MAIB

MARINE ACCIDENT INVESTIGATION BRANCH

SAFETY DIGEST

Lessons from Marine Accident Reports 2/2011

MAIB
MARINE ACCIDENT INVESTIGATION BRANCH

SAFETY DIGEST

Lessons from Marine Accidents

No 2/2011

MAIB
is an
INVESTOR IN PEOPLE

This publication can also be found on our website: www.maib.gov.uk

October 2011

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.

Extracts can be published without specific permission providing the source is duly acknowledged.

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

If you do not currently subscribe to the Safety Digest but would like to receive an email alert about this, or other MAIB publications, please get in touch with us:

- By email at maibpublications@dft.gsi.gov.uk;
- By telephone on 023 8039 5500; or
- By post at: Publications, MAIB, Mountbatten House, Grosvenor Square, Southampton, SO15 2JU

If you wish to report an accident or incident
please call our 24 hour reporting line
023 8023 2527

The telephone number for general use is 023 8039 5500.

The Branch fax number is 023 8023 2459
The e-mail address is **maib@dft.gov.uk**

Summaries (pre 1997), and Safety Digests are available on the Internet:
www.maib.gov.uk

MAIB

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 2005 – Regulation 5:

"The sole objective of the investigation of an accident under the Merchant Shipping (Accident Reporting and Investigation) Regulations 2005 shall be the prevention of future accidents through the ascertainment of its causes and circumstances. It shall not be the purpose of 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

CCTV - Closed Circuit Television

cm - centimetre

COLREGS - International Regulations for the Prevention of Collisions at Sea 1972 (as amended)

CPO - Crude Palm Oil

CPP - Controllable Pitch Propeller

ECDIS - Electronic Chart Display and Information System

EPIRB - Emergency Position Indicating Radio Beacon

GNSS - Global Navigation Satellite System

GPS - Global Positioning System

IMO - International Maritime Organization

kg - kilogramme

m - metre

"Mayday" - The international distress signal (spoken)

MCA - Maritime and Coastguard Agency

MGN - Marine Guidance Note

MSN - Merchant Shipping Notice

OOW - Officer of the Watch

RHIB - Rigid Hull Inflatable Boat

RNLI - Royal National Lifeboat Institution

Ro-Ro - Roll on, Roll off

RYA - Royal Yachting Association

SMS - Safety Management System

TSS - Traffic Separation Scheme

VDR - Voyage Data Recorder

VHF - Very High Frequency

VTS - Vessel Traffic Services

Introduction

As I write this introduction, the first storm of the Autumn is breaking over Southampton. The resulting turbulence in the Solent and English Channel reminds me that, as a young and very green cadet, one of the first things I learned was to respect the sea and be ever wary of its potential for destruction. Case 4 provides a very good example of why I was taught this…..

Forty years ago, that same cadet probably did not have the wit or vision to even dream about the technology available to today's mariners. There is now an increasing reliance on technology to provide the information and tools needed to safely operate and navigate vessels of increasing size, speed and complexity. However, a number of recent accidents, including those described in Cases 5 and 10, have indicated that there may be many masters and OOWs who do not really understand the capabilities and operational limitations of new aids to navigation such as ECDIS. With paper charts being steadily replaced by this equipment, it is vital that ships' crews receive proper instruction in its use. Robin Middleton also makes a similar observation in his introduction to the Merchant Vessel section of this Digest. If you are required to use an ECDIS on your ship, do you know how to operate it effectively?

Previous introductions to Safety Digests have highlighted the scant attention some fishermen give to their own and their shipmates' personal safety. Sadly, the consequences of entirely avoidable accidents continue to kill and injure too many UK fishermen. However, Case 22 demonstrates that, with proper training, fishermen can successfully manage a potentially very difficult situation and provides good evidence on the effectiveness of the mandatory training courses provided by Seafish. If you are a fishing vessel skipper, have you completed your mandatory training? Have you made sure your crew are similarly trained? – it could save your lives.

Finally, the MAIB has published two Safety Bulletins since the last edition of Safety Digest. They both relate to important issues arising from a fatal accident involving the failure of a fast recue boat launching system. They are reproduced at Appendix C.

Until next time, keep safe.

Steve Clinch
Chief Inspector of Marine Accidents
October 2011

Part 1 - Merchant Vessels

"The sea is selective; slow in recognition of effort and aptitude, but fast in sinking the unfit".

Felix Riesenberg.

From my point of view it is a particular privilege to contribute this introduction to the Merchant Vessels Section of the MAIB's Safety Digest.

Accidents happen. During my tenure as the United Kingdom Secretary of State's Representative for Salvage and Intervention (SOSREP) I was involved in over seven hundred incidents and the wider SOSREP support team in many more. Some of those involved preventative activity, where a ship appears to be in potentially dangerous circumstances, many others involved casualty salvage and mitigating the impact of accidents whilst acting always, "in the overriding interests of the UK".

The MAIB's role is, of course, that of safety at sea. Whilst I was involved with aspects of incidents as they occurred the MAIB had a significantly wider brief. From the outset I came into contact with the MAIB Investigation process and came to know their Inspectorate well, and I like to think there was mutual respect between us. We would meet on occasions for discussion of aspects of incidents from which process I learned that they would listen to opinions and consider points made before coming to their conclusions. After all they too were involved in the aftermath of incidents and, by publishing the results of investigations, in contributing to the knowledge of the maritime world and furthermore by making recommendations will prevent many potential incidents in future. Prevention and cure.

Yet the number of marine casualties at sea continues to give cause for concern. The International Union of Marine Insurance has recently published a report which states that 2010 will join the worst five vessel loss years in the last seventeen years.

Accidents will happen and this Merchant Shipping Section outlines the circumstances which led to sixteen incidents. With hindsight it is perhaps easy to say that many of these incidents need never to have occurred. Reality however is not so straightforward.

When being taught to become a diver I was introduced to the concept of the "incident pit". The incident pit is a slang term used by divers. It refers to a conceptual pit, the sides of which slope gently at first then steeper and steeper until recovery from the pit (or incident) is impossible. "Falling into the pit" is never intentional and often commences with a series of events, each of which alone would not be serious. However the effect is to put you onto the downwards slope and additional events can serve to cause more problems which exacerbate the situation, and steepen the slope until a point of no return is reached. It is often the fact that many, if not all, of the events may occur frequently and, when encountered on their own, often pass unnoticed. An example of this is outlined in the report "Are They In or Are They Out?" In "The Lessons" section appears the phrase *"The chain of events began when . . . . ."*.

Reading through the narratives and lessons I find that across the board, failures in seamanship and watch-keeping were significant contributors to the incidents with inadequate or missing planning and written procedures and key persons being distracted as joint second. And, perhaps surprisingly, in these times, failures in risk assessment contribute to at least four of the incidents. Two of the incidents exemplify topical issues: weighing containers and over-reliance on electronic navigational systems.

The MAIB has already pointed out that there is a strong case for weighing unaccompanied lorry trailers before they are loaded for export. Similarly there is growing pressure in some quarters for the IMO to establish a legal requirement that all loaded containers are weighed at the loading facility before being stowed aboard a vessel for export. Such legal requirements are probably years away from being imposed, but there can be little doubt that such a move would be in the interests of good practice. And not only "loaded" containers should be weighed – the incident "Too Much Up Top" exemplifies the implications of inadvertently stacking loaded containers which were supposedly empty.

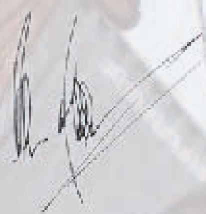
Over-reliance on systems such as GNSS and ECDIS can be dangerous. In respect of GNSS trials have already established that systems are vulnerable to interference from both natural (e.g. solar flares) or accidental or deliberate activities by man (e.g. jamming – where there are no restrictions on supply of necessary equipment). Trials have indicated that where GPS signals are jammed the receiving units don't just stop and close down, but they can provide false data which can be dangerously misleading.

The report "How Not To Use ECDIS" and "What Were They Thinking?" provide examples of what can go wrong. In the Lessons is the statement, *"In forthcoming years ECDIS will replace paper charts as the primary means of navigation".* The lesson goes on to point out that proper training is essential if this equipment is to be used effectively and safely. Even on my own boat I always check the whole of the electronic passage plan on the larger magnification screens, where small hazards show up better, and keep a full paper plot during transit.

Finally, in "The Lessons" elsewhere, appears the following, *"Simply checking that an individual carries the required certification is not sufficient in an industry where the consequences of poor practices can be devastating".* It is a major lesson and a lesson, as are others in this publication, I believe, espoused by Lord Cullen following the PIPER ALPHA disaster in July 1988.

It is my pleasure to commend the reading which follows and the lessons, as they are set out, to you. I would be surprised if many people could honestly say they cannot associate with some of the events presented.

What we have to do now is learn . . . . . .



Robin Middleton CBE

Robin Middleton became the Secretary of State's Representative for Maritime Salvage and Intervention in October 1999. As the SOSREP he officiated in more than 700 maritime and offshore incidents and emergencies, five of which involved activation of the UK's National Contingency Plan.

Mr Middleton's background includes qualifications and work in law enforcement, commercial diving, multi-disciplinary organisational management and peacetime emergency response.

He has served the Royal National Lifeboat Institute as a lifeboat crew member and has received the Institute's Silver Medal for Bravery. He still serves the RNLI as a member of Council and is a patron of the Maritime Volunteer Service.

In recognition of his achievements he has received the Lloyds List Lifetime Achievement Award, been awarded the first Honorary Life Membership of the International Salvage Union, made a life member of the Tug and Salvage Association, a life Member of UKSPILL, elected to Honorary Membership of the International Tug and Salvage Union. He was nominated as Personality of the Year by the British Tug-owners Association in 2007.

Robin Middleton retired from the post of SOSREP at the end of 2007 and now lives in retirement in the Isle of Man.

No Brakes

Narrative

As a ro-ro passenger ferry approached a link-span, she did not slow down as expected. The master further reduced the pitch on the two controllable pitch propellers (CPP) from the control panel on the port bridge wing, but soon noticed that the pitch indicator for the starboard propeller was still at full ahead.

The master ordered the chief officer to take control of the propulsion in the wheelhouse and to put the pitch on both propellers to full astern. This was done quickly, but the vessel's speed remained at about 10 knots and the vessel's bow sheered towards an adjacent pier. As the bow glanced off the pier, the starboard anchor was let go and the starboard engine was stopped. Seconds later, the ferry hit the linkspan and was severely damaged. The bow visor was penetrated by the linkspan arm (Figure 1) and the forefoot and forepeak buckled on impact with the concrete ramp (Figure 2). Control of the starboard CPP system was lost because a linkage had failed, leaving the pitch stuck on full ahead (Figure 3). An identical failure had occurred on the starboard CPP system several months earlier when the system was being tested alongside. On that occasion, the broken linkage was replaced but the cause of its failure was not investigated. The replacement linkage was taken from onboard spares but was longer than the original component and had to be adjusted after fitting. Unfortunately, the adjustment of the linkage caused it to come into contact with other components when the engine was overloaded, which ultimately led to its eventual failure during the ferry's passage.

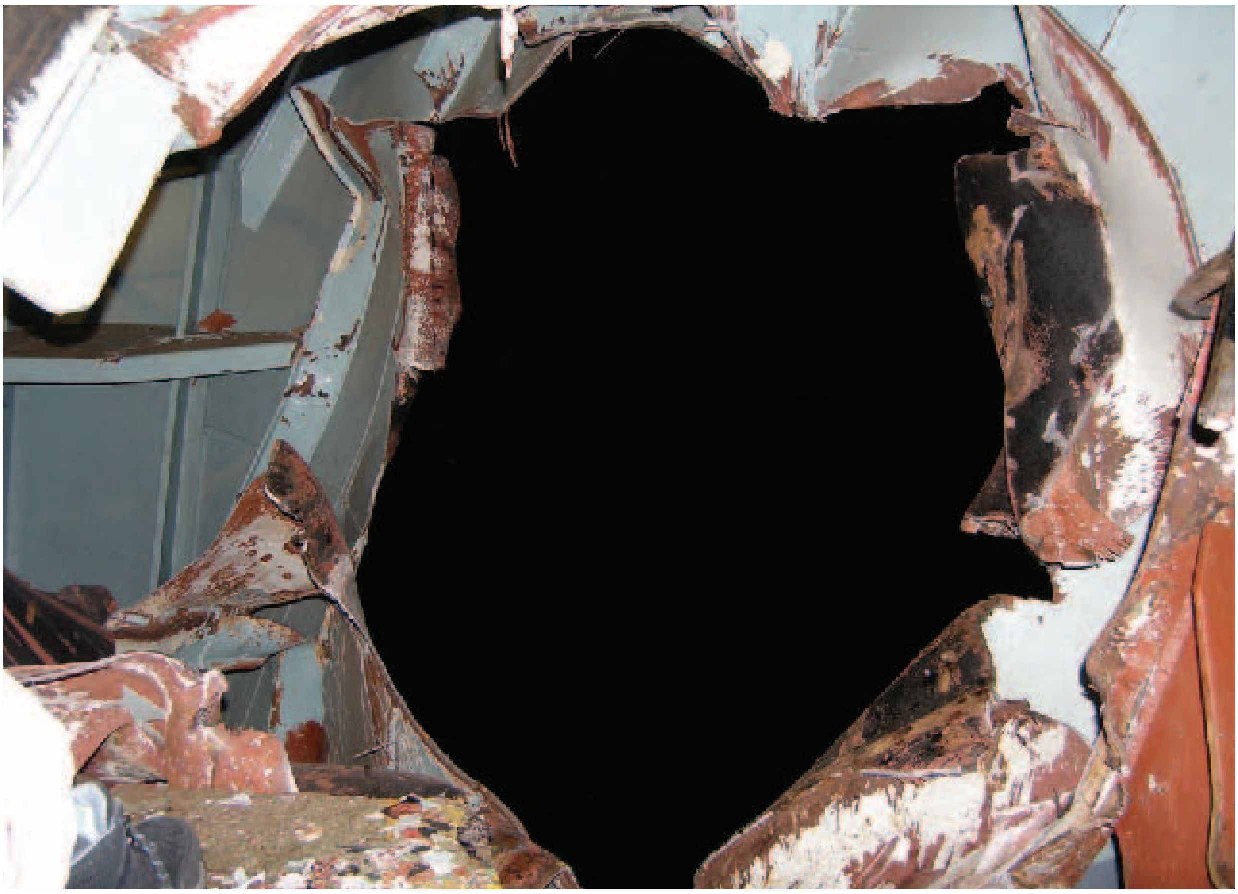


Figure 1: Penetration in bow visor

Figure 2: Buckling of the stern and forepeak

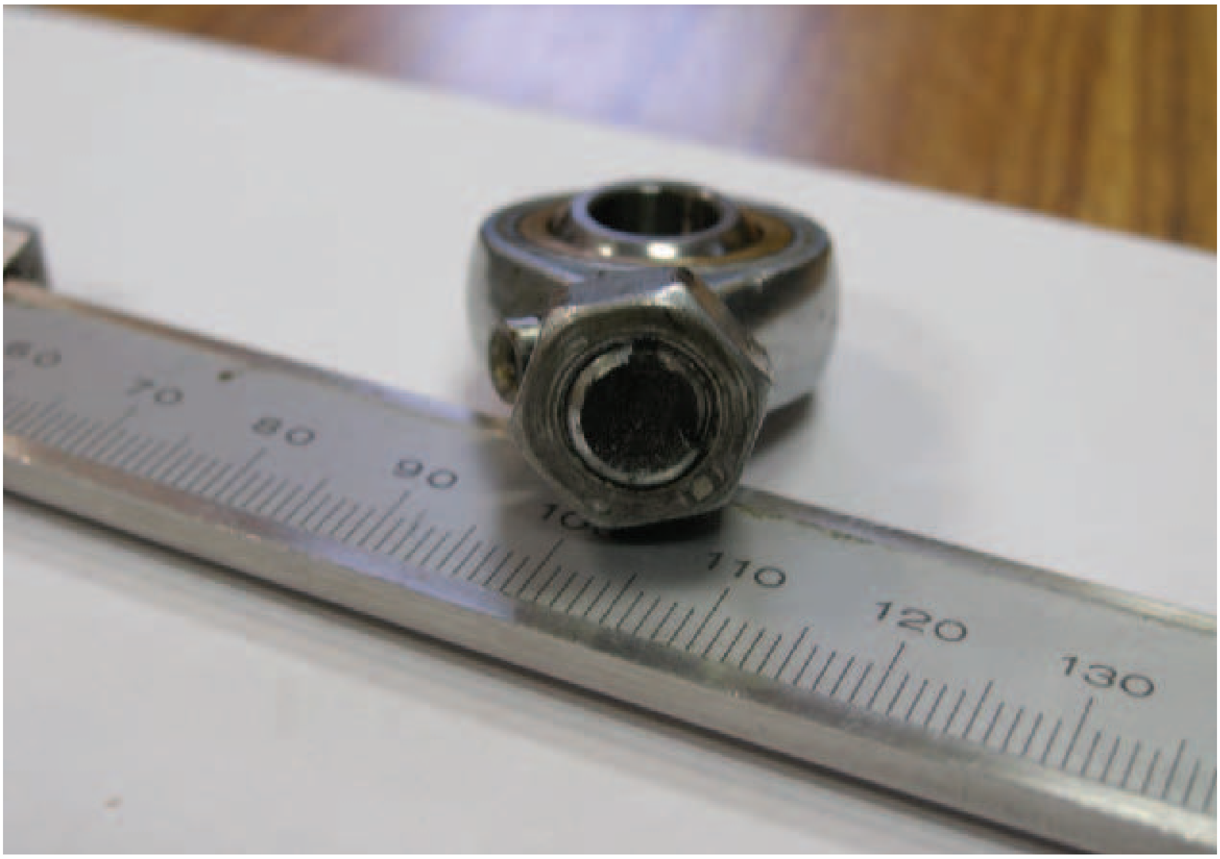


Figure 3: Failed linkage from CPP

The Lessons

1. Mechanical and electrical failures are not always readily apparent. Therefore, the testing of propulsion and steering controls prior to port entry and after changing control positions is crucial.

2. Machinery breakdowns have a knack of occurring when least expected. When they happen close to dangers, accidents can frequently only be prevented by rapid diagnoses and response. In this respect, breakdown drills not only improve system knowledge among bridge teams, but they also help to prepare for the unexpected.

3. When a CPP system fails, the default position for the pitch varies between full ahead and full astern. In this case, the pitch failed to full ahead. Consequently, although full astern was ordered, this only increased the power ahead on the starboard propeller.

4. Ships' engineers often pride themselves on fixing machinery when it goes wrong. However, a role that is equally important, is finding out why the machinery or equipment failed in the first place. This goes a long way in preventing a similar breakdown occurring in the future.
   If required, technical advice can be sought from shore superintendents, manufacturers and class.

More Thought Less Speed

Narrative

During a busy bank holiday weekend, an incoming ro-ro passenger ferry operating in sheltered waters was unable to berth because her linkspan was occupied by a sister vessel. The ferry, which was already 25 minutes behind schedule, had to wait nearly 20 minutes before the berth was clear and the master could commence a stern-first approach.

Powered by three Voith Schneider units, the ferry quickly accelerated to 8.4 knots under the control of the master on the starboard bridge wing. The OOW was on the port bridge wing monitoring the vessel's proximity to adjacent berths. As the ferry was north of the position from which the approach to the berth was usually started, the master tried to rejoin the usual track. However, the combination of the vessel's speed, which was faster than usual, and her angle of approach, resulted in the ferry slightly over-shooting the usual approach track by several meters.

The master used considerable lateral thrust to try and align his vessel with the linkspan. However, this reduced the stern power available and the ferry struck protective fendering adjacent to the linkspan at a speed of about 4.5 knots (Figure 1). As a result, two passengers were slightly shaken and the vessel's stern ramp was damaged (Figure 2).

No speed indication was available on the bridge wings because the GPS display was only available in the wheelhouse; the vessel was not fitted with a speed log because of the underwater turbulence created by the propulsion system. The master had been on duty for about 9 hours and was scheduled to be relieved on arrival.

Figure 1: Damage caused to mounting

Damage caused to fendering

Figure 2: Damage sustained to stern ramp

The Lessons

1. When plying between the same places, ferry crews inevitably become very familiar with the approaches to the berths used. This is largely beneficial, but care must be exercised to carefully consider and plan each arrival, particularly when responding to changes to the 'normal' routine that may occur at short notice. It is important not to let familiarity lead to complacency, particularly at the end of a long day.

2. Speed is critical to every berthing. It impacts on vessels' handling characteristics, turning circles, stopping distances, leeway, the effectiveness of bow thrusters, and the use of tugs. The margin between too fast and too slow is often delicately balanced and needs to be carefully judged and monitored. An unnecessarily fast approach might save seconds, but also risks there being less time and water available to react when things don't go as intended.

Unguarded Machinery and Lone Work - a Fatal Combination

Narrative

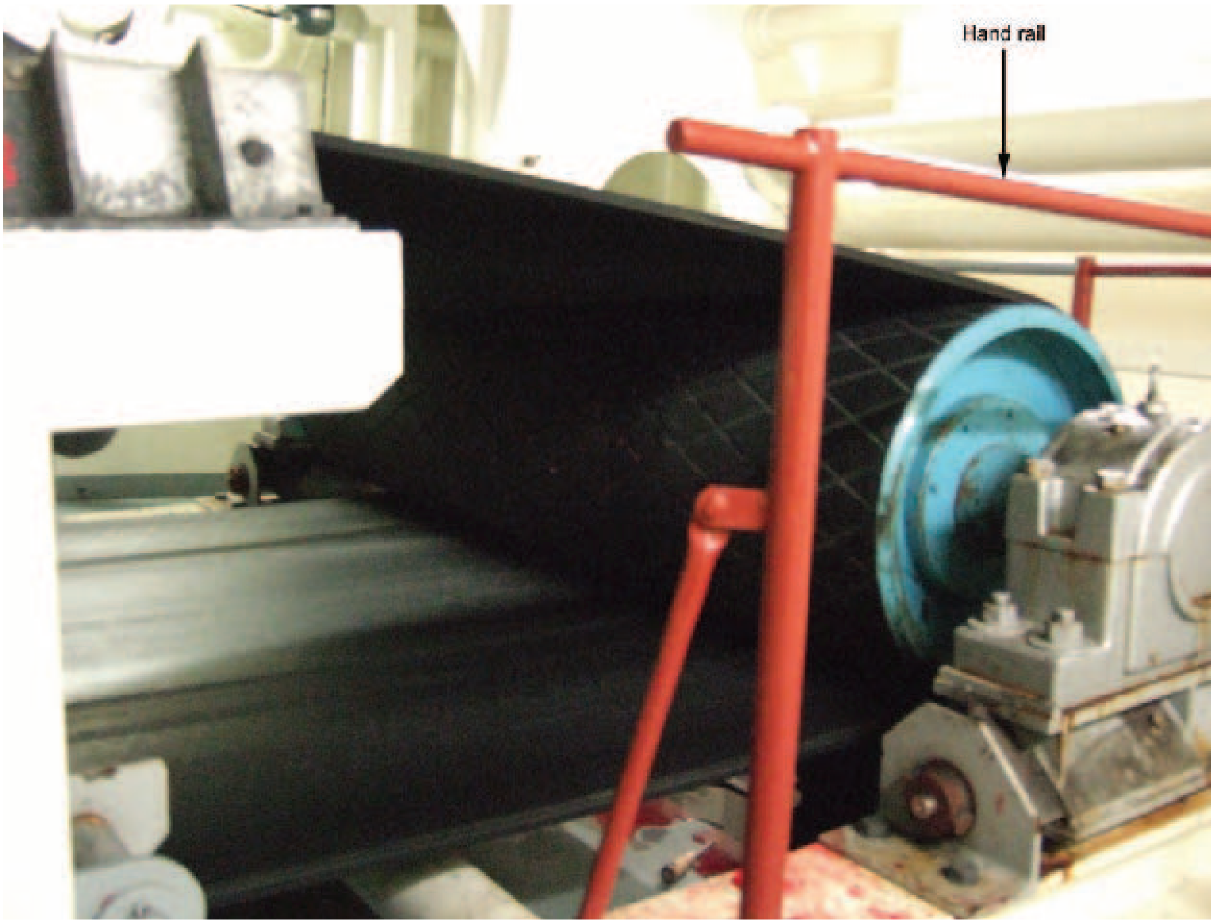
During self-discharging operations of a cargo of slag, the wiper called the cargo control room on his personal radio set to report that he was on watch in the conveyor belt tunnels, which were beneath the cargo holds.

About 45 minutes later, the chief officer went down to the tunnels to carry out routine rounds of the self-discharging system. When he reached the after end of the port side conveyor belt, he found the wiper's body between the conveyor belt roller and a supporting beam. The chief officer activated the emergency conveyor belt stop system and called for help.

Although the emergency services were quickly on scene, the wiper had already died of severe head injuries.

The wiper had not been required to carry out any maintenance work on watch and no mechanical faults were found in the self-discharging machinery.

The reason for the wiper becoming caught in the system is unknown. There were no witnesses.



The conveyor belt system

The Lessons

1. The machinery at the end of the conveyor belt system was guarded by only a waist-high hand rail. Therefore, it was easy for a crew member to intentionally or unintentionally bypass the rail and come into contact with the moving belt or end roller. There was no safety stop in the immediate area.

   Ship owners have an obligation under The Merchant Shipping and Fishing Vessels (Provision and Use of Work Equipment) Regulations 2006 to ensure that every dangerous part of the ship's work equipment is provided with guards or protection devices. These are to prevent access to danger zones or to halt movements of dangerous parts before the danger zones are reached.

2. The wiper worked alone during his 6-hour watch. His only contact with the cargo control room was to call the officers there on his personal radio set if he wished to go to the mess. There were no procedures in place to regularly check on a lone worker. This is contrary to the Code of Safe Working Practices for Merchant Seamen, which gives advice on communications for personnel entering and working alone in unmanned machinery spaces.

3. There were no risk assessments on board the vessel. A proper risk assessment of the area could have identified control measures such as enhanced guarding or CCTV coverage, which existed in other areas of the conveyor belt system, and extension of the safety stop arrangements.

4. The wiper had been given only verbal instructions on his duties during cargo discharge operations. There was no written job description for this work. A more defined job description might have deterred him from carrying out any extraneous work that could have placed him in danger.

Lulled Into a False Sense of Security

Narrative

A 1300 tonne, 40 year old cargo vessel was on a regular voyage carrying 1250 tonnes of logs between two NW European ports in winter. About 250 tonnes of the logs were stowed on deck. The logs were 5.5 metres long and rested on wood bearers to prevent them sliding on the wet deck. They were held in place by webbing lashings and 2 metre high, $90mm^2$ uprights fitted into sockets welded at the hatch coamings at 2.5 metre intervals.

Due to a deep depression producing severe gales, the vessel remained within the lee of the land for most of her voyage. However, the location of her destination port meant that she would have to eventually transit more exposed waters.

The vessel's owners and DPA were aware of the conditions and asked the master if he planned to delay the voyage, and shelter. However, the master, although having reduced speed to about 4 knots because of the weather, assessed that an unexpected lull would enable the vessel to make the tide as planned at her destination.

The master pressed on, but when the vessel's heading was altered away from the lee, she encountered increasingly severe conditions. The vessel began to pound into the heavy seas and a large wave broke over her deck.

The force of the wave overloaded the lashings in the fore and middle sections of the logs on deck, and the lashings parted. This allowed the logs to move to starboard (Figure 1) and overload the uprights, which bent 90° (Figure 2). About 100 tonnes of loose logs fell overboard.

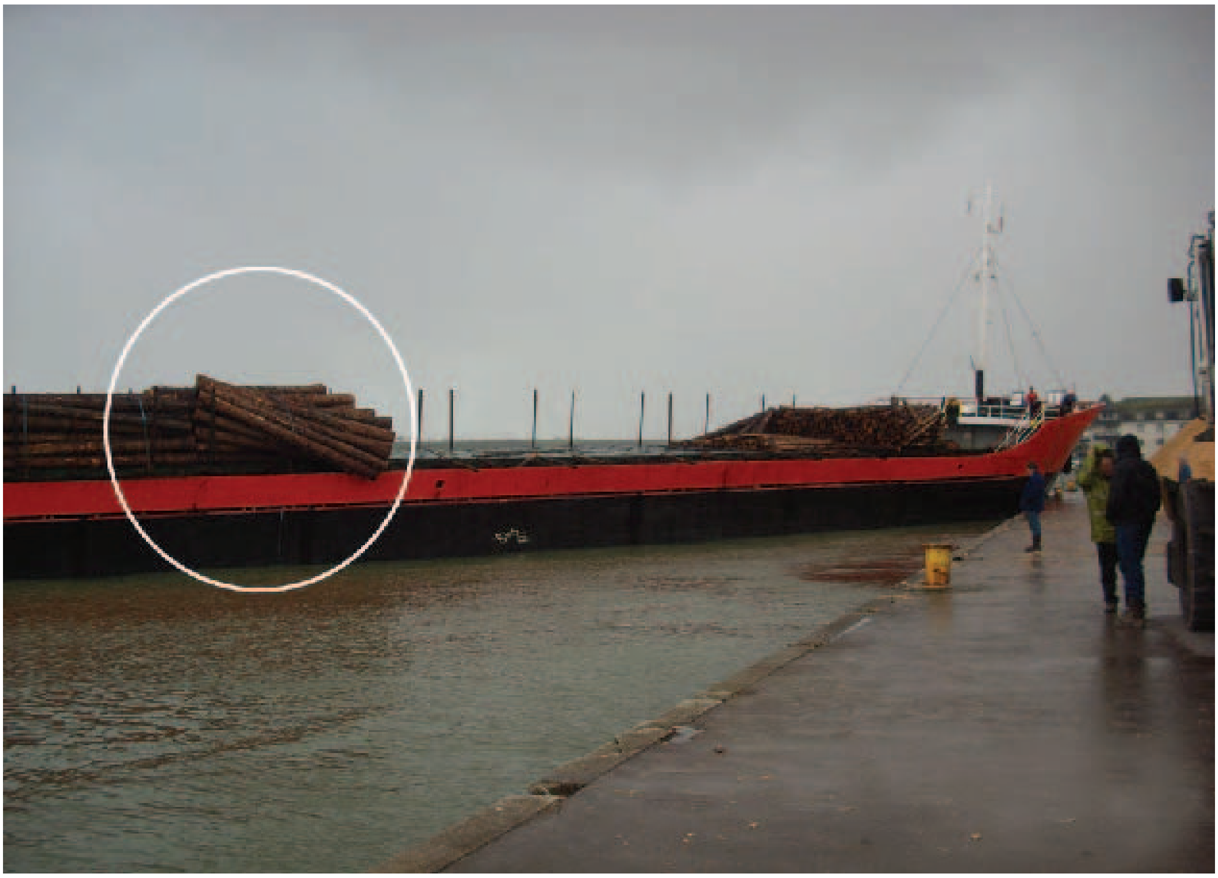


Figure 1: The timber shift

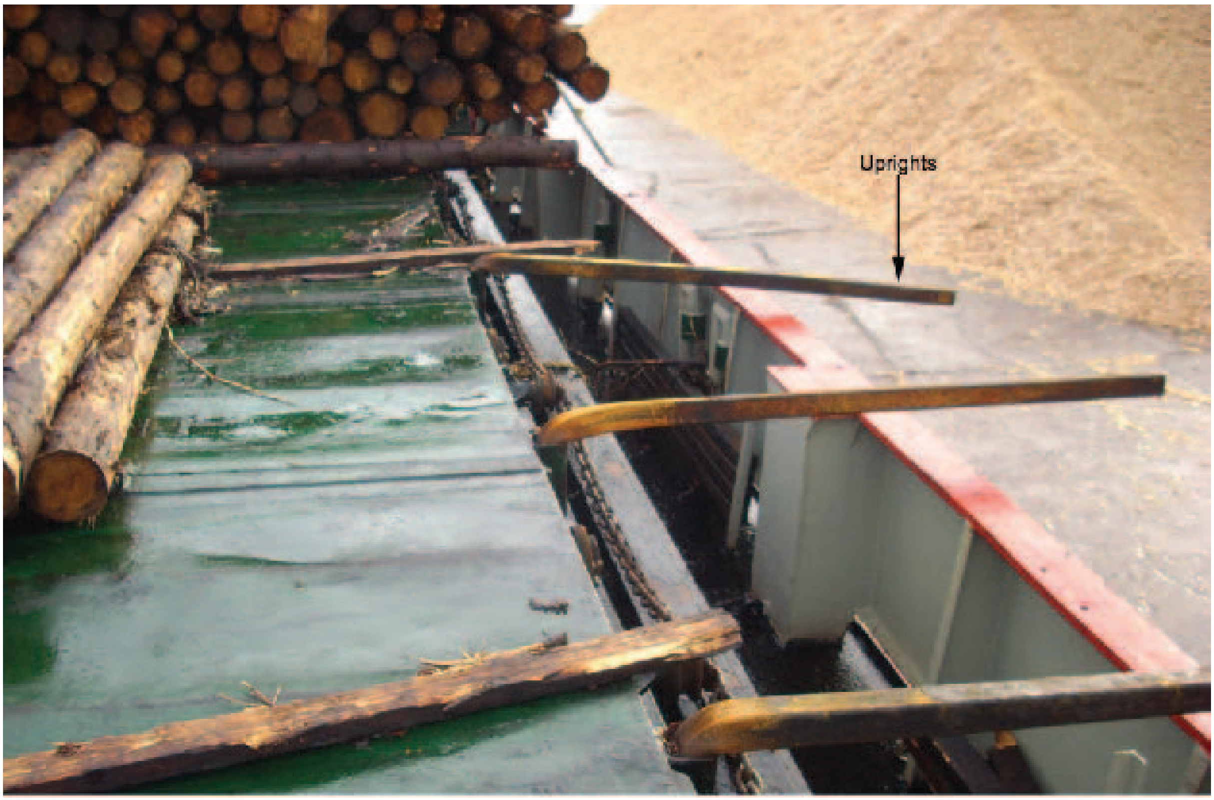


Figure 2: Uprights bent 90°

The Lessons

1. It is no coincidence that nearly all timber cargo shifts and losses overboard occur during bad weather. In such conditions, a timber deck cargo is vulnerable to movement when hit with great force by considerable amounts of water. The water can get between the timber, and pounding and rolling can generate tremendous loading on the cargo and its lashings.

2. In cases where severe weather and sea conditions are unavoidable, masters should be conscious of the need to reduce speed and/or alter course at an early stage in order to minimise the forces imposed on the cargo, structure and lashings.

3. Log cargoes can take time to settle, and their lashings need to be tensioned regularly. This is not always possible in rough seas and it is worth noting that, no matter how strong or effective lashings might seem, they are no match for imprudent ship-handling in heavy weather.

4. The use of hog wires between the cargo and linking the uprights make log stows more secure by sharing the load with the uprights and the lashings.

How Not to Use ECDIS

Narrative

A 4000 tonne dry cargo ship was on passage in the North Sea. The visibility was good and the sea was calm. The OOW was alone on the bridge and was monitoring the vessel's position in relation to the voyage plan using an ECDIS. The autopilot was selected and for much of his watch the OOW worked on paperwork in anticipation of a forthcoming vessel audit.

The voyage plan had been input to the ECDIS by the vessel's chief officer and had been amended the previous evening to shorten the route and save time. At 1550, course was altered to 331 to follow the intended plan. About 25 minutes later, the master, who was in his cabin, felt a change in the vessel's vibrations. He called the OOW and instructed him to check the depth of water. The OOW looked at the ECDIS display and reported to the master that there was no cause for concern.

However, the vibrations increased and the vessel quickly lost speed. The OOW now realised that something was wrong and put the propeller pitch to zero. He then changed the ECDIS display to a 1:50000 scale and saw from the charted depth of water that the vessel was aground. This was confirmed after switching on the echo sounder. A green, starboard mark was also seen off the port bow.

By now, the master had arrived on the bridge with the chief officer and put the propeller pitch to full astern. The vessel refloated without difficulty and there was no damage. No action was taken to save the VDR data.

The amended voyage plan had taken the vessel across a charted area of shallow water. The vessel's officers had not been trained in the use of ECDIS and no procedures on the system's use were included in the vessel's SMS. They were therefore ignorant of many of the system requirements and features, and operated the system in a very basic and inherently dangerous manner. In-built safeguards in the vessel's ECDIS were not utilised and system warnings were not acted upon. In addition, the planner's check of the route plan was only cursory and was not cross-checked by the master.

The Lessons

1. **In forthcoming years, ECDIS will replace paper charts as the primary means of navigation on many vessels. It goes without saying that deck officers need to be properly trained in the use of this equipment if it is to be used effectively and safely.**

2. **The prime responsibility of an OOW is the immediate safety of his ship. This responsibility cannot be met when he is distracted by secondary duties. ECDIS is potentially a very accurate and effective navigation and bridge watchkeeping aid, but it is no more than just that: an aid. When using ECDIS, OOWs still need to keep their wits about them, identifying navigational marks and cross-checking a vessel's position by different means. The use of ECDIS does not diminish the importance of keeping a good lookout.**

3. **The principles and requirements of passage planning on ECDIS are no different than when using a paper chart, and a master's responsibility to cross-check the work of his officers still remains.**

4. **VDRs have been fitted on many ships for a number of years, yet many masters are still not certain when VDR data needs to be saved. Where doubt exists, it is better to save the VDR data and not use it, rather than to lose information that might help to prevent similar accidents from occurring in the future.**

CASE 6

Corrosion – a Penetrating Issue

Narrative

A cruise ship was expected to encounter severe weather during the first few days of her next voyage, and appropriate precautions were taken: storm shutters were closed, crew and passengers were briefed, and warning notices were posted on doors opening onto the upper deck.

The ship left port in the early evening and, once clear of land, started to experience significantly stronger winds than were originally forecast, prompting the master to adjust the passage plan so as to take advantage of the lee of an off-lying island. Beam winds reached 90 knots and it was necessary to offset the ship's heading by 30° to maintain the revised planned track. Once clear of the island, the seas increased and the ship sustained damage to a number of external and internal fittings.

In the engine room, water was observed to be coming from a ventilation duct. The duct was of rectangular construction, and used two adjacent transverse frames and the ship's side plating to form three sides, with the duct completed by the fitting of a plate over the two frames.

A ventilation fan was removed to enable an internal inspection of the duct. Water could be seen seeping into the ship, apparently from under a large rust flake at the ship's side. Assessing that disturbing the rust flake might cause the plate to fail, a blanking piece was manufactured and attached to the duct in place of the fan as a temporary containment measure. Previous ultrasound surveys of the area when the vessel was last in dry dock had not identified any significant diminution of the steel.

On arrival at the ship's next port of call, an underwater survey was carried out and ultra-sound measurements of the shell plate were taken in way of the ventilation duct. The shell plate thickness was measured as 3mm, and further scraping of the corrosion on the ship's side around the area of leakage increased the rate of water ingress both above and below the original site.

Ventilation duct with cover removed showing the leak in the vessel's hull

The Lessons

1. Using the gap between the frames as a ventilation duct was an efficient use of space. The duct, however, was designed and built in such a way that it was impossible to inspect the steelwork inside. Even if the duct had been coated internally before being closed up, condensation would have regularly formed in it which, over time, would have broken down the coating and led to corrosion. The fitting of removable inspection plates at each deck would have readily enabled the duct to be inspected internally and for preventative maintenance to be carried out.

2. When considering modifications to existing structures ships' staff, shore managers and, when appropriate, class surveyors, should consider carefully any potential unintended consequences that may adversely impact on the operation or fabric condition of the vessel.

3. Classification society rules detail the areas that require thickness measurement during class renewal survey. All suspect areas are required to be measured; as the ship ages, the scope of the required measurement increases. However, it is possible for the measuring transducer to be inadvertently placed on only thicker parts of the structure. This will give a false impression of the overall state of the plate and smaller areas of extensive corrosion may not be identified. It is therefore essential to conduct a visual inspection in addition to ultrasound thickness measuring, particularly in the case of this type of ventilation duct and other areas of similar construction.

CASE 7

Too Little Too Late

Narrative

A ro-ro cargo ferry was on a southerly heading when entering a river port at night in good visibility. The master held a pilotage exemption certificate for the port and was very familiar with the channel, which he had navigated regularly for over 4 years.

Accompanying the master on the bridge were the chief engineer, an OOW and a helmsman. There was no passage plan drawn on the chart and the bridge team had not been briefed on the arrival. The tidal stream was flooding at between 3 and 4 knots, and a 20 knot wind was acting on the vessel's starboard beam.

In preparation for entering a lock, the master manoeuvred the vessel to the eastern side of the channel; he also stopped the vessel's engines. He was then told that the diesel alternator supplying the bow thruster had shut down due to low lubricating oil pressure.

Over the next 2 minutes the master discussed the diesel generator with the chief engineer, agreed passing intentions with an outbound vessel via VHF radio, and advised the forward and aft mooring parties of the need to minimise the use of electrical power.

During this time, the wind and tidal stream set the ferry out of the main channel. When the master realised that the next port hand mark, a light-float, was now on the starboard bow, he used both helm and engines to try and manoeuvre the vessel towards the main channel. However, this action was taken too late and the 50 tonne lightship struck the vessel's port side. The buoy's superstructure was damaged (figure) and its mooring chain was severed by the ferry's propeller blade.

The ferry immediately anchored in the main channel but was later towed to her berth by two harbour tugs. The buoy was recovered 5 miles upriver.

Damage sustained to the lightship's superstructure

The Lessons

1. Many vessels routinely trade between the same ports. Although this enables bridge teams to become familiar with the ports' navigational and procedural requirements, such familiarity does not replace the need for detailed passage planning. This allows the potential effects of differing environmental conditions to be identified, and provides the master with an accurate picture of the safe water available. In this case, because the passage had not been planned, position monitoring relied on staying between the buoys and the master was unaware that there was sufficient water for the ferry to leave the light-float to starboard.

2. Briefings given to bridge teams prior to port entry and departure are extremely useful in ensuring that all key personnel are aware of the intended plan; they also provide a prompt for the effects of factors such as strong tidal streams, winds and other vessel movements to be fully considered.

3. In pilotage waters, concentration and teamwork are essential if distractions such as machinery breakdowns are to be prevented from jeopardising a vessel's safe navigation. Responsibilities must be clearly defined to ensure that whoever has the con is not distracted, particularly when navigating close to dangers at night where distances can be difficult to judge, and where the effects of strong tidal streams might not be readily apparent.

It Only Takes One Slip For a Fatal Fall

Narrative

It was a cold morning with temperatures dipping to freezing, and there was intermittent snow as a chemical tanker berthed alongside to discharge its last parcels of cargo before a routine docking. This was also the master's last trip before retirement – unfortunately he was to remember the day for all the wrong reasons.

A cargo of crude palm oil (CPO) and stearin, which is a derivative of CPO, had been loaded in the Far East for discharge in Europe. While the crew had wide-ranging chemical experience, most had not dealt with these cargoes before which, in their solidified state were very waxy and made surfaces extremely slippery. Because of this inexperience, a supercargo had been contracted to advise on cargo operations to ensure the maximum cargo could be discharged. To achieve this, "sweepers" were used to push the remains of the cargo into the cargo pump suction well.

Cargo operations proceeded well, and during the afternoon the chief officer carried out a "sweeping" risk assessment. However, this was superficial. There was no consideration given for the use of a safety harness or fall arrestor despite the extreme slipperiness of the cargoes and the advice in the ship's safety management system regarding their use in large spaces.

Soon afterwards, the first two unkempt and noisy "sweepers" arrived on board. They were met by the chief officer and supercargo, who both noticed the smell of alcohol. The super-cargo gave them a short brief on the "sweeping" task and, although their English was poor they indicated they understood. No safety briefing or other information was passed on by the ship's officers. As they waited to be called, a number of the crew noticed the "sweepers'" unusual, noisy behaviour, which included "playfighting", but this went unreported.

Although the supercargo was also concerned about their demeanour he opted to reassess the situation at the time they were needed to "sweep" No 1 CPO cargo tank, the first tank to be discharged.

The atmosphere of No 1 CPO cargo tank was tested correctly for oxygen levels, but the equipment used to test for other gases only reached half-way down the tank.

Despite this flawed and potentially dangerous procedure, a "Permit to Enter" was issued. The "sweepers", who did not have their own safety checklist and were ill equipped, entered the tank. They wore deep tread footwear and plastic-faced gloves, but they did not have hard hats, personal gas monitors, safety glasses, emergency breathing apparatus or communications equipment. The supercargo noticed that one of the "sweepers", who was the subsequent 57 year old casualty, needed help to descend the angled ladders. Nevertheless, the "sweeping" task was completed efficiently. During late evening a third "sweeper" joined the team to "sweep" No 2 stearin cargo tank. Once again no safety briefing or "tool box" talk was given. The risk assessment and atmosphere testing having been completed in the same manner as for No 1 cargo tank, the "sweepers" entered the tank, still ill equipped. Once again the casualty needed help to go down the ladders, but because of the success with No 1 cargo tank the operation was not aborted. About 30 minutes later the supercargo indicated he was satisfied that the maximum cargo had been discharged, and signalled for the "sweepers" to leave the tank (Figure 1).

The first "sweeper" left the tank and noticed that the casualty was approaching the top resting platform with the other "sweeper" behind him. Very soon afterwards, at least one loud thump was heard and the remaining "sweeper" emerged from the tank shouting that his colleague had fallen. The casualty was found at the bottom of the tank directly in line with the top resting platform and vertical ladder to the main deck. He was removed from the tank by the local emergency services. They declined the use of the ship's own casualty recovery equipment because of its unsuitability.

Figure 1: Cargo hold

Figure 2: An aerial view of the vertical ladder

Figure 3: The crewman's heavily contaminated glove

The post mortem toxicology report identified that the casualty's blood contained a cocktail of prescription and illegal drugs, which would have caused severe impairment. All the evidence suggests that he fell from the vertical ladder (Figure 2) and passed over the top resting platform's upper guardrail. His heavily cargo-contaminated gloves (Figure 3) could easily have caused him to lose his hand grip on the slippery surface of the ladder rungs. This was further exacerbated by his impaired physical condition.

It was also found that the mandatory bi-monthly dangerous space casualty recovery drills had not been practised for a considerable time and none had been planned for the forthcoming year.

The Lessons

1. While there is a clear responsibility for a worker to take reasonable care of his own health and safety, The Merchant Shipping and Fishing Vessels (Health and Safety at Work) Regulations 1997 also requires the Company to "*co-ordinate arrangements for the protection of all workers and the prevention of risks to their health and safety*". Safety management systems should provide guidance regarding the control and management of contractors to assist the master to discharge his responsibilities effectively.

2. A number of those on board had concerns about the casualty's behaviour and ability to negotiate the tank ladders, but these were not acted upon. If there is any doubt about a person's physical or professional ability to carry out work - whether they are crew or contractors - they should be confronted and, if necessary, the task should be aborted.

3. Risk assessments need to be thorough if they are to be of use in identifying the appropriate level of control measures. Marine Guidance Note, MGN 410, The Merchant Shipping and Fishing Vessels (Health and Safety at Work) (Work at Height) Regulations 2010 identifies that work at height may also include "*working in or entering or exiting deep tanks …*". Due consideration should be given to the use of safety harnesses or fall arrestors.

4. The risk assessment and "Permit to Enter" was based on incorrect atmosphere readings because the equipment was unsuitable. Crew should be equipped with the correct sampling equipment and be fully trained in its use and interpretation of results obtained.

5. Had this accident happened while at sea, the casualty would have been put at further risk. This is because the crew had not been suitably trained in rescue techniques, and the rescue equipment was unsuitable for the task in that it took 18 minutes to rig. Lightweight rapid deployment tripods and quadpods are commercially available and should be considered.

Too Much Up Top

Narrative

A container feeder vessel was operating between three north European ports; each call always involving a complete discharge and loading of cargo. On arrival at the vessel's home port an unlashing gang immediately boarded and released the lower lashing bars and twist locks that connected the bottom two containers in each stack stowed on deck. It was normal for the upper four containers of each stack to remain connected by twist locks as a single unit, until such time that their bay was to be unloaded.

Two shore cranes worked the ship, both initially discharging and eventually one loading as the other carried on the discharge. The second officer monitored operations from the deck and occasionally carried out ballasting operations as and when the ship developed a list.

Approximately 5 hours after arriving alongside, containers in the aftermost bay toppled to port. Eighteen were lost overboard and a number of those that remained in the bay suffered damage.

It was later found that the top containers in seven out of nine stacks, which had been declared as empty on the loading plan, each contained cargo of up to 30 tonnes weight. With the top four containers in each stack still connected by twist locks, these single units were very top heavy and liable to topple easily when exposed to a suitable trigger.

Container twist locks

The Lessons

1. The load plan was inaccurate because the container line's cargo planning department generated its load plans using the weights declared by the shipper when initially booking container slots on the ship. If the shipper updated the line at a later date, with accurate weights, the software system was not configured to update the planning department. This has since been addressed. Until containers are individually weighed before being loaded on to a ship, the very least that container lines can do is to ensure that their planning departments have the most accurate data held by the company.

2. Despite trading between three ports that had significantly different salinity levels, it was found that the deck officers on board were using the same dock water density for all calculations. In an industry where discrepancies between actual and declared weights is not uncommon, the pre-sailing comparison between calculated and observed draughts and trim is a key indication to the master that the actual load is significantly different from the load plan.

What Were They Thinking?

Narrative

Shortly after entering a busy traffic separation scheme (TSS), the master of a large container vessel arrived on the bridge to assist the bridge team during the vessel's transit. The waters were congested, and as the traffic density increased, the master took the con and the OOW switched roles to provide support to the master.

As the vessel approached a precautionary area at 21 knots, Vessel Traffic Services (VTS) advised the vessel to exercise caution as three outbound vessels were ahead and intending to cross the TSS (Figure 1).

The master, who had already started to slow down the vessel from full sea speed to full ahead manoeuvring on the 'load' programme, set the telegraph to half ahead and altered course to starboard to give way to the three crossing vessels. His plan was to pass astern of all the vessels before coming back on the planned track.

On clearing what the master thought to be the first of the three vessels referred to, he was contacted by VTS, who advised him again to slow down. He acknowledged by confirming that he had reduced speed and planned to pass around the stern of the next two vessels.

VTS, however, responded by informing him that the second of the two vessels, which was now almost right ahead, was not outbound. This was acknowledged by the OOW and, despite a subsequent warning from VTS that the vessel was heading towards shallow water, the master continued on his collision avoidance course.

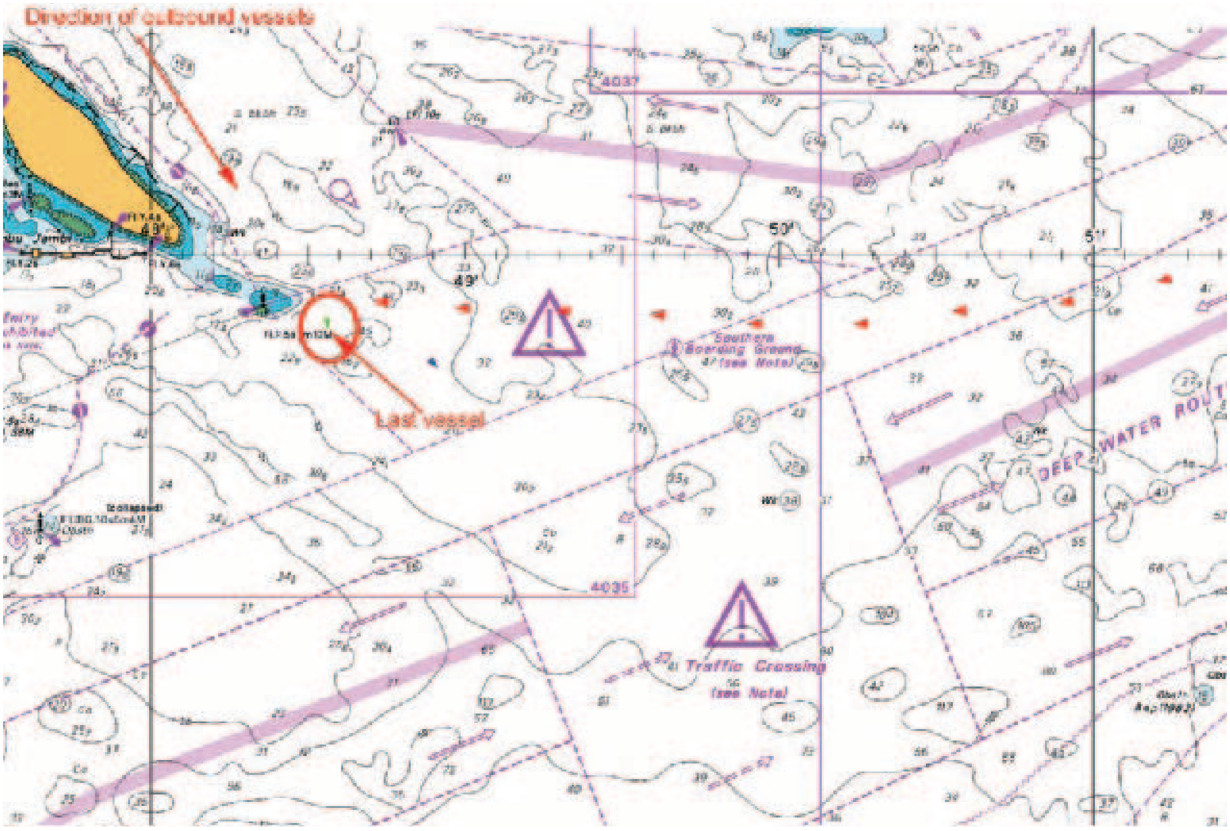


Figure 1: AIS plot of vessel

On clearing the last vessel, the master then initiated a turn to port, but this action was insufficient to prevent the vessel from running aground on a charted reef at 14 knots (Figure 2).

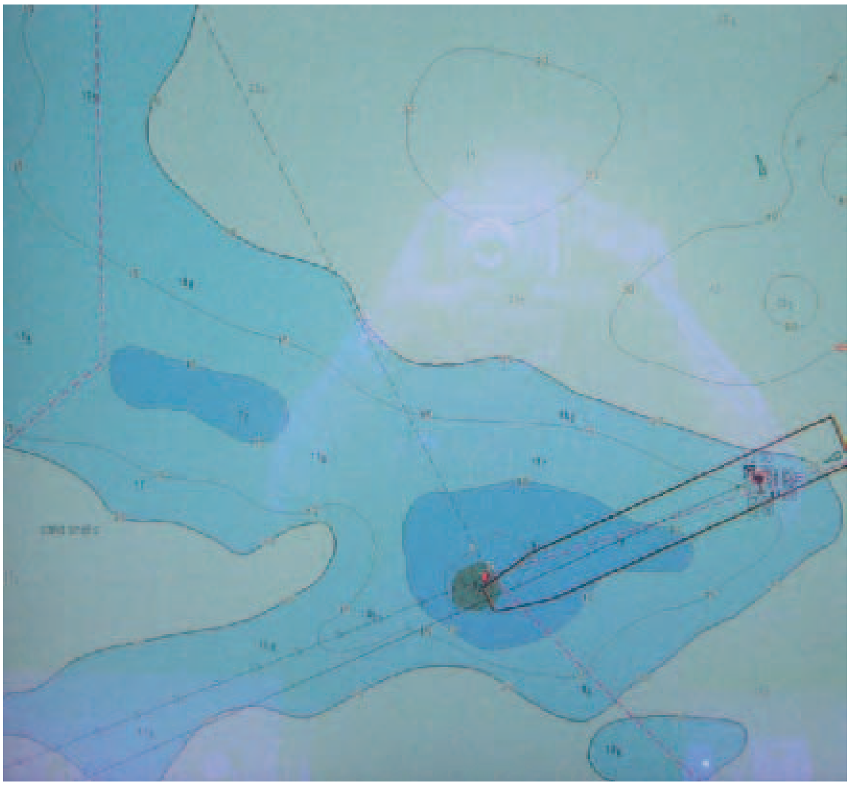


Figure 2: Vessel aground on the reef

The Lessons

The bridge team collectively made a series of errors, which they failed to recognise. Had they done so, this would have prevented the grounding:

1. Although the engine telegraph had been set from full ahead manoeuvring to half ahead, this had no effect on the engine speed as the reduction in engine speed was governed by the automatic 'load down' programme, which had to be overridden for any reduction to take immediate effect.

2. The master's assessment of the situation and decision to alter course to starboard were based on his observation of true vectors and relative trails of the radar targets; the bridge team made no attempt to utilise the 'trial manoeuvre' function.

3. The master and OOW misinterpreted the information received from VTS with respect to which three vessels it had referred to, and became irritated by its frequent interventions. This resulted in important information from VTS being missed.

4. The vessel's position was being monitored by the bridge team on ECDIS. However, they did not utilise the equipment to its full potential. Doing so, would have alerted them to the impending danger and the vessel's fast rate of approach towards the reef.

5. The combination of an early and substantial reduction of speed, together with an appropriate alteration of course, would have safely cleared all vessels. Rule 8 (c) of the COLREGS advocates an alteration of course alone as the most effective collision avoidance action - but only when a vessel has sufficient sea room; a point not fully appreciated in this case.

Are They In Or Are They Out?

Narrative

While a ro-ro passenger ferry was making her usual passage she began to roll noticeably. The OOW, who was part way through a compass error calculation, requested clearance from the engine control room to deploy the stabiliser fins. Permission was granted and the fins were extended, after which the OOW returned to his calculations. He forgot to place the "Fins Out" sign on the engine controls, which was the normal practice to heighten awareness and to supplement the control panel indicator light.

As the vessel approached her destination, the master went to the bridge and agreed that the OOW would keep the con and berth the vessel under his close supervision. The second officer arrived on the bridge to complete the pre-arrival checklist, and had a conversation with the master. Some minutes later, the second engineer called the second officer and told him that the engine room was ready for entry into port and that the fins were *out*. The second officer entered this into the pre-arrival checklist, but he mistakenly recorded that the fins were *in*, and then resumed his conversation with the master. The OOW gave a briefing to the bridge team, and the second officer announced that the pre-arrival checklist was complete, which the master acknowledged.

As the vessel approached the berth, the master and OOW moved to the starboard bridge wing controls and the second officer went to the port bridge wing. The second officer told the Information Office to call the passengers down to the vehicle decks, and then he left the bridge to open the bow doors. When the bow was about 4 metres off the pads, and the vessel was 1 metre off forward and 3.5m off aft, the master bent down to shade the bridge wing console from the bright sunshine. He then saw that the stabiliser fin indicator light was showing that the fins were still extended. As he ran to the centre console to house the fins, the master instructed the OOW to thrust the vessel off the berth. The port fin housed normally; the starboard fin did not.

The vessel moored port side alongside another ro-ro berth and discharged her cargo. It was later found that the starboard stabiliser operating ram was deformed and the fin protruded from the vessel's side by 1.5m.

The Lessons

1. A chain of errors began when the OOW extended the stabiliser fins while he was distracted with another task. This led him to forget to display the "Fins Out" sign on the engine controls, to tell the master that they were out on approach to the port, and to mention their status when he conducted the bridge team port entry briefing.

2. The second officer was also distracted by his conversation with the master, and missed the second engineer's statement that the fins were out. This error went undetected because reliance was placed on the "Fins Out" sign being displayed, even though the indicator light on the control room panel was illuminated to indicate that the fins were out.

3. As the master allowed the OOW to keep the con to the berth, he did not specifically enquire as to the status of the fins. Instead, he relied on the OOW's briefing and the second officer's pre-arrival checklist to confirm that all was ready for arrival. He also entered into a conversation with the second officer, which would have impaired his general oversight and supervision.

4. Despite being aware that the fins were out, and having a CCTV monitor in the engine control room showing the vessel's position, the engineers on watch were distracted with other tasks and did not warn the bridge team that the fins were still out as the vessel approached the berth.

5. Effective bridge resource management should eliminate the risk that an error on the part of one person could result in a dangerous situation. Without an alarm to indicate that the fins were out as the vessel approached the berth, reliance was placed on team management procedures to identify and address the impending danger. In this case, all members of the bridge and engine room teams had become distracted with other tasks to the extent that the OOW's error in leaving the fins out remained undetected until it was too late.

Testing Times

Narrative

A cargo vessel was conducting a rescue boat drill while alongside in port. The boat, which was crewed by the chief officer and an AB, was lowered to the water and taken for a short trip in the harbour. It was then manoeuvred back alongside the vessel in preparation for recovery.

The AB secured the lifting hook, and the second officer, who was operating the recovery davit on the vessel, then pushed the winch "start" button to raise the boat. As the boat neared its stowage position, the second officer released the "start" button. However, the winch continued to operate. The davit limit switch then operated, but this also failed to stop the winch.

Eventually, a wire fall securing clamp broke as it approached a davit sheave, causing the boat to drop into the water with the two crew members still inside.

The Lessons

Investigation found that a winch motor electrical relay had become stuck, causing both the "start" and limit switch electrical relays to be over-ridden. The "emergency stop" button had not been activated.

1. **Electrical failures can happen. It is therefore essential that adequate safety measures are in place when they do. In this case, a functional "emergency stop" was available to electrically isolate the winch motor. However, it was neither tested before the recovery operation nor activated when things started to go wrong. Crew members need to be familiar with the safety features provided and have the confidence to use them when required. Such knowledge is maintained through regular testing during emergency drills and before operational use.**

2. **A single point failure was able to override the limit switch electrical relay. Although the "emergency stop" was available as a last resort, the limit switch was designed to prevent equipment overload by stopping the operation with the rescue boat at, or close to, its stowage position. Built-in redundancy can itself help to improve safety. In this case, a second winch motor electrical relay was subsequently fitted in series with the first, requiring both relays to become seized for the same problem to arise in the future.**

CASE 13

Assumptions and Interaction Strike Again

Narrative

A 2,800gt cargo vessel collided with a 58,000gt ro-ro vessel as it was overtaking the larger vessel in the confines of a buoyed channel when they were departing from a major port. Local pilots were embarked on both vessels at the time.

The ro-ro vessel had recently entered the channel from a lock, and was steadily increasing speed as the cargo vessel approached her from the starboard quarter. The cargo vessel's pilot assumed the ro-ro vessel would quickly increase speed and pull ahead, and initially was not concerned as the distance between the two vessels continued to decrease.

However, the cargo vessel continued to overtake the other vessel, and with shallow water to starboard it reduced speed in an attempt to prevent a collision. Unfortunately this action was ineffective as the cargo vessel was now so close to the ro-ro vessel that hydrodynamic interaction occurred between the two vessels. The cargo vessel took a sheer to port and collided with the ro-ro vessel's starboard quarter.

The cargo vessel's engine was stopped, but she remained pinned against the ro-ro vessel for several minutes. The ro-ro vessel's bridge team had been unaware of the close proximity of the other vessel until the collision occurred as both vessels had been monitoring different VHF channels.

The cargo vessel's engine was then put astern and she slid aft, along the ro-ro vessel's hull, until she came clear of the larger vessel. Both vessels suffered minor damage as a result of the collision, but were able to continue on their respective passages.

The Lessons

1. **The cargo vessel was overtaking the ro-ro vessel and was thus the give way vessel. However, the pilot of the cargo vessel assumed that the ro-ro vessel would quickly pull ahead, but by the time it was realised that this was not happening, it was too late to avoid a collision. The pilot of the cargo vessel made an assumption, based on scanty information, that the ro-ro vessel was increasing speed. He should have ensured that this was the case before coming so close to the other vessel that a collision was unavoidable.**

2. **Hydrodynamic interaction occurred between the two vessels when the cargo vessel drew level with the ro-ro's starboard quarter. There was a strong attractive force between the two vessels due to the reduced pressure between the underwater portion of the hulls. Mariners should familiarise themselves with *MGN 199 (M) Dangers of interaction* in order to be alert to the situations when hydrodynamic interaction may occur.**

3. **The bridge personnel were not functioning as a team on either vessel. They had been monitoring different VHF channels and those on the ro-ro vessel were not aware of the cargo vessel until after the collision. It is essential that every member of the bridge team remains vigilant and fully involved in monitoring the execution of the passage, and that a good all round lookout is maintained when the vessel is in pilotage waters as well as when she is at sea.**

A Lack of Planning Gets the Master Carried Away

Narrative

Two large bulk carriers collided in an anchorage when one was set down on to the other (still anchored) vessel by a strong spring tidal stream while weighing anchor and manoeuvring to pick up a pilot. Both vessels suffered extensive damage, requiring them to be taken out of service for repairs.

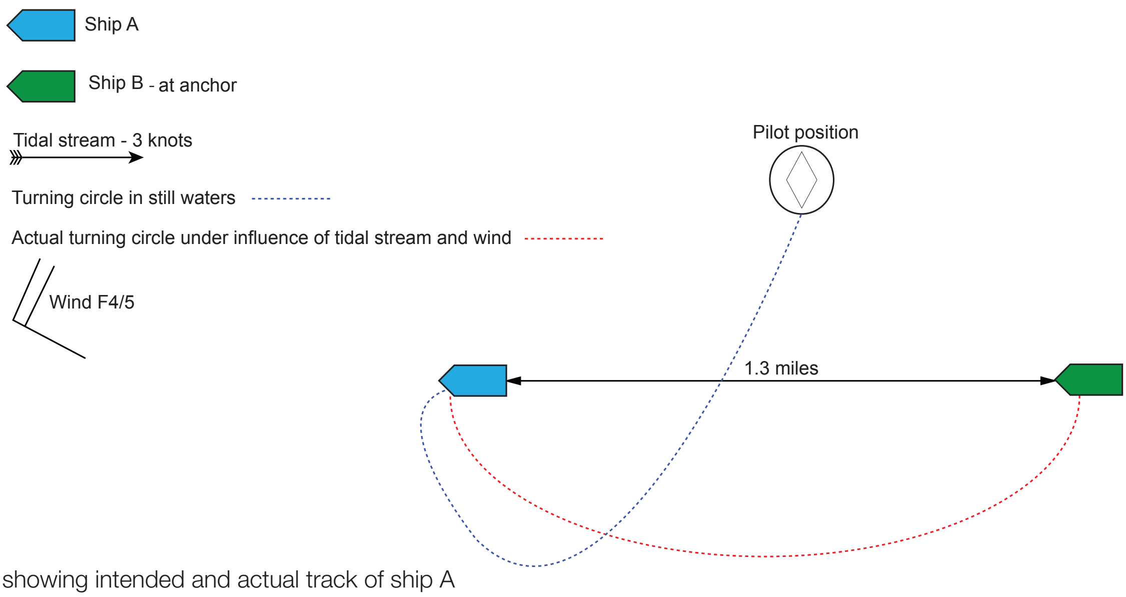
The first bulk carrier had arrived at the port 4 days earlier and had anchored while she waited for the berth to become available. The master was advised on the afternoon before the accident that the ship would berth on the next morning's high water. Despite the company's SMS providing an in depth series of checklists for passage planning (all of which were ticked off as having been completed), the strong flood tidal streams in the area had not been identified.

Prior to weighing anchor the chief mate had started to test the gear, and when the master arrived on the bridge he finished off the pre-departure checks. Neither referred to a checklist, both of them considering the vessel to be neither departing nor arriving, but effectively shifting ship within a harbour. When the mate went forward to haul the anchor, the bridge team consisted of the master, the third mate and a helmsman. A pre-departure briefing was not held and therefore the tidal streams were not discussed.

As the vessel got underway, the bow payed off to port. The master decided to carry on this momentum and turn the vessel through approximately 225º before heading to the north, out of the anchorage and towards the pilot boarding position. This took the bulk carrier towards the anchored vessel lying approximately 1½ miles astern of her original position. The master ordered the wheel hard to port and put the engine to dead slow ahead.

For the next 25 minutes, during which time the ship was undertaking this slow turn to port, very little information was exchanged between the bridge team concerning the safe navigation of the vessel. The chief officer of the anchored vessel had been monitoring the bulk carrier's manoeuvre and became concerned that she was getting set on to his own ship. He contacted the bulk carrier by VHF to warn of this and then called his master to the bridge.

The bridge team began to discuss the current, and over the next 7 minutes the master gradually increased his vessel's engine speed through slow ahead, half ahead and full ahead to the maximum available. However, the master's efforts were too late, and the bulk carrier collided with the anchored vessel, causing structural damage above the waterline to both vessels and the anchored vessel to part its cable just below the hawse pipe. Both vessels assessed damage, ensured the safety of their crew and checked that there was no risk of pollution before safely re-anchoring. Guidance for this on board the vessel that was manoeuvring was not easily accessible in the SMS, and the master did not refer to it.



Plan showing intended and actual track of ship A

The Lessons

1. The modern seafarer often bemoans the number of checklists that have to be completed before carrying out the most simple of tasks. However, this accident demonstrates very well the importance of referring to such an aide-mémoire properly, rather than simply "ticking the boxes". On this occasion two of those boxes that were ticked included an assessment of the tides and currents, and the holding of a navigational brief.

   For the operator's part, they should provide checklists that are simple, not over exhaustive and are readily available if needed in an emergency situation. The reason why one of the masters did not refer to a post-collision decision support checklist or aide-mémoire was because it consisted of 2½ pages of text, embedded somewhere in several hundred pages of the SMS.

2. Although deck officers on the bulk carrier which was underway had successfully completed a bridge team management course, there was evidence that this training was not put into practice. Operators should make every effort to ensure that their officers and crew are carrying out best practice as instructed during the various training courses they might well have funded. Typical ways of achieving this goal include conducting internal audits at sea rather than when the vessel is alongside, or listening to VDR recordings of arrivals or departures selected at random.

   Operators and owners need to recognise that they have a responsibility to monitor the working practices of the men and women that work on their vessels. Simply checking that an individual carries the required certification is not sufficient in an industry where the consequences of poor practices can be devastating.

3. Provided there is sufficient sea room, it is safer, and better seamanship, to pass astern of a ship at anchor. Passing close ahead of a ship at anchor is potentially perilous, but if it is unavoidable, the effects of the tidal stream, wind and a ship's manoeuvrability need to be taken into account.

4. Demonstrating a good anchor watch, the chief officer of the anchored vessel ensured that, when the accident happened, the alarm was raised quickly and the crew were able to assess damage, start engines and re-anchor without undue delay. While at anchor, the OOW should remember that he is not relieved of his responsibilities for the safety of the vessel just because it is not underway.

Mind the Gap!

Narrative

A car and foot passenger ferry arrived alongside her dedicated berth during the early hours of the morning. The weather was very poor with driving rain and winds gusting force 7-8, and the visibility wasn't helped because some of the lights at the terminal had developed a fault, causing them to go off and come on intermittently.

The ramp was lowered onto the 2 cm proud, stiff rubber cushioning of the linkspan. Although there was a large gap between the outboard edges of the ramp lifting mechanism and the linkspan wall, it had never been the practice to fit a barrier; after all, no one could possibly walk into the gap and fall overboard - especially as the walkway was identified with bright yellow paint (Figure 1). Or could they?

The ferry was fully secured to the linkspan. The vehicles were driven off the ramp and the foot passengers followed, guided by the yellow painted walkway.

At about 0345, a few vehicles were loaded for the return journey. A short time later a lady arrived at the ferry terminal clearly in some distress following an altercation with the person driving her there. She had a number of bags and a small, wheeled suitcase with her.

As she made her way towards the ferry ramp she kept her head down against the driving rain. Unfortunately, instead of moving towards the yellow painted footpath on the ramp, the lady veered off towards the right. She believes she might have tripped on the linkspan rubber cushioning before stumbling between the ramp and the linkspan wall (Figure 2) and then falling into the cold water.

Luckily the second mate had seen what happened and immediately threw a lifebuoy into the water, which the lady managed to grab and hold on to. She was pulled to the side of the linkspan and the ferry's crew and shore staff hauled her, uninjured, from the water.

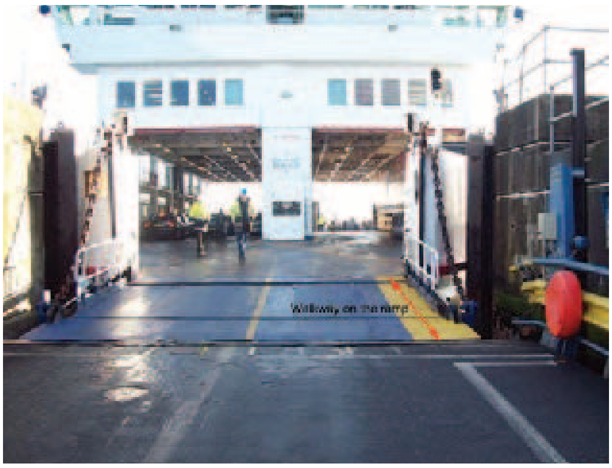
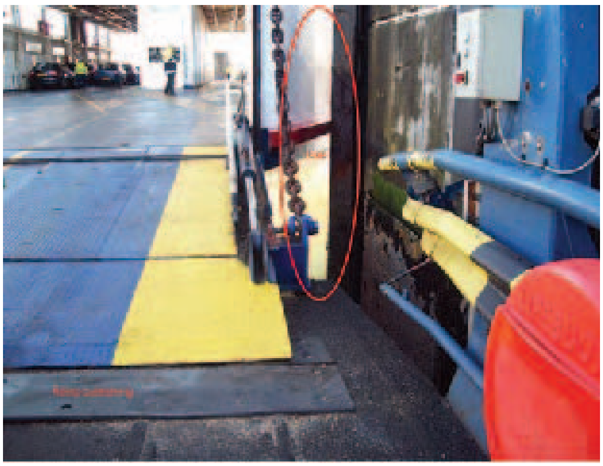


Figure 1: The walkway onto the vessel



The position where the passenger fell

The Lessons

The yellow painted foot passenger walkway clearly indicated the safe route to be taken by foot passengers when leaving the ferry. Because the risk area (the gap between the ramp and the linkspan wall) was behind disembarking passengers, the risk of falling into the water was negligible. The gap, however, presented a risk to embarking passengers, and this risk had not been recognised. Therefore no risk control measures had been put in place, such as a hinged barrier or other closing arrangement.

1. Ensure that risk assessments are reviewed regularly and that control measures are put in place to help prevent accidents such as this one. A simple hinged gate, closing off the gap between the ramp and the linkspan wall, could easily have prevented this accident.

2. Just because an accident has not happened in a particular area doesn't mean that one will not occur in the future. Do think of all eventualities: if there is a way to fall through a gap, someone is bound to find it!

3. Consider eliminating or at least reducing tripping hazards – the consequences, as this case shows, can be potentially severe.

4. While the indicated pathway may well appear to be satisfactory, a person walking onto a ferry, fully laden and with his (her) head down in inclement weather will have a different perspective. Do check to see if the pathway is sufficiently indicated to avoid confusion both on the ferry and the linkspan access/egress routes.

5. There is no clear evidence that the intermittent lighting contributed to this accident. However, defects affecting lighting should be addressed as soon as possible so that passengers can identify and avoid any tripping hazards.

A Lucky Escape

Narrative

The 'A' frame on board a 25 year old floating sheerleg was being rigged by her crew while the vessel lay alongside. The rigging, which had never been risk assessed and for which there were no operational procedures, was controlled from the wheelhouse by the master. With the mate keeping a watchful eye on deck, the master started to lift the 'A' frame into position using separate heaving and luffing winches; heaving in on one set of winches and slacking back on the other. The rigging equipment was not fitted with alarms or interlocks to warn or prevent elements of the equipment becoming overloaded, and there were no signs or labels by the winch controls to show the directions of heave and slack.

The raising of the 'A' frame was a fairly slow process, but after about 45 minutes it was upright (Figure 1). This was a critical phase of the rigging operation where the weight of the 'A' frame transferred from the heaving to the luffing winches.

At this point, the vessel's commercial agent boarded. The master stopped both sets of winches and gave the agent the information he required. The rigging operation was then resumed. However, a lack of co-ordination in the use of the hoisting and luffing winches caused the crane's deck pad eye fittings (Figure 2) to become overloaded. As a result, the deck pad eyes failed and the 80 tonne 'A' frame fell backwards onto the wheelhouse and the main deck. Although substantial damage to the deck and wheelhouse resulted (Figure 3), thankfully no one was injured.

Figure 1: The A-frame in the upright position

Figure 2: Damaged deck eye pad fittings

Figure 3: Damage to the wheelhouse and main deck

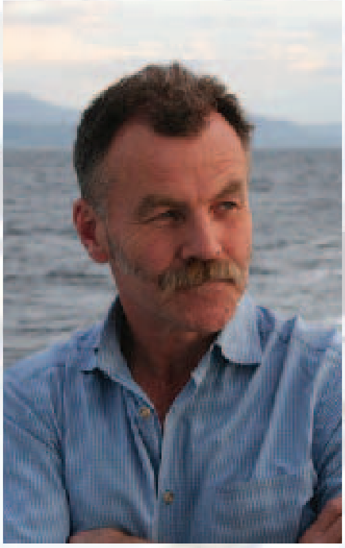
The Lessons

1. Where tasks require a high degree of skill and/or co-ordination, it is essential that operators are protected from unnecessary distractions, regardless of their experience or proficiency. In this case, the arrival of the agent at a critical point of the rigging operation broke the master's concentration and caused him to lose his place in the sequence of events.

2. It is important that all key shipboard operations are identified and properly assessed. Appropriate procedures must then be developed and followed, which reduce the potential for human error, taking into account factors such as the provision of physical and electronic safety measures and alarms, manning requirements, and control of access.

3. All lifting equipment should be periodically tested and examined regardless of what it is used for. Many seafarers are aware of the requirements in this respect for appliances used in cargo work, but few seem to be aware of the requirements for other lifting equipment.

Part 2 - Fishing Vessels



My first two experiences of the sea could hardly have been more different. The first was aboard an Ocean Youth Club ketch in the early 1970s. I'll never forget how in one week the officers of this fine vessel managed to turn a motley crew of seafaring novices into a team capable of running and sailing the ship efficiently. An essential element of this training process was a commitment to personal and collective safety.

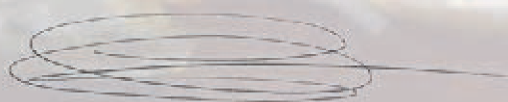
The second was an equally unforgettable trip on a trawler. There was no training and the only way another trip could be earned is if you could quickly learn how to gut; splice; mend; shovel; cook and make a decent cup of tea. An aptitude for doing all of this whilst more or less asleep was also necessary. There was no safety induction and "lifejacket" was a dirty word. I got the second and subsequent trips and have been messing about in boats ever since.

It's fair to say that present attitudes to safety aboard fishing vessels are better now. The advent of improved vessels and the greater availability of mandatory training courses mean a better and safer working environment for everyone. The 16.5m Seafish skipper's ticket is achievable by anyone who puts their mind to it and also provides skills that are applicable ashore.

Requirements to comply with legislation have produced documents such as the Fishing Vessel Safety Folder. Some deem such documents and the need for training to be an unwarranted intrusion into their perceived right to do as they please. This attitude is diminishing as word gets out that marine insurers are happy to walk away from claims where the minimum paper trail isn't in place for the vessel or crew.

Fishing is undoubtedly a safer occupation than it used to be yet the statistics regarding its safety in comparison to other professions are truly awful. The following incidents sadly include instances where men have died. The elimination of every accident is the ultimately unachievable human goal, yet everyone should try to draw lessons from these incidents and make their own and their colleagues' working environment a safer place.

The MAIB's Safety Digest is an invaluable tool. It describes incidents in a factual, blow-by-blow manner and clearly describes the lessons that can be learned from them. Previous Digests are readily accessible from the MAIB website and the Merchant and Small Craft narratives contain much that is applicable to Fishing. They make a worthy contribution to the improvement of everyone's life at sea.



Trevor Jones

Trevor Jones is a mussel farmer working from Bangor in the Menai Strait.

He contributes to the Maritime and Coastguard Agency Fishing Industry Safety Group, which seeks to improve all aspects of fishing vessel safety. He is a Seafish Approved Instructor and has taught Isle of Man fishermen from deckhand through to Class 2 (Fishing) Skipper via the NVQ system.

He is a board member of the Welsh Seafish Industry Group Training Association.

The Menai Strait mussel industry is the largest producer of bottom-farmed mussels in the U.K. It operates two 43m vessels and one 20m vessel in the husbandry and harvesting of mussels. It recently became the first enhanced fishery to gain Marine Stewardship Council accreditation. It regularly partakes in environmental research projects with the University of Wales School of Ocean Sciences in Menai Bridge.

Running on Autopilot

Narrative

After clearing the harbour fairway, during the hours of darkness, the skipper of a 2-man trawler put the steering to autopilot and without checking its status left the wheelhouse to repair damage to the trawl net. A few minutes later the vessel ran full speed, head on, into a submerged rock. Flooding quickly ensued to the vessel's foc'sle, where fortunately it was contained by a watertight bulkhead. The skipper was able to regain control of the vessel before she went aground, and he and his crewman fought the flooding using a submersible pump and by bailing as they hurried back to harbour. There, the vessel was laid safely alongside a pier.

The fire brigade assisted in pumping out the damaged craft as she lay alongside. The skipper and owner were able to survey the damage to the trawler's forefoot (about 3 feet below the waterline) from a rowing boat. They believed that, with the aid of a mechanical salvage pump, they would be able to get the vessel to a repair yard several miles away. No attempt was made to plug or repair the hull to reduce ingress of water.

An RNLI lifeboat was dispatched to escort the trawler, and upon its arrival replaced the fire brigade's pump with a lifeboat salvage pump. This pump countered the flooding without difficulty while they lay alongside the pier. Escorted by the lifeboat, the trawler then set sail for the repair yard. As the trawler built up speed, sea was forced into the foc'sle through the hole in the damaged fore foot, requiring the salvage pump to be driven harder to cope with the water ingress. Without warning, the trawler's engine overheated and had to be stopped to enable a blocked sea inlet to be cleared. With the vessel slowed in the water the ingress reduced again. Unfortunately the speed of the salvage pump was not reduced to match the decreased water ingress. As a result, the salvage pump quickly emptied the foc'sle space and air locked, allowing uncontrolled flooding to ensue.

The escorting lifeboat quickly lashed alongside the trawler while attempts were made to prime the disabled salvage pump. A few minutes later the pump was re-activated, enabling the water to be pumped out again. The lifeboat then towed the trawler alongside until they reached port safely, where a waiting crane hoisted the damaged trawler ashore for repair.

Figure 1: The vessel awaiting repair

Figure 2: A close-up of the damage

The Lessons

1. The skipper had carried out the action of setting the autopilot many times and had become over familiar with the task, resulting in him accidentally setting the autopilot to standby rather than active mode. He also failed to check it before leaving the wheelhouse. This allowed the trawler to veer from her heading until she came to an abrupt stop against a rock.

2. Keeping a lookout from the deck of a small trawler may be just about possible during daylight. During pitch darkness, however, with no visible horizon, stars or compass to follow, it is nigh on impossible to monitor your course, let alone see rocks or a cliff face.

3. The skipper and owner were lulled into a false sense of security by how easily the water ingress was contained by pumps while the vessel was in harbour. To set sail without attempting to plug the damaged bow was a grave error of judgment and enabled sea to be driven into the hole. At 6 knots, this tested the pumps to capacity. A simple tarpaulin over the bow would have reduced much of the ingress. The Seafish Industry Authority offers damage control training to fishermen. This training is offered freely, or at a minimal cost to fishermen, so there is every reason to take full advantage of it.

4. The RNLI provides an exceptional service to mariners. Its main function, however, is to save life. While the willingness of the volunteer crew to assist in the above circumstances was laudable, it meant that an SAR asset was occupied escorting an unseaworthy vessel from a safe haven. Had the lifeboat been required to react to another nearby emergency its crew's allegiance would have been compromised. Mariners should not abuse the willingness of the RNLI volunteers. In circumstances such as those described here, another commercial craft should have been used as an escort, but again, only after suitable damage control measures or temporary repairs had been carried out.

Thinking Outside the Box

Narrative

An Anglo Spanish longliner undertook her MCA renewal survey in Spain. The "out of water" hull plate thickness was measured using ultrasound techniques and by visual examination. There were a couple of areas of pitting in a tank which warranted re-survey a year later, but other than that the 8mm plates were in good condition for a 35 year old fishing vessel.

The 16 crew were also put through their paces by the MCA surveyors when they carried out emergency procedures training at sea. This included manoverboard, fire-fighting and flooding drills.

Further emergency drills were carried out during the passage from northern Spain to the fishing grounds. The machinery was running well and the crew looked forward to a fruitful spell of fishing. Having landed her catch the vessel resumed fishing, but this time with limited success. The longline gear was hauled in and prepared for shooting away again. The chief mate and the second engineer took the watch as the vessel steamed at 8.5 knots towards new fishing grounds which were 4 hours away. The second engineer made his routine checks of the running machinery; everything was normal. But not for much longer!

About 3 hours into the passage, the skipper and chief engineer were awakened by a very loud bang on the starboard side of the hull. This was immediately followed by a series of heavy thumps which appeared to come from somewhere around the after end of the vessel.

The chief mate immediately put the gearbox into neutral as the skipper went to the wheelhouse. The chief engineer rushed to the engine room, where he found the second engineer checking the gearbox. The gearbox oil pressures were normal and there was no noticeable vibration from the box. The chief engineer suspected that the vessel had hit an underwater object which might have passed through the propeller, so he stopped the engine.

As the chief engineer went onto the bottom floor plates to check the freedom of the propeller shaft he saw there was about 40cm of water in the bilge, which was just below the high level bilge alarm setting. He started a 35 ton/hour and a 15 ton/hour bilge pump which quickly lowered the water level. He was then able to see a small "vee" shaped hole in the immediate vicinity of the bilge pump suction.

Remembering the lessons from the emergency drills carried out earlier, the skipper passed ropes through the arms of an oilskin jacket, which he intended to use as fothering. He passed it over the side of the vessel and secured it over the breach of the hull (Figures 1 and 2).

Figure 1: The vessel awaiting repair

Figure 2: Oilskin jacket used as fothering

This reduced the water ingress and allowed the chief engineer to concentrate on putting a shore internally over the hole. He adapted materials at hand to manufacture a shore from a tube welded to a baseplate which was covered with neoprene rubber. He manufactured a second shore using a bottle screw from a deck wire stay which provided a method of adjustment (Figures 3 and 4).

Fortunately a fishery patrol vessel was also nearby. They landed a party on board the casualty to check that the crew were safe and that the situation was under control. This took some time because the checks were hampered by the lack of an English speaker on board the fishing vessel. When the checks were finally completed the patrol vessel stood off as the owners made arrangements for a tug to take the vessel into port.

Figure 3: Manufactured steel shoe with neoprene rubber facing

Figure 4: Manufactured adjustable shoe with neoprene rubber facing

Having significantly reduced the water flow the chief engineer then tried to turn the propeller shaft, but found that it was seized. He made a further attempt using a 1 tonne chain block, but this also failed.

In the meantime the skipper, who could not speak English, nor could any of his crew, contacted another nearby Anglo Spanish fishing vessel to advise her of his problems instead of alerting the coastguard. This conversation was overheard by other vessels in the area and it was they who informed the coastguard of the emergency.

The subsequent diver's inspection of the hull identified that the leading edges of the propeller blades were polished and that there was a mass of large size monofilament longline around the propeller and the stern gland housing. When this was removed the shaft was free to turn. Checks of the gearbox found that there was damage to the gearbox pinions and clutch housing (Figure 5). The outside area around the hole in the hull was clean and there was no scraping which would indicate that something had passed down the hull. All the indications pointed to something coming into direct contact from under the vessel (Figure 6).

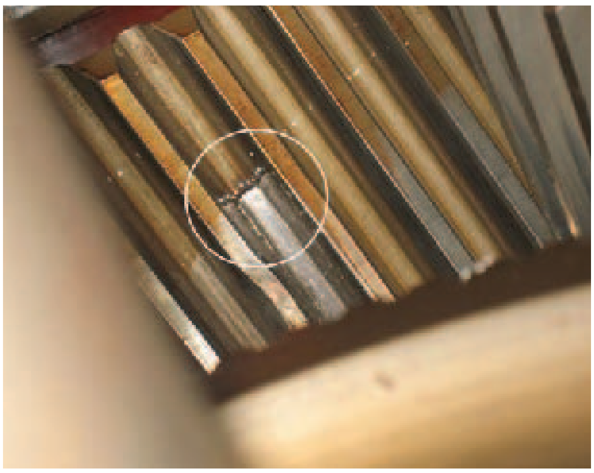


Figure 5: Gearbox pinion damage

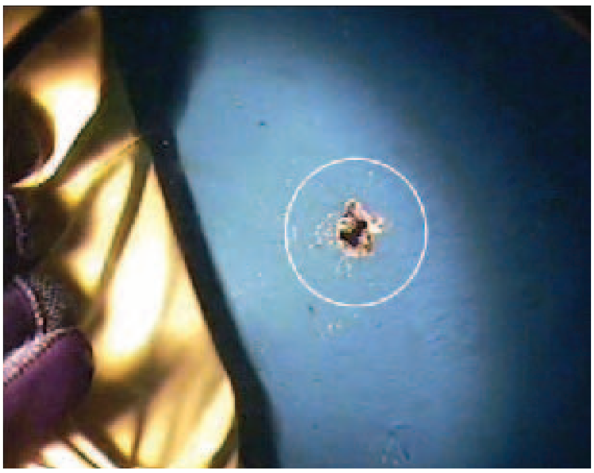


Figure 6: Hull penetration

Ultrasound hull plate thickness readings around the hole were also taken and this showed that the thickness had wasted to 1-1.5mm inside a 70mm diameter circle around the hole. The surrounding plate scantling then rapidly increased to 6.5-8mm.

The likely cause of the machinery damage was over torqueing of the gearbox after a large amount of monofilament longline had become entangled around the propeller and stern gland housing, seizing the shaft. It is significant that the flooding situation occurred at the same time as the gearbox damage. When the line was removed the main shaft was free to turn, and it is possible that a longline granite or steel weight (the corner of which matched the hole's shape) caused the hull penetration as the monofilament line was wound around the shaft.

The Lessons

This accident very clearly demonstrates that effective damage control often needs crew to think "outside the box" to limit damage and to ensure the survival of both the crew and the vessel. In this case the skipper and chief engineer showed ingenuity in the use of fothering and adaptation of materials to establish effective shoring.

1. Think about how you would deal with flooding incidents. Have you got timber on board for shoring purposes? Consider providing a damage control bag for immediate use stocked with rubber, softwood wedges and bungs and wooden pad pieces.

2. Hull plate wastage occurs in areas of pitting, at the waterline, in areas subject to cavitation and where there is water disturbance, especially in way of bilge suctions – ensure these areas are covered when taking hull plate thickness measurements.

3. Carry out regular emergency drills – a well trained crew is far better prepared to deal instinctively with emergencies; as this case shows.

4. The lack of English speakers on board the vessel impacted the crew's ability to communicate with the vessels standing by the casualty. It also partly explains why the skipper was reluctant to speak to the coastguard despite the vessel being disabled and the hull being breached. Always alert the coastguard to this sort of emergency so that the emergency services can be prepared should they be required. This saves time, and potentially lives.

5. Owners and managers of foreign-owned, UK registered fishing vessels are reminded of the requirement to have at least one English speaking officer on board their vessels. This requirement, and others applicable to non-UK officers serving in UK registered fishing vessels, is laid out in the MCA's – Merchant Shipping Notice (MSN) 1825 F – Certificate of Equivalent Competency: Fishing Vessels Training and Certification Guidance Part F.

Snagging Leads to Capsize

Narrative

A scallop dredger was trawling, downwind, in moderate to heavy seas when one of her warps became snagged on the seabed. The vessel immediately yawed and heeled to starboard. In the wheelhouse, the skipper was heard to pull the engine control back to neutral as a succession of large waves broke over the vessel, which was now beam onto the sea. The vessel then capsized rapidly. Her three crewmen had been in the mess room, and one of them managed to dive down and out through the open accommodation door to escape from the upturned vessel.

Once the crewman was on the surface, the wind and tide took him quickly away from the hull, but he was able to grab two wooden planks which had floated free from the wreck. He then saw his crewmates but, despite his best endeavours to assist them, they were beyond help. The man swam towards the shore, which was about 2 miles away. He had been in the water for over an hour when, shouting and waving frantically, he attracted the attention of a passing yacht and was rescued. A search and rescue operation later recovered the bodies of the skipper and the two remaining crewmen from the sea, nearby.

At the time of the accident the vessel had been towing her gear in following seas. When her warp became snagged, the resultant downward forces combined with the buoyant forces of the waves, proved sufficient to overcome the vessel.

The vessel had a registered length of less than 12m. At the time of her build, although not a statutory requirement, she had met the stability requirements for larger fishing vessels. When the vessel was salvaged, however, an analysis of her stability found that, due to the installation of additional ballast and fishing equipment, her operational displacement had increased by over 30% since new. Due to these modifications, the vessel would no longer have met these stability standards.

The fishing vessel before and after the accident

The Lessons

1. While there are no statutory requirements for fishing vessels of less than 15m to meet stability standards, it is prudent for skippers to be aware of the stability condition of their vessel at all times.

2. When planning alterations or additions to a vessel, fishermen should seek the advice of a competent person in order to gain a better understanding about what effects the changes will have on their vessel's stability.

3. The accident shows the risks of fishing gear becoming snagged and how quickly disaster can occur, particularly when trawling downwind. These risks should be fully assessed, in advance, to ensure appropriate control measures are in place to prevent water ingress or capsize should snagging occur.

Anchor of Hope

Narrative

After a day's fishing a skipper decided to drop anchor and lay over in a sheltered bay. The skipper set his new 20kg "look-alike" Bruce anchor in calm conditions, with a trip rope to aid recovery, and then retired for the night with no watch set.

Thirty minutes later, the skipper heard the chain rumbling across the seabed and got up, to discover the vessel was almost aground. He promptly raised the rest of the crew and hauled in on the anchor chain; only the anchor shank was on the end of it. They picked up the trip buoy, and on hauling in the line found the remainder of the anchor attached.

Figure 1: "Look-alike" Bruce anchor

Figure 2: Flawed casting in the shank

Figure 3: Recovered head and parted shank

The Lessons

1. It was the skipper's vigilance (or ability to sleep with one eye open) that prevented this boat from grounding.

   There were sufficient crew to have allowed for an anchor watch to be set. This would have been a prudent measure reducing the potential consequences of the anchor dragging, gear parting, or for the boat to be in collision with other vessels. The additional benefit of setting an anchor watch is that it should enable the other crew to sleep soundly and obtain quality rest.

2. Beware the danger of cut-price look-alike equipment and, wherever possible, ask for a bona-fide test certificate on cast items such as anchors and blocks.

3. After dropping anchor, ensure it is well and truly set by putting strain on the gear while attempting to make sternway. Not only will this set the anchor and establish if it is holding, but it may also highlight weak points in the ground gear.

Even a Small Item Failure Can Kill

Narrative

An accident occurred on the after deck of a twin-rig trawler during hauling operations. The clump weight had been stowed and the starboard trawl door had been secured alongside by two of the four deckhands. The skipper, who was inside the wheelhouse using CCTV screens to monitor the after deck, had heaved the port trawl door until there was 0.5m of trawl wire left outside the trawl block. A deckhand placed a hook into one of the trawl door inner chain links. The hook was attached by shackles to a 2m length, 32mm diameter polypropylene rope strop, the other end of which was attached to a pad eye welded to the top of the bulwark (see Diagram 1).

As the skipper heaved in the last 0.5m of wire, the rope strop tightened and, in turn, bowsed-in the trawl door alongside the bulwark (see Diagram 2). Just as the skipper stopped heaving, the hook opened up under load, causing it to be released from the chain link. The rope snapped back and the hook struck the head of one of the deckhands.

The deckhand's injuries were so severe that the emergency services decided a medical team should be flown to the vessel and the injured person should be airlifted off. This was carried out and he was flown to hospital, where he was later pronounced dead.

The hook had failed due to ductile overloading. It had been weakened by wear and corrosion; however, there were no signs of fatigue cracking.

Diagram 1

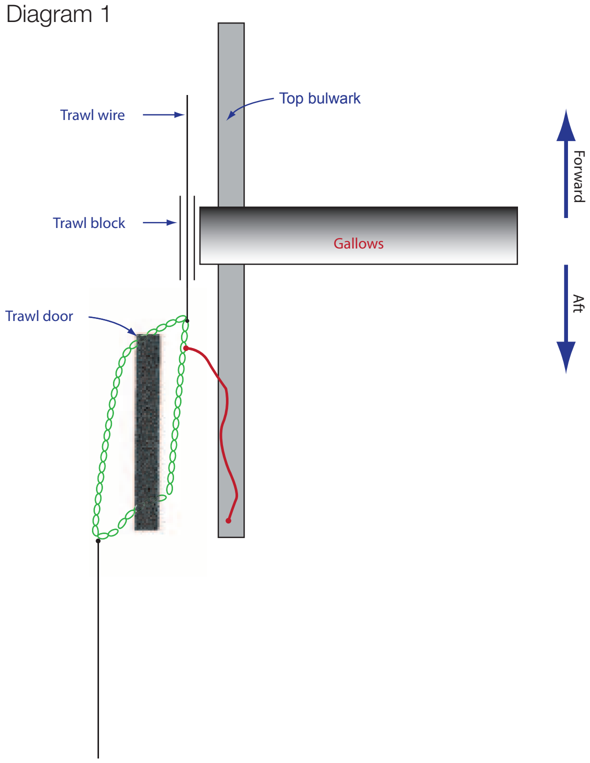
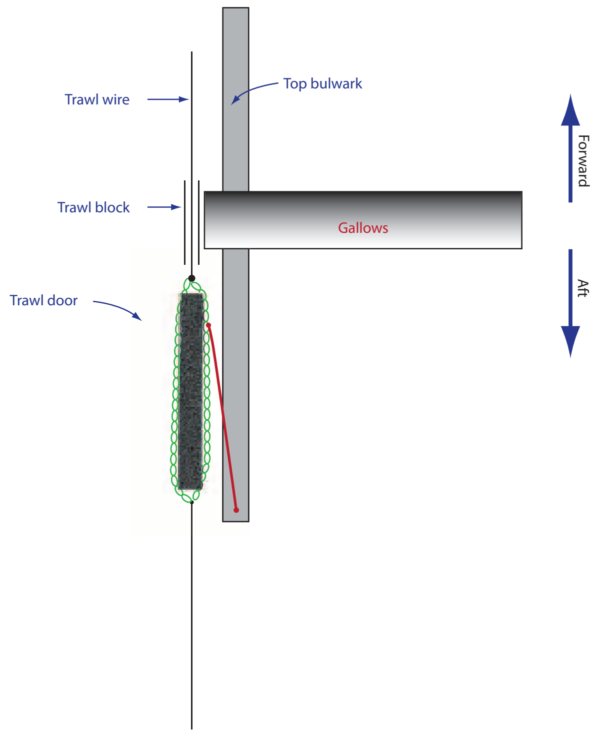


Diagram 2



The Lessons

1. The hook's history could not be determined as no certificates relating to it were held. The crew thought that it was adequate for the purpose of bowsing-in the trawl door. However, it was the "weak link" in a system that was inherently unsafe – it was inadvertently, but routinely, overloaded during normal operation.

2. The hook was not an item of lifting equipment and, therefore, was not subject to LOLER[1]. Nevertheless, skippers and owners should ensure their vessel operates an effective work equipment examination and maintenance/replacement routine, and that relevant records are maintained.

3. The deckhand had gone to the side of the vessel at the same time as the skipper was hauling in the last 0.5m of trawl wire. He was not warned of the danger in which he had placed himself because the skipper did not notice him on his CCTV screen and the remaining deckhands were otherwise occupied. Where risks cannot be adequately reduced, further control measures such as organisation, supervision, effective communications and clearly marked snap-back areas need to be implemented.

4. There is useful information on this subject in the UK Maritime and Coastguard Agency's MGN 331 (M+F) relating to The Merchant Shipping and Fishing Vessels (Provision and use of Work Equipment) Regulations 2006.

[1] The Merchant Shipping and Fishing Vessels (Lifting Operations and Lifting Equipment) Regulations 2006

Fire Below!

Narrative

Things were looking pretty good for the 3-man crew of a 12 metre steel stern trawler. The hauls had been surprisingly productive, the weather was being especially kind and the vessel was behaving well. There was time for one last tow before heading home for a well deserved, quiet weekend.

The boat was 20 miles off the coast when the net was shot away. The crew rested while the skipper took the helm. As darkness closed in, the skipper checked the wheelhouse engine and gearbox indications; there was nothing out of the ordinary and he settled into his chair for the remainder of the tow.

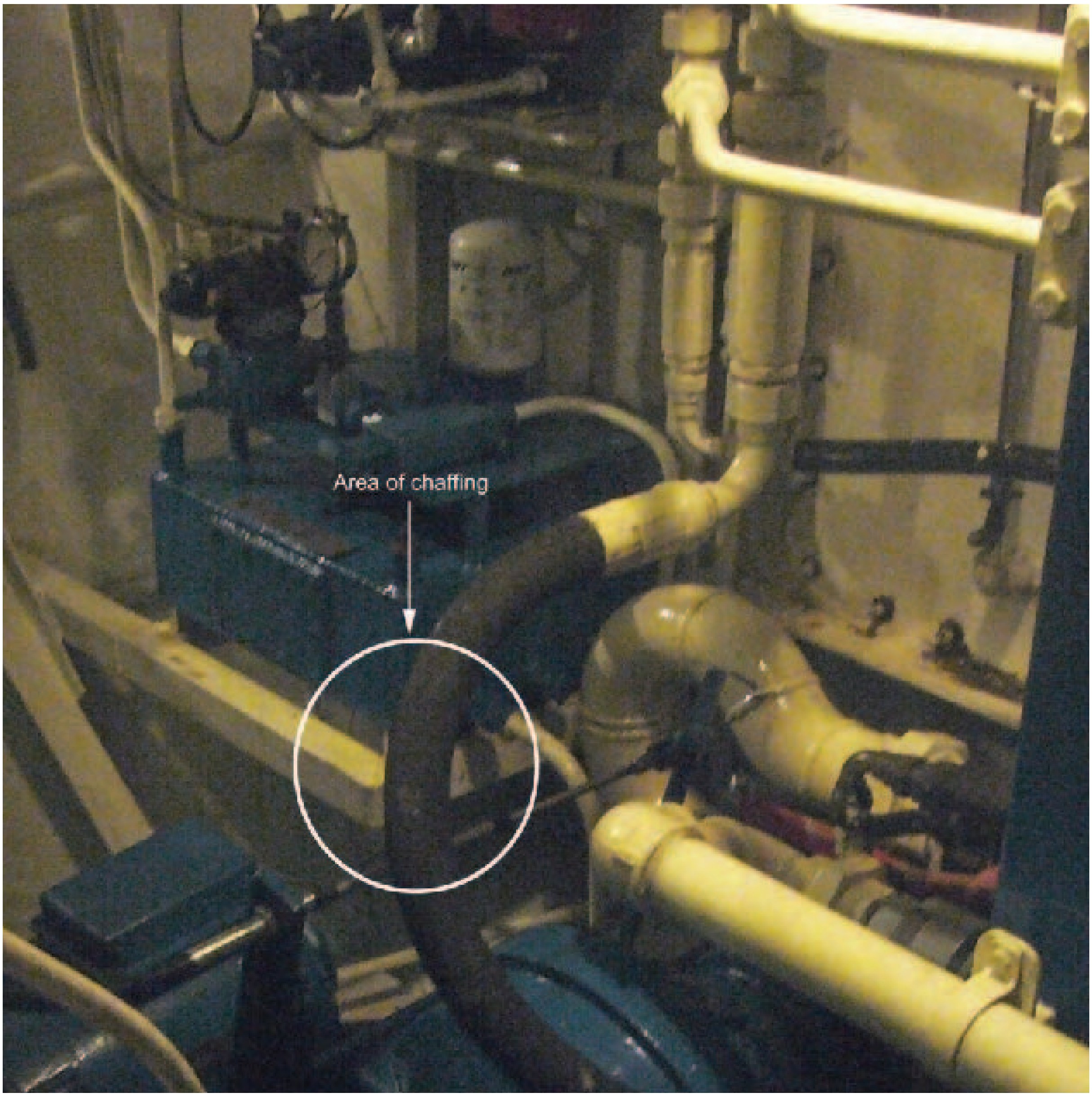
Suddenly the boat's speed dropped, but the engine revolutions remained steady. The skipper looked through the wheelhouse after windows and saw flames shooting out from the engine room exhaust vents. He immediately reduced the engine speed and called the crew. Luckily they had recently completed their fire-fighting courses so, although unwelcome, now was the opportunity to put the theory into practice.

It was clear that there was a major fire in the engine room. The skipper stopped the engine to reduce the risk of any fuel or oil feeding the fire as the crew very quickly closed the engine vent flaps to starve the fire of oxygen.

The coastguard was informed as the crew monitored the deck temperatures and engine room adjacent bulkheads to determine if the fire was spreading. Fortunately there was no increase in temperatures. The net was buoyed off as the rescue helicopter and local lifeboat closed in on the scene.

Unsure of the situation in the engine room the crew decided to set up boundary cooling on the deck and the vessel's sides using the hand-operated deck wash pump. The lifeboat was soon on scene and took the vessel under tow after establishing that the crew were safe and the situation was under control.

continued overleaf



Area of failed hydraulic pipe

Although the engine room vents were cool, and there was no discernible rise in the bulkhead temperatures, the skipper was conscious of the risks of re-ignition if he attempted to enter the engine room too soon. About 2 hours later, with there being no indication of a fire, the skipper considered that the situation had stabilised and he cautiously entered the engine room. There, he was soon able to confirm that the fire had been extinguished. He also found that one of the gearbox flexible hydraulic pipes had chaffed through (figure). The hose's metal inner lining had touched the starter motor's bare contacts, causing a spark which had ignited the high pressure and high temperature oil.

The Lessons

Neither the skipper nor his crew panicked when they were faced with a difficult, potentially catastrophic situation. They had all completed their mandatory fire-fighting courses and thought their way through the situation from the information they had available. The fuel supply was quickly shut off as, although they did not know the cause of the fire, they felt it likely to be engine related because of the coincident drop in power.

Rather than risk entering the engine room, they took the sensible and safe option of closing it down to reduce the oxygen supply. They then cooled the compartment utilising the boundary cooling techniques they had discussed during the fire-fighting course. The team's prompt action prevented excessive damage and, most importantly, they did not put themselves in danger by risking a re-entry too early.

1. The importance of attending a fire-fighting course cannot be over stressed. It makes actions instinctive in the case of a fire, and increases the likelihood of survival and damage limitation.

2. Remember the basic fire triangle: a fire needs oxygen, a fuel source and heat. Remove any one of them and the fire will be extinguished. In this case all three elements were dealt with by stopping the engine, shutting the vents and by establishing boundary cooling.

3. There will always be a tendency to enter a compartment where there is a fire – a few seconds thought can save your life and others. Fire-fighting is a thinking man's game – consider all the risks to you and the vessel. Too many lives and vessels have been lost during a re-entry as a result of fire spreading.

4. When checking the engine room and other compartments, and following maintenance, do look for evidence of chaffing pipes. Separate them by the proper use of bracketing. If this is not possible then consider re-routing pipework to prevent the chaffing risk – it may just prevent every seafarer's worst nightmare: A FIRE AT SEA.

5. If you experience a fire at sea – are you and your crew prepared for it? Have you all been drilled and is the equipment fully tested and functional? Your life may well depend upon it.

6. Bare electrical connections present a real danger, particularly as a source of ignition in cases of fuel leaks; they should be avoided at all costs. There are proprietary covers available – if you are unsure seek expert electrical advice.

Part 3 - Small Craft

Plan hard - sail easy

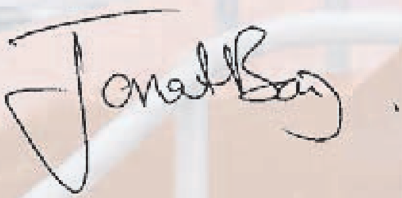
The seas and oceans of the world and the conditions experienced on them do not differentiate between professional seafarers on large container ships or a family on a weekend sailing experience in their small craft. Therefore, to reduce the potential of things going wrong and make the experience enjoyable for everybody, it is essential that skippers of small boats take the same precautions and consider the same hazards as a captain of a larger ship would which sails through the same area.

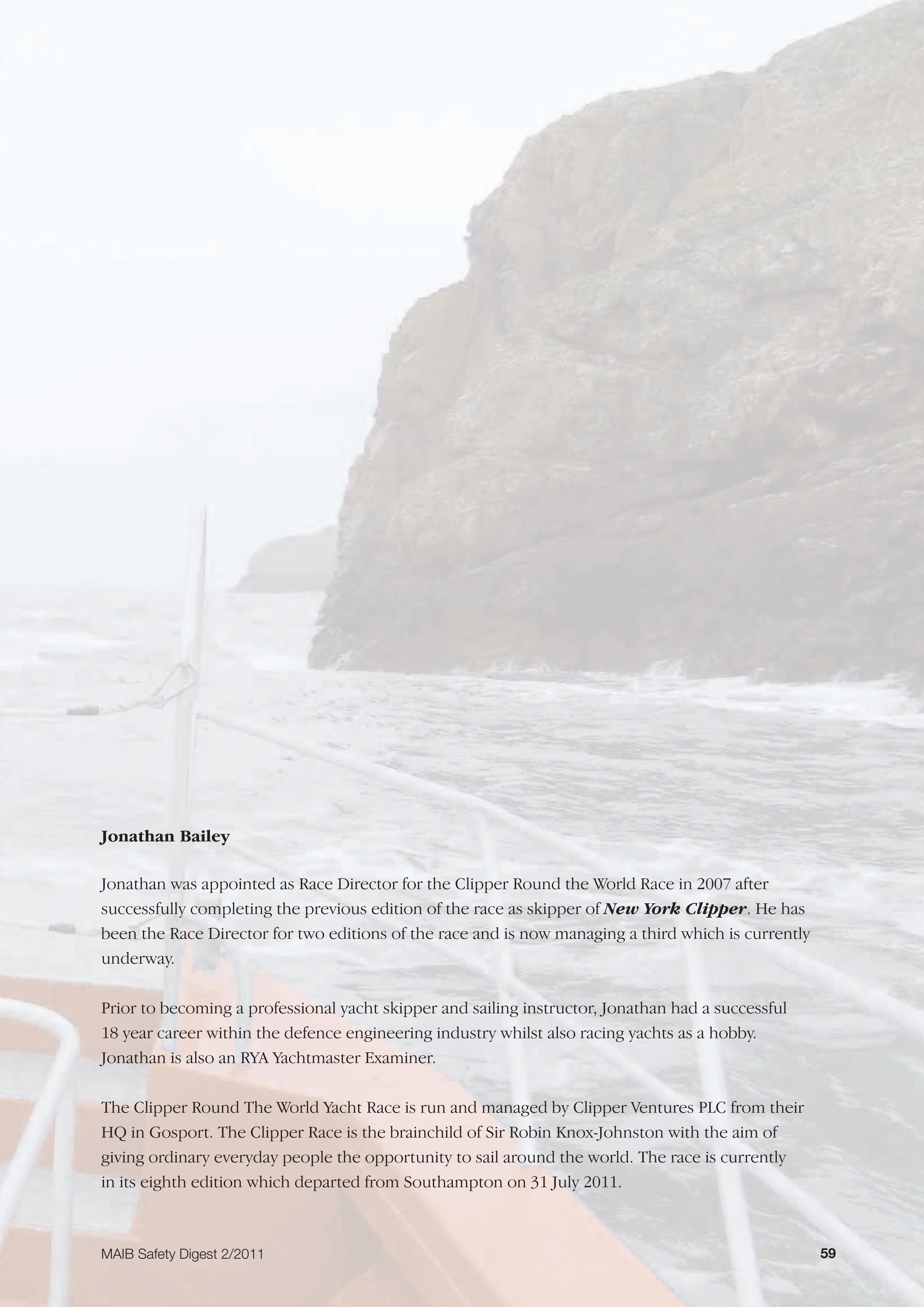
Under the SOLAS V regulations, passage planning is a legal requirement for all craft that 'go to sea'. Planning shouldn't been viewed as a chore or time wasting exercise, but as a useful tool, like having another pair of hands on board. With prior preparation and taking the time to plan, even just five minutes, to make sure your craft, crew and equipment suit the expected conditions, accidents can be prevented and lives saved. If you don't have the experience on board or the craft to handle the expected weather conditions, then simply change the circumstances – stand off and make that difficult entry in daylight, take things a little more slowly, set realistic and conservative passage times, wait in port for a better weather window or take another experienced crew member on board to help.

You only have to look at this edition of the MAIB Safety Digest to realise that the outcome of these tragic cases could have been very different with a properly constructed passage plan that considered whether the craft and the crew were fit for the intended passage and all the ports of refuge/diversion been thoroughly researched.

However many times you have completed a certain voyage and however long or short it is, passage planning must be viewed as an essential and mandatory step that will help to improve the safety of all aboard and it must be completed before the first line even slips the dock. That said, a passage plan and all the maritime qualifications in the world will not defend you against complacency or a lack of common sense.

It is through the valuable contribution that the MAIB makes to safety at sea with their investigations and publications, such as this Digest, that we can develop new methods and procedures to prevent future accidents at sea. It is also a reminder of lessons that we have already learnt but, due to time and/or complacency, sometimes forgotten.





Jonathan Bailey

Jonathan was appointed as Race Director for the Clipper Round the World Race in 2007 after successfully completing the previous edition of the race as skipper of ***New York Clipper***. He has been the Race Director for two editions of the race and is now managing a third which is currently underway.

Prior to becoming a professional yacht skipper and sailing instructor, Jonathan had a successful 18 year career within the defence engineering industry whilst also racing yachts as a hobby. Jonathan is also an RYA Yachtmaster Examiner.

The Clipper Round The World Yacht Race is run and managed by Clipper Ventures PLC from their HQ in Gosport. The Clipper Race is the brainchild of Sir Robin Knox-Johnston with the aim of giving ordinary everyday people the opportunity to sail around the world. The race is currently in its eighth edition which departed from Southampton on 31 July 2011.

Too Exhausted to Climb

Narrative

Two men left the UK in a 12m yacht with the intention of wintering in the Canary Islands. Not long into the voyage, engine problems resulted in a 4-week delay in a foreign port. Further engine problems necessitated a second diversion for repairs.

By now, the vessel was already 3 months into her voyage and winter conditions were setting in. When passage was eventually resumed, adverse weather was forecast, but the yacht's skipper had estimated that the last part of the voyage would take less than 1 week, and decided to press on.

The yacht soon encountered strong winds and large waves which increased in severity, gradually exhausting the skipper and his crew. Breaking waves also damaged the yacht's electrical system, and her engine and bilge pumps stopped when the engine compartment half-filled with water.

The skipper raised the alarm by broadcasting a "Mayday"; he also operated the EPIRB and readied the liferaft. The EPIRB transmission was received by the coastguard, and a crude oil tanker was diverted to assist. The oil tanker arrived on the scene several hours later but was unable to deploy its rescue boat in the 7m seas. Her crew therefore lowered the pilot ladder. A life-ring with a rope attached was thrown to the men on the yacht and the crewman stepped into it and inflated his lifejacket. He then jumped into the sea and was pulled to the side of the tanker, where he grabbed the pilot ladder.

With the tanker stopped and rolling heavily, the yacht's crewman struggled up the ladder, eventually reaching the deck nearly 30 minutes later. The life-ring was then thrown to the yacht skipper. When the skipper reached the side of the tanker, he was extremely tired and was unable to climb the pilot ladder. Encouraged by the tanker's crew, he tried for 2 hours before the tanker's crew resorted to pulling him up to the deck by the line attached to the life-ring. The yacht's skipper lost consciousness and, although the tanker's crew tried to resuscitate him, they were unsuccessful.

The Lessons

1. When planning or undertaking any voyage, the predicted weather and sea conditions must stay at the forefront of a skipper's thinking, bearing in mind that conditions can deteriorate quickly. Once in open seas, there is nowhere to shelter and the availability of dedicated rescue assets such as lifeboats and helicopters is much reduced. Modern ocean-going merchant vessels tend to have a high freeboard and their ability to rescue persons from the water in heavy seas is often limited.

2. The debilitating effect of rough seas should never be underestimated. The physical abilities of all crew must be taken into consideration before setting off on a voyage during which heavy weather is expected. Otherwise, performance levels might fall dramatically just at the time everybody on board needs to be on the ball.

3. The activation of the EPIRB resulted in prompt assistance.

CASE 24

Know Your Limitations

Narrative

A 10m yacht was on a 900 mile delivery voyage. The skipper had planned a coastal passage that allowed several port visits en route, enabling him and his two crew members to get adequate rest. The skipper held an RYA Yachtmaster Offshore certificate but the crew, although having some sailing experience, held no sailing qualifications.

Half way through the voyage one of the crew had to be replaced due to work commitments. While on passage to the port selected for the changeover, the yacht was unable to sail due to the lack of wind, so she motored on a southerly course. Given a favourable current and a moderate to heavy swell from astern, the skipper estimated that the yacht would arrive in the early hours of the following morning.

As the yacht neared the port, the seabed steadily shelved and the swell increased. All three men were wearing waterproof clothing and the skipper insisted that both crew wore their self-inflating lifejackets, and that their lifelines were clipped on; the skipper did not wear a lifejacket or a lifeline. When the skipper saw the lights on the northerly and southerly breakwaters marking the harbour entrance, he turned the helm to port until the vessel was heading into the entrance on a north-easterly heading. He was unaware that the port had been closed due to the heavy swell.

As the yacht neared the breakwaters, a large breaking wave was heard and then seen on the port quarter. The skipper put the wheel hard to port to try and head directly into it. However, the yacht heeled over and the skipper and his crew fell overboard. With the helm hard to port and the engine operating ahead, the yacht circled at a speed of 6 knots, dragging the crew through the water by their lifelines. Although the skipper discarded layers of clothing and tried to swim back to the yacht, he was unable to do so. He recognised that he was being set away from the harbour and, on seeing the lights of emergency vehicles near the beach he swam ashore and raised the alarm. It was not until much later that morning that sections of the yacht were found broken up on rocks. The bodies of the crew were recovered several days later further down the coast.

The Lessons

1. **Entering a relatively unfamiliar port in darkness is inevitably more challenging than entering in daylight, when navigational marks and features are readily identifiable. More importantly, in daylight the swell or tidal conditions can be seen and therefore be more easily assessed.**

2. **It is always useful when a skipper has some local knowledge, but it should not be relied upon if it is sparse or out of date. On the other hand, the information provided in almanacs is updated periodically and is therefore generally accurate and should be referred to when planning a passage or port entry. In any event, where doubt exists regarding local conditions or procedures, seeking advice from the local harbourmaster's office is never a bad move.**

3. **Lifelines are usually lifesavers, but very occasionally there are accidents such as this, in which they can contribute to injury - or worse. The same is also true for auto-inflated lifejackets, which can trap a person under an upturned boat. Nevertheless, the advantages of wearing lifelines and lifejackets far outweigh the disadvantages. However, where possible lifelines should be attached in a way that prevents the wearer from going overboard. Where this is not possible, the wearer must know how to, and be practised in, quickly releasing themself from the lifeline should the need arise.**

Thrill of a Lifetime – But One to Forget

Narrative

It was another fine summer's day with only light winds. The sun was out and a couple had a surprise in store for their 6 year old daughter as their holiday neared its end. Today was the day for a boat trip up the nearby river estuary.

Unfortunately road traffic held up the family and they arrived at the boat's departure point only to see the passenger boat disappearing from view. However, all was not lost. The operating company suggested they take a 15 minute "Thrill of a Lifetime" ride on one of their rigid hull inflatable boats (RHIB) as an alternative. The boat was in good overall condition and it was certified to carry a total of 12 people which, in this case, included the helmsman and one crew member. As only six passengers had booked the trip there was still enough room to take the family as well.

The mother was very cautious and sought reassurance several times that the trip would be suitable for her daughter. She was assured that her daughter would be fine. The nine passengers boarded the RHIB, each having been fitted with manually inflating lifejackets with a crotch strap. However, the child was fitted with an adult lifejacket, as was a 2 year old girl accompanied by another couple. The helmsman gave a rudimentary safety brief on how to inflate the lifejacket in the unlikely case that a passenger found themselves in the water. There was no mention of how to raise the alarm if a passenger felt unsafe, no warning of the dangers of high speed impact, nor how to secure themselves in their seats, and there were no checks made on the health of the passengers.

There were six passenger seats ahead of the helmsman and four behind him. The mother felt some trepidation, justifiably so as it turned out, and her family group opted to take the seats behind the helmsman because they felt more secure there (see figure).

Seating configuration

Soon after the boat left the harbour the helmsman commenced some unannounced high speed turns. The couple became concerned that their daughter could not hold onto the grab rail in front of her, so the mother held on to her daughter with one hand while her partner held on to her from behind. The boat then conducted a particularly violent manoeuvre as it skipped sideways across a wave. The mother was dislodged from her seat and thrown overboard. At the same time, the 2 year child slipped from her seat, but luckily was grabbed by her parents to prevent her also going overboard. The helmsman was initially unaware of these events as he concentrated on carrying out the next high speed turn. It was not until the woman's partner shouted to the helmsman that she had gone overboard that the boat was finally brought to a stop.

Fortunately the woman in the water was a good swimmer and she managed to swim towards the boat. She did not inflate her lifejacket. She was recovered on board, badly shaken but unhurt, and taken back to the departure point.

The Lessons

Taking a fast ride on the water and experiencing high speed turns in a RHIB can be extremely exhilarating and appealing. However, for many passengers this may be their first experience afloat and they may well be unaware of the extreme forces associated with high speed turns and wave jumping. The latter, in particular, can cause spinal injury to susceptible passengers or those poorly seated.

This case demonstrates that even the most competent skipper can sometimes forget that in attempting to give passengers a ride that is both thrilling and exciting, some may find the experience extremely frightening.

1. Operators of high speed thrill rides should consider the ability of passengers to cope with the rigours of a high speed RHIB ride. Particularly, assessment should be made of the ability of any young passengers to adequately brace themselves.

2. The impact and movement on a small high speed craft is greater at the bow and reduces towards the stern. Forces of 10g can be experienced parallel to the deck and up to 20g perpendicular to the deck. Skippers should take this into account when allocating seating positions.

3. Safety briefings are a key component to a safe operation. They should be comprehensive and passengers should be advised of the forces involved with high speed rides. Those with back or spine problems are particularly vulnerable to shock loading through the seats during wave jumping, and anyone suffering from such conditions might be best advised not to take the trip.

4. A selection of lifejackets suitable for all ages/sizes should be provided and a clear demonstration given on their use.

5. It is essential that the passengers are aware of how to communicate with the crew when they have concerns. This is especially important if the passengers are seated behind the crew.

More detailed guidance on the operational and management aspects of high speed commercial craft is available in the Royal Yachting Association's publication – "Passenger Safety on Small Commercial High Speed Craft" and in the Passenger Boat Association's publication – "Small Passenger Craft High speed Experience Rides Guidance".

Investigations started in the period 01/03/11 – 31/08/11

Date of Accident	Name of Vessel	Type of Vessel	Flag	Size (gt)	Type of Accident
06/03/11	*Cosco Hong Kong* *Zhe Ling Yu Yun 135*	Container vessel Fishing vessel	UK China	65531 182	Collision (11 fatalities)
13/03/11	*Forth Guardsman*	Other commercial vessel	UK	722	Accident to person (1 fatality)
16/03/11	*Clonlee*	Container vessel	Isle of Man	3999	Machinery failure
24/03/11	*Our Boy Andrew*	Fishing vessel	UK	17	Accident to person (1 fatality)
09/04/11	*Lynn Marie* *Philipp*	Fishing vessel Container vessel	UK Gibraltar	65 8971	Collision
15/05/11	*CMA CGM Platon*	Container vessel	UK	17594	Collision
24/05/11	*Clipper Point*	Dry cargo vessel	Cyprus	14759	Contact
28/05/11	*Liquid Vortex*	Small commercial sailing vessel	UK	Unknown	Accident to person
01/06/11	*Sun Clipper* *Morfil*	Passenger vessel Pleasure craft	UK Unknown	143 Unknown	Collision
14/06/11	*About Time*	Fishing vessel	UK	15.57	Accident to person (1 fatality)
17/06/11	*Lion*	Small commercial sailing vessel	UK Antilles & Aruba	Unknown	Accident to person (1 fatality)
25/06/11	*Saffier*	General cargo vessel	Netherlands	3970	Machinery failure
15/07/11	*Fremantle Express*	Container vessel	UK	23540	Accident to person (1 fatality)
22/07/11	*Blue Note*	General cargo vessel	Antigua & Barbuda	3845	Machinery failure
03/08/11	*Karin Schepers* *Ernest Bevin*	Container vessel Ferry	Antigua & Barbuda UK	7852 Unknown	Grounding Accident to person (1 fatality)
09/08/11	*CSL Thames*	Bulk carrier	Malta	19538	Grounding
12/08/11	*Chiefton*	Tug	UK	36.34	Capsize (1 fatality)
23/08/11	*SD Nimble*	Naval support	UK	319	Accident to person
25/08/11	*Starlight Rays*	Fishing vessel	UK	320	Accident to person

APPENDIX B

Reports issued in 2011

Antonis – contact with Langton-Alexandra swing bridge in the Port of Liverpool on 11 December 2010
Published 2 June

Blue Angel – man overboard, west of Gigha on 6 January 2011
Published 22 July

Delta 8.5m RIB – injury to a passenger on board a Delta 8.5m RIB on the River Thames, London on 6 May 2010
Published 27 January

Ever Excel – fatal accident to the chief engineer in the lift shaft on board the container ship, Kaohsiung, Taiwan on 21 April 2010
Published 12 May

Homeland/Scottish Viking – collision 4.2 miles off St Abb's Head on 5 August 2010 resulting in one fatality
Published 17 March

Jack Abry II – grounding on Isle of Rum on 31 January 2011
Published 12 August

Joanna – fatal man overboard from the cargo vessel alongside in Glasgow, Scotland, on 13 December 2010
Published 2 June

Karen – grounding at the entrance to Ardglass Harbour, County Down, Northern Ireland on 3 January 2011
Published 2 June

Norman Arrow – contacts made by the high speed craft with quays in Portsmouth International Port, Portsmouth, UK on 31 March 2010 and with a mooring dolphin in Le Havre, France on 29 August 2010
Published 19 May

Oscar Wilde – machinery space fire, Falmouth Bay on 2 February 2010
Published 10 March

Princes Club Water Sports Park – fatal accident at Princes Club Water Sports Park Bedfont, Middlesex on 11 September 2010
Published 20 July

Royalist – sea cadet's fatal accident on board the sail training ship, Stokes Bay in the Solent on 2 May 2010
Published 3 March

SBS Typhoon – contact in Aberdeen harbour on 26 February 2011
Published 22 July

Skandi Foula – contact with *OMS Resolution* in Aberdeen harbour on 29 May 2010
Published 12 August

Yeoman Bontrup – fire and explosion on board the bulk carrier, Glensanda Quarry, Loch Linnhe, Western Scotland on 2 July 2010
Published 5 May

MAIB SAFETY BULLETIN 1/2011

Overweight rescue boat identified during the investigation into the failure of a fall wire with the loss of one life on the car carrier *Tombarra*

MAIB

Marine Accident Investigation Branch
Mountbatten House
Grosvenor Square
Southampton
SO15 2JU

MARINE ACCIDENT INVESTIGATION BRANCH

MAIB SAFETY BULLETIN 1/2011

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 2005 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.

Steve Clinch
Chief Inspector of Marine Accidents

NOTE

This bulletin is not written with litigation in mind and, pursuant to Regulation 13(9) of the Merchant Shipping (Accident Reporting and Investigation) Regulations 2005, 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.maib.gov.uk
Press Enquiries: 020 7944 6433/3387; Out of hours: 020 7944 4292
Public Enquiries: 0300 330 3000

BACKGROUND

At approximately 1550 (UTC) on 7 February 2011, the fall wire attached to the rescue boat of the UK registered car carrier *Tombarra* parted during a routine drill which was being conducted in the sheltered waters of the Royal Portbury Docks, Bristol, UK. The accident occurred at the point when the rescue boat had been hoisted to its stowed position. The rescue boat and its four crew fell nearly 29m into the water below. One of the boat's crew died and two were hospitalised.

The rescue boat, a Watercraft WHFRB 6.50 had a certified weight of 980kg, but was 1450kg when weighed after the accident **(Figure 1)**. Subsequently, several rescue boats of the same model carried on board *Tombarra*'s sister vessels were also inspected and weighed, and they too were found to be significantly heavier than when supplied.

In all cases, in an unladen state, the boats' weights were close to or exceeded the safe working load (SWL) of their davits. With crew, fuel and equipment on board, the SWLs of the davits were exceeded.

However, the weight of *Tombarra*'s rescue boat by itself should not have resulted in the failure of its fall wire due to the safety margins in place. Investigation into the failure of the wire remains ongoing and it is anticipated that a further safety bulletin will be published shortly.

Figure 1

Weighing of the rescue boat

INITIAL FINDINGS

The rescue boat was manufactured by Watercraft Hellas SA and delivered to *Tombarra* in 2006. The Watercraft WHFRB 6.50 was certified to meet the requirements of SOLAS, the Life Saving Appliance (LSA) Code and the Marine Equipment Directive (MED).

The WHFRB 6.50 was constructed with an inner and outer hull. The void below deck was divided into 16 compartments, 15 of which were filled with rigid polyurethane foam to provide a watertight, buoyant volume.

Investigation has identified that 14 of the 15 foam-filled compartments in *Tombarra*'s rescue boat had been penetrated by water. In addition, the foam in the lower sections of the hull contained cavities and there were voids between the foam and the hull. In these areas the foam appeared to be of varying consistency and colour **(Figures 2 & 3)**.

Figure 2

Below deck inspection

Figure 3

Foam sample from cavity

Although the boat was fitted with a drain plug on the transom, the internal compartments were not interconnected. The removal of the plug therefore allowed the water to drain only from the aftermost compartment. The water in the remaining compartments was trapped and had to be drained by separately drilling into each compartment through the hull **(Figure 4)**.

Figure 4

Water draining from foam-filled compartments

Investigation into how water entered the buoyancy compartments of the boats inspected has identified a number of different types of penetrations in their hulls and decks. Investigation into the properties of the foam used is ongoing.

SAFETY ISSUES

Water ingress and retention within the foam-filled internal compartments of the Watercraft WHFRB 6.50 is a serious cause for concern. It is apparent that, without warning, it can result in a boat's weight increasing considerably over time, with the following consequences:

- the SWL of the davit and fall could be exceeded
- the rescue boat's performance and manoeuvrability could be adversely affected in relation to:
    - the ability to self-right (or be righted) after capsize
    - the ability to tow survival craft, and
- safety of the 5-yearly dynamic test where the boat is included in the test weight could be compromised.

In view of the widespread use of foam-filled compartments in the construction of many rescue boats and fast rescue craft, it is possible that the problems of water ingress and retention might not be limited to just this particular model of boat.

ACTION TAKEN

Norsafe Watercraft Hellas SA has issued a product awareness notice to its customers while it continues to investigate the cause of the water ingress, water retention and the condition of the foam. The notice advises owners of Watercraft WHFRB 6.50 to arrange for their boats to be weighed, seeking assistance from the manufacturer if required. The notice also provides practical advice on how to conduct inspections of this type of boat.

The Maritime and Coastguard Agency (MCA) has given temporary dispensation to Wilhelmsen Lines Car Carriers to suspend launching drills for the Watercraft WHFRB 6.50 rescue boats provided on board its vessels. However, should a Watercraft WHFRB 6.50 have to be used, dispensation has also been given for the crew to embark and disembark when the rescue boat is in the water, rather than from its embarkation point on deck.

RECOMMENDATIONS

S116/2011 Owners of ships using rescue boats or fast rescue craft built with integral polyurethane foam-filled compartments should:

- In the case of Watercraft WHFRB 6.50, follow the advice issued by the manufacturer, or urgently contact the manufacturer if a product awareness notice has not been received.
- Be alert to the possibility of boats being heavier than designed and arrange for the boats to be weighed, or boat manufacturers contacted for advice, where doubt exists.
- Inspect boats' hulls and exposed decks for possible holes, cracks, or fittings through which water could penetrate.
- Ensure that drain plugs fitted to the hull are regularly opened.
- Monitor boat performance for unusual characteristics that could be attributed to an increase in weight, eg that it does not feel 'heavy' or 'sluggish' when manoeuvring.

Owners, operators or manufacturers identifying ships' boats heavier than certificated are requested to inform the MAIB by email (maib@dft.gsi.gov.uk) using the title "Boat Weight", and include the name of the vessel, the boat manufacturer and model, and the date of supply. This information is for internal use only and will be treated in the strictest confidence.

Issued April 2011

MAIB SAFETY BULLETIN 2/2011

Malfunction of a proximity switch, which resulted in failure of a fall wire with the loss of one life on the car carrier *Tombarra*

Marine Accident Investigation Branch
Mountbatten House
Grosvenor Square
Southampton
SO15 2JU

MAIB SAFETY BULLETIN 2/2011

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 2005 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.

Steve Clinch
Chief Inspector of Marine Accidents

NOTE

This bulletin is not written with litigation in mind and, pursuant to Regulation 13(9) of the Merchant Shipping (Accident Reporting and Investigation) Regulations 2005, 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.maib.gov.uk
Press Enquiries: 020 7944 6433/3387; Out of hours: 020 7944 4292
Public Enquiries: 0300 330 3000

BACKGROUND

At approximately 1550 (UTC) on 7 February 2011, the fall wire of the rescue boat on board the UK registered car carrier *Tombarra* parted when the vessel was alongside in Royal Portbury Docks, Bristol, UK. The accident occurred as the rescue boat reached its stowed position on the davit following a monthly drill. Hoisting was not stopped before the davit reached its stowed position. The proximity switch, that should have cut electrical power to the winch motor before the davit reached its stops, failed to function. The rescue boat and its four crew fell nearly 29m **(Figure 1)** into the water below. One of the boat's crew died and two were hospitalised.

Figure 1

Vessel and parted fall wire

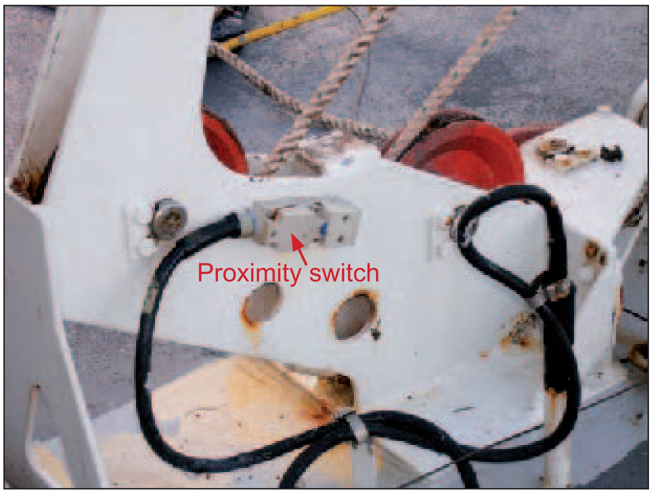
The 12mm diameter fall wire had a certified minimum breaking load of 141kN. Its safe working load (SWL) was 23.5kN based on a factor of safety of six. The wire was fitted to a single-arm davit (SA 1.5) **(Figure 2)**, manufactured by Umoe Schat-Harding Equipment AS (Schat-Harding). The davit system was powered by a Schat-Harding W50 two-speed electric winch with a nominal pull of 50kN.

Figure 2

Davit system

The winch was operated by a control panel sited forward of the davit. The boat was hoisted using the buttons on the control panel until the davit was near the stowed position. It was then intended that hoisting be completed manually by the use of a winch handle adjacent to the winch motor. To prevent the inadvertent operation of the winch when the rescue boat was in its stowed position, an inductive proximity sensor/switch (Telemechanique XS7-C40FP260) was fitted on the davit **(Figure 3)**. The switch was intended to cut off power to the winch when the davit closed to within approximately 12mm of the sensor.

Figure 3



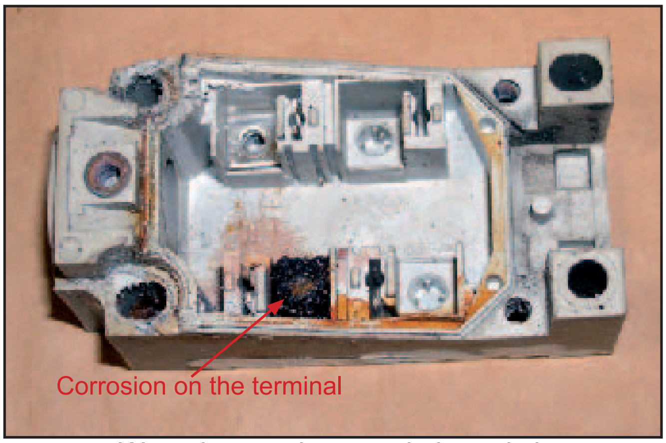
Proximity switch on davit

Annual inspections of the davit system had been conducted by Schat-Harding service engineers since the vessel was built in 2006. The last service was conducted in September 2010.

INITIAL FINDINGS

The fall wire was observed to be in good condition and when tested after the accident it achieved a breaking load of 137kN. The wire parted near the lower most davit sheave as the rescue boat reached its stowed position and the winch was still hoisting under power. Although the winch motor was rated with a nominal pull of 50kN, the maximum pull that it was capable of exerting when trying to overcome the increased resistance in the system during the final stages of hoisting would have rapidly exceeded the breaking load of the wire. The proximity switch, which should have prevented this situation from occurring, was tested in situ and was found to be defective.

Figure 4



Water ingress into proximity switch

The switch was installed in 2006, and prior to the accident it was not tested before hoisting was commenced. Inspection identified that the switch body had been penetrated by water **(Figure 4)**. However, detailed analysis highlighted that the switch malfunctioned due to an unrelated electronic fault. The MAIB is aware of both inductive proximity and mechanical limit switches fitted on other vessels that have also failed to operate correctly. However, none are known to have resulted in a similar accident.

The rescue boat was weighed and was approximately 450kg overweight (see MAIB Safety Bulletin 1/2011 for further details). Although the additional weight caused the davit's SWL to be exceeded, by itself it would not have caused the wire to fail.

SAFETY ISSUES

- The maximum pull of a hoist winch can exceed its nominal pull several-fold, and therefore is likely to exceed the breaking loads of other system components unless this is prevented by a properly functioning ‘final stop’ or safety device.
- The proximity switch fitted to the Schat-Harding SA 1.5 davit, and also known to be fitted to the SA 1.75 davit, is considered by its manufacturer to be inappropriate for use as a ‘final stop’ or safety device.
- The fitting of the proximity switch was not compliant with its manufacturer’s instructions. As a result, the gland and cable entry were higher than the switch body and its susceptibility to water ingress was increased.
- Given the potential catastrophic consequences of the failure of the proximity switch fitted to the SA 1.5 and SA 1.75 davits, it is essential that owners of vessels fitted with these davits (over 320 vessels) are made aware of the potential limitations of the switches and the precautions to be taken.
- All devices (inductive and mechanical) fitted to davits to prevent overload must be maintained, tested and replaced in accordance with manufacturers’ recommendations.

ACTION TAKEN

Schat-Harding has issued a Product Awareness Notice (PAN) to its customers highlighting the need to test the proximity switches fitted on its SA 1.5 and SA 1.75 davits on each occasion before hoisting operations commence, and recommends that the proximity switch is replaced every 2 years; it also highlights the need for caution when using pressure washers on deck.

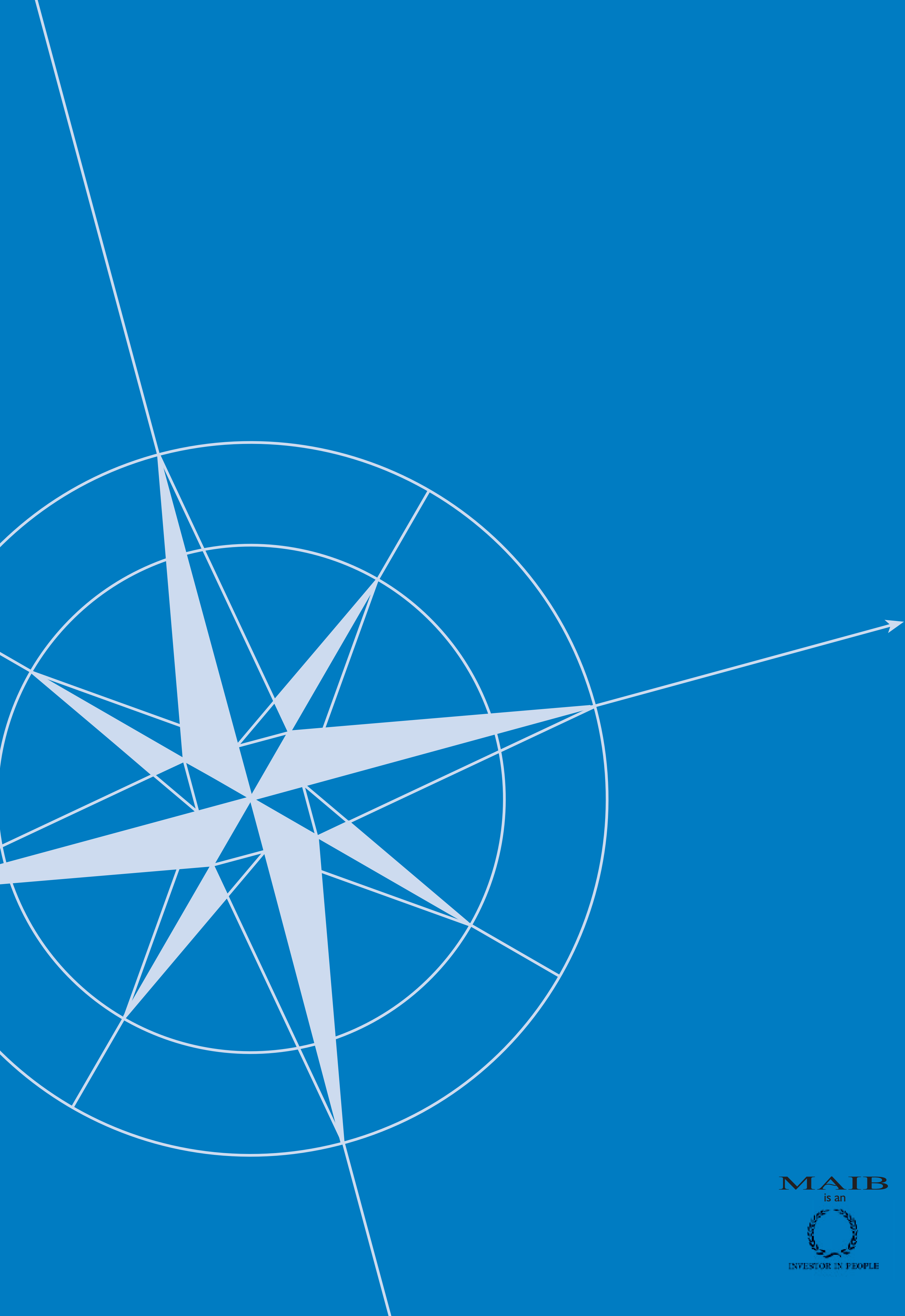
RECOMMENDATION

S117/2011 Owners and operators of vessels equipped with boat davits should:

- In the case of vessels fitted with the Schat-Harding SA 1.5 and SA 1.75 davits, follow the advice contained in the PAN recently issued by the manufacturer or urgently contact Schat-Harding[1] if a PAN has not been received.
- Ensure that all devices (inductive or mechanical) fitted to boat davit systems to prevent overload are tested on each occasion before a boat is hoisted and that such devices are not relied upon during operation.
- Follow manufacturers’ recommendations regarding the maintenance and periodic testing, examination and replacement of safety devices, seeking clarification from manufacturers where ambiguity exists.
- Verify the effectiveness of watertight seals on electrical equipment fitted to boat davit systems on weatherdecks.

Issued May 2011

[1] service@schat-harding.com



MAIB
is an
INVESTOR IN PEOPLE