargo | Ro-Ro Cargo	Lithuania	11530 gt	Fire
07/05/2018	*Laura Jane* (SE80)	Fishing vessel | Potter	UK	1.1 gt	Capsizing | listing (1 fatality)
18/07/2018	*Priscilla*	Cargo ship | Solid Cargo | General Cargo	The Netherlands	2281 gt	Grounding
04/08/2018	*ANL Wyong* *King Arthur*	Cargo ship | Solid Cargo | Container Ship Cargo ship | Liquid Cargo | Liquified gas tanker | LPG	UK Italy	39906 gt 4761 gt	Collision
07/08/2018	*Fram of Shieldaig* (BRD679)	Fishing vessel | Potter	UK	10.1 gt	Occupational accident (1 fatality)
14/08/2018	*Sunbeam* (FR487)	Fishing vessel | Trawler | Stern	UK	1349 gt	Occupational accident (1 fatality)
26/08/2018	*Wight Sky*	Passenger ship | Passenger and Ro-Ro cargo	UK	2546 gt	Fire

Reports issued in 2018

Windcat 8
Catastrophic engine failure and subsequent fire on a 15 metre windfarm crew transfer vessel off the Lincolnshire coast, England on 7 September 2017.
Report 1/2018 Published 28 February

James 2/Vertrouwen
Collision between a fishing vessel and a motor cruiser in Sussex Bay off Shoreham-by-Sea, England on 6 August 2017 resulting in the motor cruiser *James 2* sinking with the loss of 3 lives.
Report 2/2018 Published 8 March

Saga Sky/Stema Barge II
Collision between the general cargo ship *Saga Sky* and the rock carrying barge *Stema Barge II* resulting in damage to subsea power cables off the Kent coast, England on 20 November 2016.
Report 3/2018 Published 15 March

Constant Friend
Fatal man overboard from a stern trawler in Kilkeel Harbour, Northern Ireland on 23 September 2017.
Report 4/2018 Published 22 March

Enterprise
Fatal man overboard from a potter off Scarborough, England on 6 November 2017.
Report 5/2018 Published 11 April

Formula 4 powerboats
Collision between two powerboats on Stewartby Lake, Bedfordshire, England resulting in 1 person injured on 2 July 2017.
Report 6/2018 Published 12 April

Huayang Endeavour/Seafrontier
Collision between the bulk carrier *Huayang Endeavour* and the oil tanker *Seafrontier* in the Dover Strait, English Channel on 1 July 2017.
Report 7/2018 Published 26 April

Ocean Prefect
Groundings made by a bulk carrier while approaching Ahmed Bin Rashid Port in Umm Al Qaywayn, United Arab Emirates on 10 and 11 June 2017.
Report 8/2018 Published 27 April

Islay Trader
Grounding of a general cargo vessel near Margate beach, Kent, England on 8 October 2017.
Report 9/2018 Published 10 May

Ocean Way
Flooding and sinking of a stern trawler while north-east of Lerwick, Scotland on 3 March 2017.
Report 10/2018 Published 24 May

Ruyter
Grounding of a general cargo vessel on the north shore of Rathlin Island, Northern Ireland on 10 October 2017.
Report 11/2018 Published 21 June

CV24
Grounding and loss of a commercially operated yacht on Cape Peninsula, South Africa on 31 October 2017.
Report 12/2018 Published 28 June

Varuna
Fatal man overboard from a creel fishing vessel while west of Camusterrach, Scotland on 20 November 2017.
Report 13/2018 Published 4 July

Wight Sky
Catastrophic engine failure on a ro-ro passenger ferry while approaching Yarmouth on the Isle of Wight, England on 12 September 2017 resulting in a fire and serious injury to an engineer.
Report 14/2018 Published 19 July

Illustris
Fatal man overboard from a stern trawler in Royal Quays Marina, North Shields, England on 12 November 2017.
Report 15/2018 Published 9 August

Eddystone/Red Eagle
Unintentional release of carbon dioxide from a fixed fire-extinguishing system on the ro-ro cargo vessel *Eddystone* while in the southern Red Sea on 8 June 2016 and a similar incident on the ro-ro passenger ferry *Red Eagle* while on passage from the Isle of Wight to Southampton, England on 17 July 2017.
Report 16/2018 Published 12 September

Safety Bulletins issued during the period 1/03/18 to 31/08/18

MAIB
MARINE ACCIDENT INVESTIGATION BRANCH

SAFETY BULLETIN

SB2/2018

June 2018

Extracts from
The United Kingdom Merchant Shipping (Accident Reporting and Investigation) Regulations 2012

Regulation 5:
"The sole objective of a safety investigation into an accident under these Regulations shall be the prevention of future accidents through the ascertainment of its causes and circumstances. It shall not be the purpose of such an investigation to determine liability nor, except so far as is necessary to achieve its objective, to apportion blame."

Regulation 16(1):
"The Chief Inspector may at any time make recommendations as to how future accidents may be prevented."

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NOTE

This bulletin is not written with litigation in mind and, pursuant to Regulation 14(14) of the Merchant Shipping (Accident Reporting and Investigation) Regulations 2012, shall be inadmissible in any judicial proceedings whose purpose, or one of whose purposes is to attribute or apportion liability or blame.

All bulletins can be found on our website:
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Failure of a throw bag rescue line during a boat capsize rescue drill

24 March 2018

MAIB SAFETY BULLETIN 2/2018

This document, containing safety lessons, has been produced for marine safety purposes only, on the basis of information available to date.

The Merchant Shipping (Accident Reporting and Investigation) Regulations 2012 provide for the Chief Inspector of Marine Accidents to make recommendations at any time during the course of an investigation if, in his opinion, it is necessary or desirable to do so.

The Marine Accident Investigation Branch was informed of the failure of a RIBER throw bag rescue line during a recent manoverboard rescue exercise. Further enquiries revealed that throw bag rescue lines made by other manufacturers have been found defective in the past. The purpose of this bulletin is to recommend, as a matter of urgency, that owners of throw bag rescue lines take steps to verify that the rescue lines are fit for their intended purpose.

Steve Clinch
Chief Inspector of Marine Accidents

<u>NOTE</u>

This bulletin is not written with litigation in mind and, pursuant to Regulation 14(14) of the Merchant Shipping (Accident Reporting and Investigation) Regulations 2012, shall not be admissible in any judicial proceedings whose purpose, or one of whose purposes, is to apportion liability or blame.

This bulletin is also available on our website: www.gov.uk/maib

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Public Enquiries: 0300 330 3000

BACKGROUND

A defective throw bag rescue line was discovered while Warrington Rowing Club was conducting boat capsize drills for new rowers at Halton Baths in Cheshire, UK. A 15m long polypropylene rescue line in a throw bag, supplied by Riber Products Limited (RIBER), parted **(Figure 1)** while a young person in the water was being pulled to the side of the pool during a simulated rescue. There were no injuries. The rowing club safety advisor subsequently found another throw bag with a defective rescue line that had been purchased from the same supplier. RIBER was informed and the company contacted its customers after identifying a batch of 208 throw bags that could be at risk. A further three defective rescue lines have been identified as a consequence of the customer warning notice posted on Facebook **(Figure 2)**.

Considering the potentially serious consequences of a throw bag rescue line failing in a real lifesaving situation, the MAIB is conducting a safety investigation.

Figure 1: RIBER 15m throw bag rescue line

Figure 2: RIBER Customer Warning Notice on Facebook

INITIAL FINDINGS

On inspection, the defective RIBER throw bag rescue lines identified by Warrington Rowing Club were found to have been made up of sections of polypropylene rope fused together, which broke easily at the joint when put under tension. One line was constructed of two sections of rope fused together, the other was constructed of four sections of rope, resulting in three fused joints in its 15m length **(Figure 3)**. Intact and joined sections of one of the defective rescue lines were tested to determine the line's minimum breaking load. The intact section failed at 256 kgf (kilogramme force) and the joined sections failed between 19 and 23 kgf.

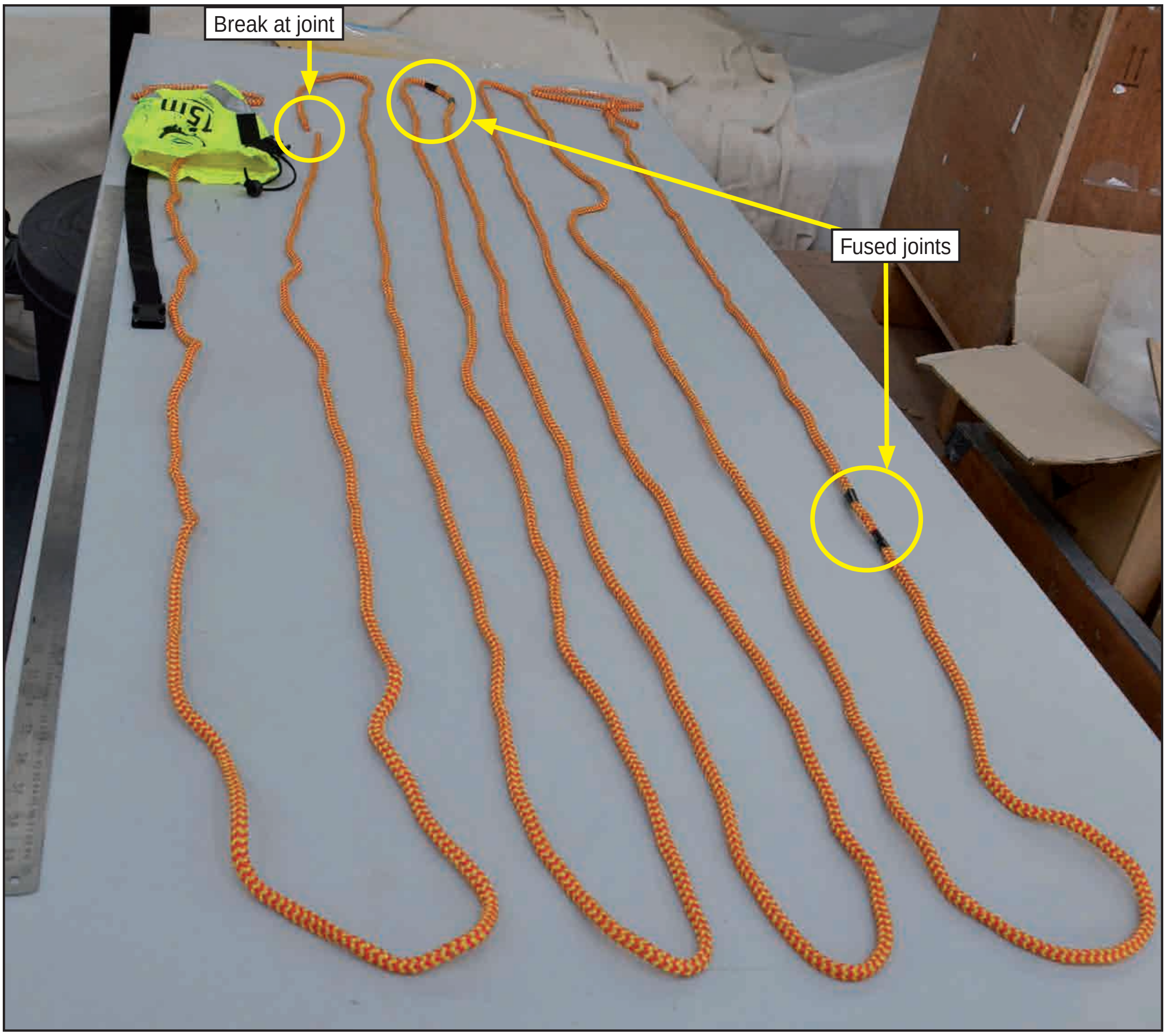

Figure 3: 15m rescue line with three joints

RIBER, and several other suppliers of throw bag rescue lines, import the complete manufactured product pre-branded with their company's logo. The foreign suppliers identified so far assemble the throw bags using components from further suppliers. As the rope used for rescue lines in throw bags is not classified as lifesaving or safety equipment, there is no requirement for it to conform to any recognised safety or quality standards other than the General Product Safety Directive 2001/95/EC.

APPENDIX C

SAFETY LESSONS

Many commercial craft and recreational vessels carry throw bag rescue lines as part of their safety equipment, and it is estimated that there are tens of thousands in circulation in the UK alone. It is likely that many of these throw bags will lie dormant in a cupboard or locker until they are required to be deployed in an emergency.

To ensure that throw bag rescue lines are fit for purpose they should be opened and checked. In particular:

- The entire length of the rescue line should be examined for joins or other discontinuities. This can best be done by feeling along the length of the line with bare hands to identify rough patches or lumps.
- Any knots, splices or other methods of securing the ends of the line to handles, quoits or other parts of the equipment should also be checked for integrity.
- The throw bag should be inspected and tried at regular intervals and repacked according to the manufacturer's instructions, as otherwise the line may not deploy freely from the bag when required.

Any throw bag rescue lines found to have joins or discontinuities should be removed from service and the original manufacturer /supplier informed.

REQUEST FOR INFORMATION

To assist this investigation, it is requested that full details of any defective throw bag rescue lines discovered are also passed to the MAIB via throwbags@maib.gov.uk.

Issued June 2018

MAIB
MARINE ACCIDENT INVESTIGATION BRANCH

SAFETY BULLETIN

SB3/2018 August 2018

Extracts from The United Kingdom Merchant Shipping (Accident Reporting and Investigation) Regulations 2012

Regulation 5:
"The sole objective of a safety investigation into an accident under these Regulations shall be the prevention of future accidents through the ascertainment of its causes and circumstances. It shall not be the purpose of such an investigation to determine liability nor, except so far as is necessary to achieve its objective, to apportion blame."

Regulation 16(1):
"The Chief Inspector may at any time make recommendations as to how future accidents may be prevented."

Press Enquiries:
01932 440015

Out of hours:
020 7944 4292

Public Enquiries:
0300 330 3000

NOTE

This bulletin is not written with litigation in mind and, pursuant to Regulation 14(14) of the Merchant Shipping (Accident Reporting and Investigation) Regulations 2012, shall be inadmissible in any judicial proceedings whose purpose, or one of whose purposes is to attribute or apportion liability or blame.

All bulletins can be found on our website:
https://www.gov.uk/maib

For all enquiries:
Email: maib@dft.gov.uk
Tel: 023 8039 5500
Fax: 023 8023 2459

Keel failure and capsize of the commercial yacht

Tyger of London

1 nautical mile south of Punta Rasca, Tenerife

on 7 December 2017

MAIB SAFETY BULLETIN 3/2018

This document, containing safety lessons, has been produced for marine safety purposes only, based on information available to date.

The Merchant Shipping (Accident Reporting and Investigation) Regulations 2012 provide for the Chief Inspector of Marine Accidents to make recommendations at any time during the course of an investigation if, in his opinion, it is necessary or desirable to do so.

The Marine Accident Investigation Branch (MAIB) is carrying out an investigation into the keel failure and capsize of the commercial yacht *Tyger of London,* while on passage from La Gomera to Tenerife on 7 December 2017.

The MAIB will publish a full report on completion of the investigation.

Andrew Moll
Chief Inspector of Marine Accidents

NOTE

This bulletin is not written with litigation in mind and, pursuant to Regulation 14(14) of the Merchant Shipping (Accident Reporting and Investigation) Regulations 2012, shall not be admissible in any judicial proceedings whose purpose, or one of whose purposes, is to apportion liability or blame.

This bulletin is also available on our website: www.gov.uk/maib

Press Enquiries: 01932 440015; Out of hours: 020 7944 4292

Public Enquiries: 0300 330 3000

BACKGROUND

The MAIB is investigating the keel failure and capsize of the UK registered commercial yacht *Tyger of London* **(Figure 1)** while on passage from La Gomera to Tenerife, on 7 December 2017. The five persons on board were rescued from the water by the crew of a nearby yacht.

Figure 1: *Tyger of London* post-capsize

INITIAL FINDINGS

Tyger of London was a Comar Comet 45S designed by Vallicelli & C and built in 2007 by Comar Yachts s.r.l, at Fiumicino, Italy. In common with other vessels built by the shipbuilder, the Comet 45S could be fitted with a choice of two keels:

- A 3200kg, 'deep draught bulb keel', consisting of a cast iron fin with a lead bulb fixed to its base **(Figure 2a)**; or,
- A 3700kg 'shallow draught, lead keel', consisting of a fabricated rectangular stainless steel top plate and frame, onto which lead was cast to form the keel **(Figure 2b)**.

Tyger of London was fitted with the 'shallow draught, lead keel', which is the subject of this safety bulletin.

Figure 2a: Deep draught bulb keel not affected by this safety bulletin

Figure 2b: Shallow draught, lead keel, fitted to *Tyger of London*, subject of this safety bulletin

The post-salvage inspection of the yacht identified that the keel's stainless steel top plate was still attached to the hull **(Figure 3a** and **b)**. The MAIB recovered the top plate to the UK for technical assessment. The lead section of the keel sank in deep water and could not be recovered.

The technical assessment of the top plate revealed that the keel had not been manufactured in accordance with the designer's drawing or intent. Specifically, the stainless steel rods forming the frame and their interconnecting plates had been only partially welded to the underside of the top plate. As a result, the joins progressively failed over time **(Figure 3c)**. The final joins failed while the yacht was underway, causing the lead keel to separate from the keel plate, following which the yacht quickly capsized and inverted.

Tyger of London had been employed as a charter vessel since 2013. It is estimated that the yacht had sailed approximately 29,000nm since build. The MAIB has been informed that prior to the accident the yacht had grounded on a number of occasions, all reportedly at slow speed and onto sand or mud.

The yacht's manager had removed the yacht from the water 22 months before the accident, for maintenance, during which paint and filler were removed to allow the keel plate and lead keel to be inspected. The securing arrangements between the keel and the hull matrix were found to be in good condition, however the lead casting prevented the inspection of the welded joins between the keel's fabricated frame and top plate.

YACHTS FITTED WITH SIMILAR KEELS

The MAIB understands that there are likely to be between 50 and 100 yachts fitted with keels fabricated in a similar manner to the 'shallow draught lead keel' fitted to *Tyger of London*. The majority of these yachts were built between 2003 and 2011 and include the Comar:

- Comet 41, 45, 50, 51, 52rs, 54, 62ed; and,
- Genesi.

SAFETY LESSON

The MAIB is not aware of any similar keel failures in yachts of a comparable design. However, owners should be aware that the 'shallow draught, lead keels' fitted to the yachts listed above might not have been fabricated in accordance with the designer's drawings. Where this is the case, the connection between the stainless steel keel plate and rods will not be as strong as intended. Furthermore, the condition of the connection cannot be inspected or assessed using traditional survey methods.

To prevent a similar accident, owners are recommended:

- To note that the securing bolts within the bilge of their boats, for this type of shallow draught lead keel, connect the top plate to the hull. The condition and tightness of these keel securing bolts do not indicate the true condition of the keel's internal frame structure.
- To arrange for an out of water inspection of their vessel by a suitably qualified yacht surveyor at the earliest opportunity if the yacht has grounded, been heavily used, or if they have any concern whatsoever as to the condition of the keel, noting the difficulty of inspection of the junction between lead keel and top plate.

Figure 3a: Comar Comet 45S keel bolt arrangement

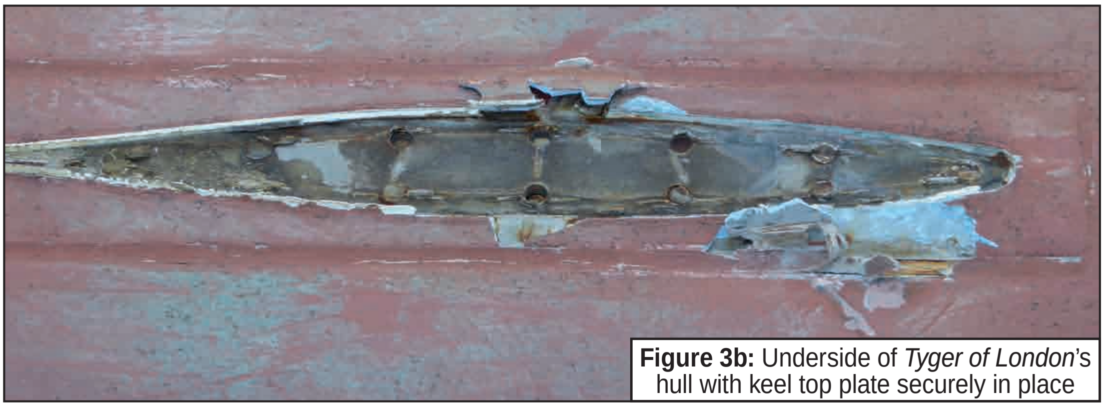

Figure 3b: Underside of *Tyger of London*'s hull with keel top plate securely in place

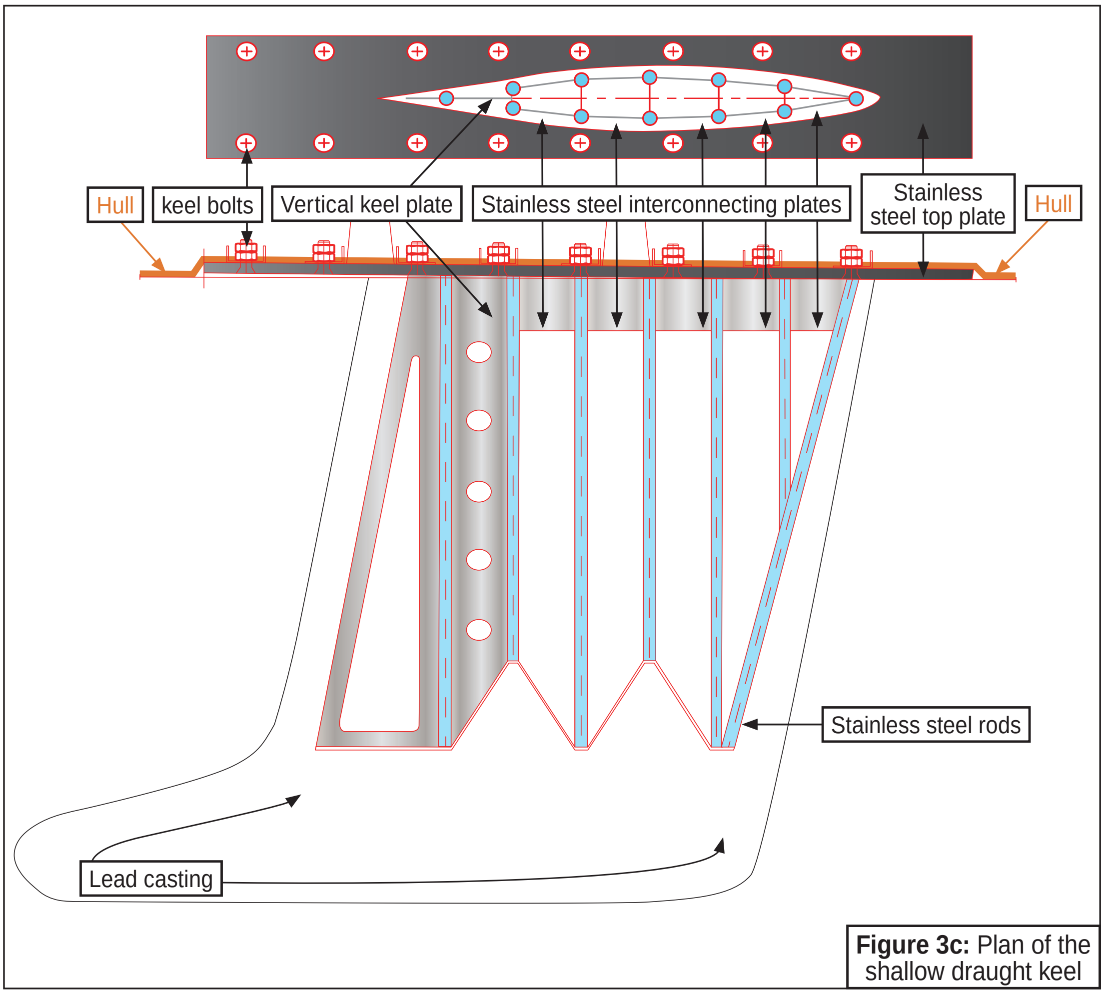

Figure 3c: Plan of the shallow draught keel

- To note that although the manufacturer, Comar Yachts s.r.l, has ceased trading, technical advice may be sought from **Gesti Nautica s.r.l**, a ship repair yard that has experience of these vessels. Their contact details are:

  Gesti Nautica s.r.l
  Via Fulco Ruffo dia Calabria snc
  00054 Fiumicino (RM)
  www.gestinautica.it
  Tel: +39 066506752

The MAIB's investigation is ongoing and it is intended that a full report will be published later in the year.

Issued August 2018

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