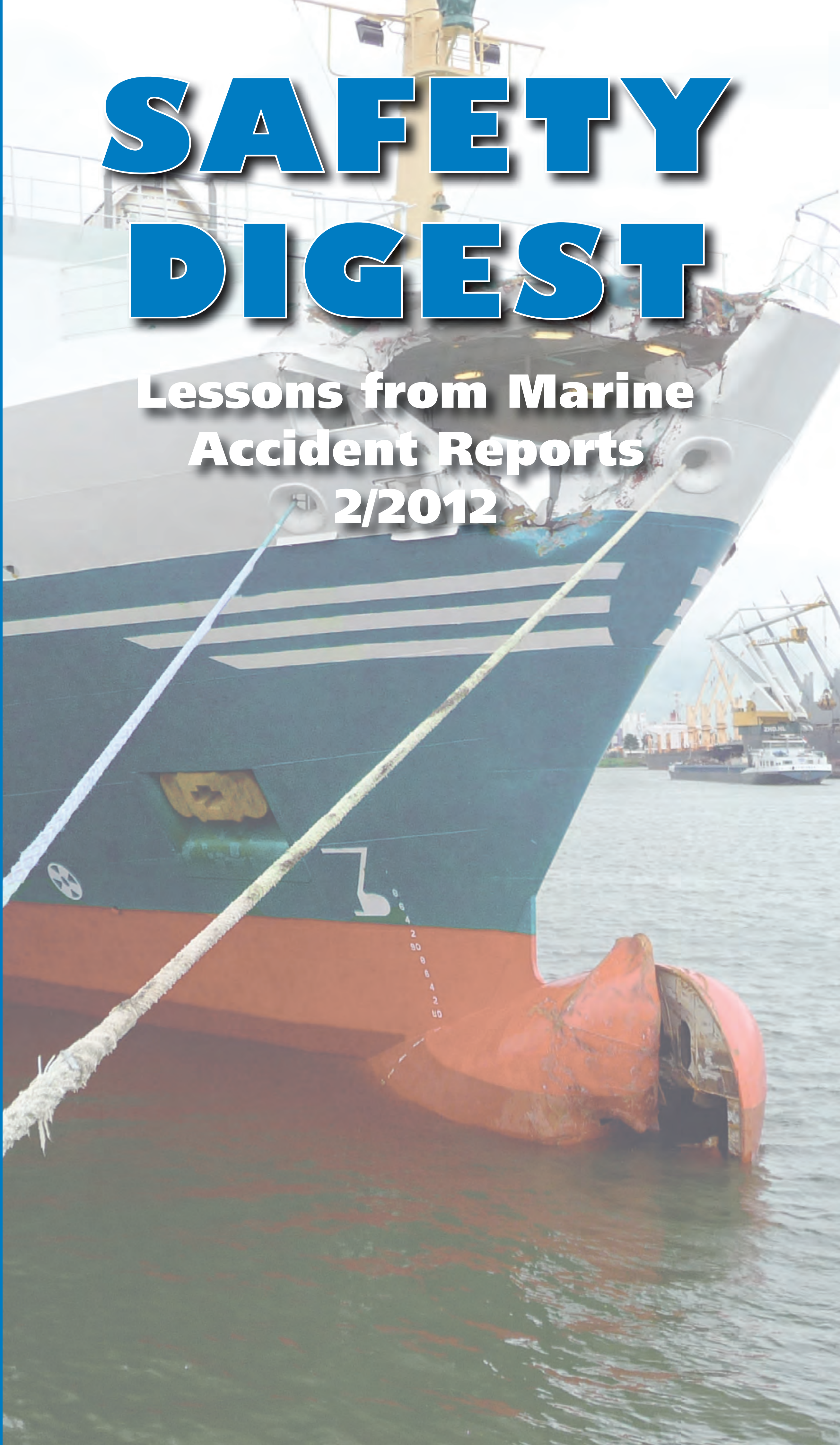
MAIB

MARINE ACCIDENT
INVESTIGATION BRANCH

SAFETY DIGEST

Lessons from Marine Accident Reports 2/2012



MAIB
MARINE ACCIDENT INVESTIGATION BRANCH

SAFETY DIGEST

Lessons from Marine Accidents

No 2/2012

MAIB
is an
INVESTOR IN PEOPLE

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

October 2012

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

MARINE ACCIDENT INVESTIGATION BRANCH

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

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

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

INDEX

Glossary of Terms and Abbreviations

AB	-	Able seaman
AIS	-	Automatic Identification System
ARPA	-	Automatic Radar Plotting Aid
C	-	Celsius
Cable	-	0.1 nautical mile
COLREGS	-	International Regulations for Preventing Collisions at Sea 1972 (as amended)
CPA	-	Closest Point of Approach
CPP	-	Controllable Pitch Propeller
DGPS	-	Differential Global Positioning System
DSC	-	Digital Selective Calling
ECDIS	-	Electronic Chart Display and Information System
EPIRB	-	Emergency Position Indicating Radio Beacon
FRC	-	Fast Rescue Craft
GPS	-	Global Positioning System
kt	-	knot
m	-	metre
"Mayday"	-	The international distress signal (spoken)
MCA	-	Maritime and Coastguard Agency
MGN	-	Marine Guidance Note
nm	-	Nautical Mile
OOW	-	Officer of the Watch
PFD	-	Personal Flotation Device
PLB	-	Personal Locator Beacon
PPE	-	Personal Protective Equipment
RHIB	-	Rigid Hulled Inflatable Boat
Ro-Ro	-	Roll on, Roll off
SAR	-	Search and Rescue
SMS	-	Safety Management System
VDR	-	Voyage Data Recorder
VHF	-	Very High Frequency
VTS	-	Vessel Traffic Services

Introduction

This edition of the Safety Digest contains the usual eclectic mix of accidents. However, Cases 7, 14, 17, 19 and 20 all highlight disturbingly common themes - very poor watchkeeping standards combined with a disregard for the requirements of the COLREGS. The obligation to keep an effective lookout at sea is fundamental to safe navigation as is the need to adhere to the rule of the road. Failure to comply with either should be unthinkable for any responsible mariner.

Equally unfathomable is the mindset of the crew involved in the accident described in Case 6 whose drunken antics led to a cargo vessel proceeding with an unmanned bridge, across busy shipping lanes, before grounding on a mercifully benign stretch of coast. Excessive alcohol consumption and navigation is a toxic mix which should not be tolerated. The vast majority of professional mariners would find the circumstances that led to the accident described in this case barely credible but, sadly, this is not the only accident of this type that has been reported to the MAIB. If such behaviour is to be eradicated, ship owners need to be more proactive in ensuring drug and alcohol policies are effective and properly policed.

I am indebted to Roger Barker, Albert Sutherland MBE and Richard Falk for their contributions. Well known and respected in their sectors of the maritime industry, they have freely provided their time and sagacity to introduce the relevant sections of this report. All three have impressive CVs which I won't labour here (a summary of each is appended to their respective contributions). I simply urge you to carefully read their introductions and take on board the messages these contain. Albert's account of the circumstances of a narrow escape he experienced when he first started his fishing career in his father's yawl, fifty years ago is particularly sobering - Albert was lucky that he was recovered from the water relatively unharmed. Sadly, Cases 16 and 22 demonstrate that this type of accident still happens today but often with less happy outcomes.

Until next time, keep safe.

Steve Clinch
Chief Inspector of Marine Accidents
October 2012

Part 1 - Merchant Vessels

Avoid over familiarity and complacency

It is interesting to me, but unfortunately not surprising, that in almost all of the reports in this section of the digest there is an element within the cause of familiarity and complacency.

In assessing modern vessel operation and Bridge team practices I believe the dangers of both must be carefully considered.

It is right and proper that we take account and make appropriate use of modern technology available to us but do we fully assess the benefits and possible dangers, and do some of the developments lead directly to complacency?

Use and reliance on Electronic positioning systems is an example.
I clearly remember when we moved from the trusted "Decca" ruler, and the hyperbolic patterns on the nautical chart, to using the "up-to-date" digital read out of Latitude and Longitude. There were those who mistakenly thought how accurate our 3 decimal place position had now become - NO, still the same underlying data just plotted differently, in fact less accurate plotting if the local errors were ignored.

Things have moved along apace and the widespread use of the electronic nautical chart, ECDIS, ECS and wholly automated bridge systems are possibly increasing risks in vessel operation, and complacency.

The move towards mandatory carriage of ECDIS is in many ways a good thing together with the requirements for training both with generic and type specific courses, but we must remain cautious to avoid complacency and over familiarisation, to the extent that we forget the importance of our core skills.

As with the "old" Decca fix, the underlying data is still the same - digital soundings, for example, displayed on the digital chart, are still dependent on the source information, but how many of our colleagues consult the source data diagram before making a change of route?

Bridge resourcing is tight, as is overall vessel manning, and we know that where there is a corner to be smoothed there will be those who take advantage without considering the risk.

Passage planning comes to mind. Early electronic planning looked really good:
- Quick and easy plotting of the passage
- Automatic checking of clearance depth
- Shortest route
- Easy storage for subsequent voyages
- Multiple bridge displays, and much more,

But:
- The first time the Master and Bridge team assess the chart may be when the vessel arrives at that location, and this only a snapshot that is available on the screen in use.
- Are the latest navigation warnings plotted as required?
- Have the vessel parameters changed? Draught / trim / manoeuvring characteristics etc
- Familiarity of the bridge team with the area / route may be different to when the original voyage was planned.

I return to the highlighting of over familiarisation and complacency - all of the problems that I have mentioned with the use of technology can be accommodated for provided we take that important step back and assess where an error or problem may lie.

I found the description of the two mooring accidents to be particularly thought provoking. I doubt that I will be alone in considering how close I have been to similar situations in the past.

Unfortunately in both cases visibility for personnel was a contributory factor. I am sure that once again familiarisation and complacency may be a significant factor in many mooring accidents or near misses.

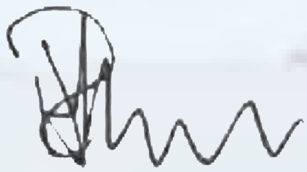
Vessels and crews on “Short Sea” schedules, where mooring stations are a daily event, may be particularly exposed to these dangers. The nature of these “very” routine operations is such that the frequency of the event by no means reduces the possible risks of an accident.

Day in, day out, the operation will go without a hitch, and a significant danger is that as a result of this familiarisation with the task, the number of personnel will be cut. I totally agree with the requirement for a “toolbox talk” and this must include a realistic assessment of the number of personnel required for the operation to be completed safely?

Complacency, familiarisation, and perhaps over confidence, spreads to the Master, Chief and others in charge aboard the vessel. I believe, however, that those “in charge” ashore must also consider their requirements. The pressure on a Master to submit a routine departure report, for example, may well take him away from his control of the vessel earlier than he perhaps should.

We must all remain careful that proportionate emphasis is placed on all tasks to ensure the requirement for a safe operation is maintained. A departure report to the charterers sent half an hour late, is a far better outcome than a grounding, or worse.

The very clear narrative and concise advice given by the MAIB in the lessons from each of the accidents are excellent and should encourage us to examine our own operations closely, ensuring our seafarers remain safe, and shores remain free from environmental damage.



Roger Barker

Roger joined the Merchant Navy at 16 as a Deck Cadet with P&O. Early years were spent with the P&O Company. On gaining his 2nd Mates certificate he transferred to the United Baltic Corporation, part of the Andrew Weir Group, sailing mostly on the short sea Baltic service but closely involved with new building programmes. Navigation in ice was a skill that he developed and particularly enjoyed. Roger continued to sail in the Andrew Weir/UBC fleet gaining a Master Mariners Certificate and HND in Nautical Science and served as Master aboard four of the company’s vessels, latterly the RoRos Baltic Eagle and Baltic Eider. He came ashore to take on the role of Marine Superintendent and was closely involved with bringing into service six strategic RoRo vessels. This enabled him to develop his close interest in integrated bridge systems and electronic charting. After 28 years with Andrew Weir he left in July 2005 to join Trinity House as Navigation (Examiner) Manager. He took over as Director of Navigation in May 2009 at which time he also became an Elder Brother of the Corporation and trustee of the two Trinity House Charities, the TH Corporate Charity and the TH Maritime Charity. He is a Member of the Nautical Institute. Married to Sue, with 2 grown up children, he lives in Rowlands Castle.

Fire and Explosion Detaches Poop Deck - an Amazing Escape

Narrative

A self-discharging bulk carrier was alongside a quarry loading a cargo of granite stones. At the same time, hotwork repairs were being carried out on the carcass of the cargo discharge chute. Both the repairs and cargo operations were proceeding well when a fire was discovered on the vertical cargo discharging conveyor belt.

Although the crew tackled the fire from within the hold conveyor tunnels, it quickly spread through the conveyor tower and into the accommodation area (Figure 1). The engine room was also fully involved as the heat transferred through the adjacent bulkhead and through a doorway which had been left open. As the fire moved into the steering gear compartment, there was a severe localised detonation as a stowage of "ship's-use" chemicals, including oxidisers, interacted with each other.

It is likely that this caused the poop deck to lift, allowing air to mix with the compartment's hydrocarbon-rich atmosphere, created by the release of oils stowed there and from the various hydraulic systems. The resultant explosion tore off the entire poop deck, fully exposing the steering gear compartment (Figure 2), and landing it on the funnel deck (Figure 3). Fortunately, there were only minor smoke inhalation injuries.

Figure 1: Fireball erupting from the vertical conveyor belt tower

Figure 2: Exposed steering gear

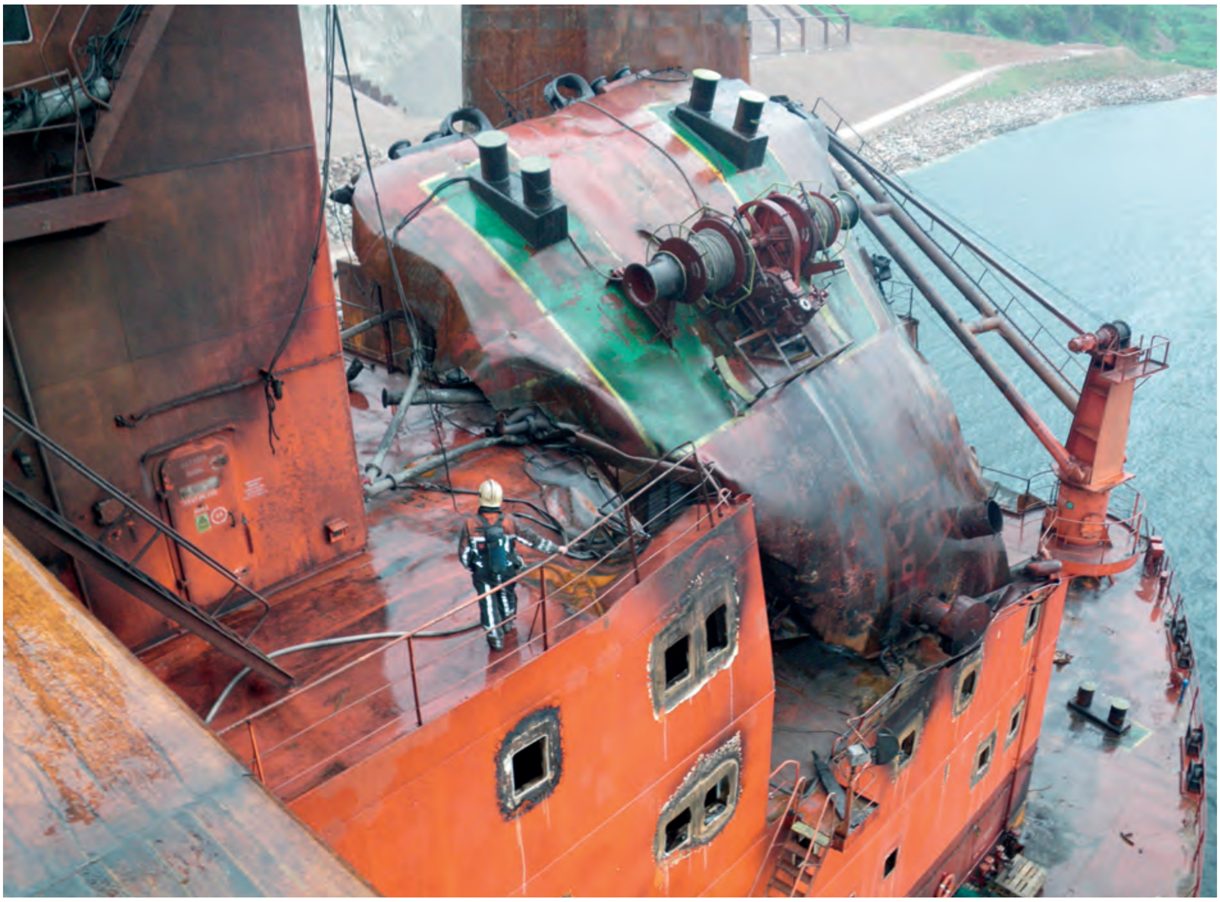


Figure 3: Poop deck relocated on the compartment funnel deck

The fire was most likely to have been caused by hotwork repair debris falling from the cargo hopper at the top of the tower into the side curtain of the conveyor belt. The hotwork repair had been authorised by the ship's manager, but other hotwork relating to the regular repair to the high tensile steel hull, carried out at the same time, had not. There were violations of the company's hotwork procedures, including not keeping a constant fire watch, no dedicated fire watchman being nominated and work being routinely undertaken in unauthorised areas.

The crew made a good effort in tackling the fire but their work was hampered by containment difficulties. The cargo handling space was very large and not designed with any method of division. The door into the engine room workshop was hinged and required bolting to be securely shut; it was poorly designed for fire containment purposes. Other doors and vents were left open, making the fire-fighting effort very difficult. This was especially so as there was no fixed fire-fighting system fitted in the cargo-handling space, and none was mandatory. In addition, the drill schedule did not specify that fire drills were to be carried out in the cargo handling area despite the high fire risk relating to the conveyor belts and potential difficulties in fighting a fire in the area.

It is not unusual for ship's-use chemicals to be stowed in steering gear compartments. In this case, alkalis, acids and oxidisers were in close proximity to each other and to a wide variety of oils. There was also evidence of other corrosive and flammable chemicals stowed in machinery spaces, passageways and workshops, increasing the risk of fire spread.

To further complicate the matter radioactive isotopes were fitted to the cargo hopper for monitoring cargo "back-ups". Despite not being used for 10 years and being in an extremely poor condition, they were still active. Risk assessments did not recognise the risk of exposure to radiation by gamma rays, and the SMS did not provide any guidance on inspections or safety precautions to be taken.

The Lessons

1. **The abrasive nature of the cargo meant that hotwork repairs were regularly required to the hopper and to the hull, which was prone to cracking. What is usually an occasional activity had become commonplace and, with it, complacency had developed. It is essential that hotwork controls are strictly adhered to and that auditing procedures assess compliance.**

2. **Containment is an essential element of controlling fire spread. No thought had been given to the difficulties in closing the bolted door accessing the engine room. Doors and hatches should be easily opened and closed. This is especially important in the highly stressful situation when dealing with an emergency.**

3. **Fire drills help in making emergency actions instinctive and thus success more likely. Crew should be drilled in dealing with fires in all areas of a ship and, where particular high risk areas are identified, these should be specified in the drill schedule.**

4. **Because of the ferocity of the fire, the chemicals in the steering gear compartment would have been involved wherever and however they were stowed. Nevertheless, to reduce the chances of interaction, the stowage guidance contained in the respective Material Safety Data Sheets should be complied with and the random stowage of chemicals should be avoided.**

5. **As automation has increased, so has the use of radiation sources in control devices, increasing the risk of exposure to radiation. SMSs should provide guidance on the management of radiation sources, and risk assessments should include the hazard where appropriate.**

Fatal Towing Accident - Are You Properly Prepared?

Narrative

A prestigious riverside development was nearing completion and required a linkspan to be fitted from the adjoining pier to the shore. The large 60 metre-long crane barge, contracted to transport the linkspan upriver, meant that there would be very little margin for error in negotiating the series of low, and sometimes narrow, bridge spans. Understandably, the subsequent tow-specific risk assessments, passage planning and assessment of the bollard pull requirement for the tugs were focused on, what was perceived to be, the high-risk bridge transits. However, risks associated with the upriver and downriver passages received virtually no scrutiny and no one thought to nominate a person to be in charge.

Two tugs were nominated for the push/pull tow configuration. The pulling tug had a bollard pull of about 4.5 tons and the pushing tug about 14.2 tons. The port authority calculated that the tugs had sufficient combined bollard pull for the tow.

The tug skippers, and the two pilots, who were on the crane barge, had some 130 years or so of river experience between them - so what could go wrong? Unfortunately, a great deal.

It was agreed that the pushing tug would be firmly connected directly to the stern of the barge with a combination of ropes and wires. This effectively made the tug and barge a composite unit in much the same way as a ship. The pulling tug was connected to the barge by a bridle made up of two short polypropylene ropes. The distance between the pulling tug and the barge was 8.4 metres. A schematic of the tow configuration is at Figure 1.

Because of the uniqueness of the tow, the pilots wanted to ensure that they could manoeuvre the barge quickly should it take a sheer and risk hitting one of the bridge supports. Therefore, soon after connecting the tugs for the upriver passage, a slow-speed manoeuvring trial was carried out against a 1 knot ebbing tide. The pushing and pulling tugs increased power and applied starboard and port helm respectively; the result was that the barge "lifted" to port. The trial was repeated successfully to starboard.

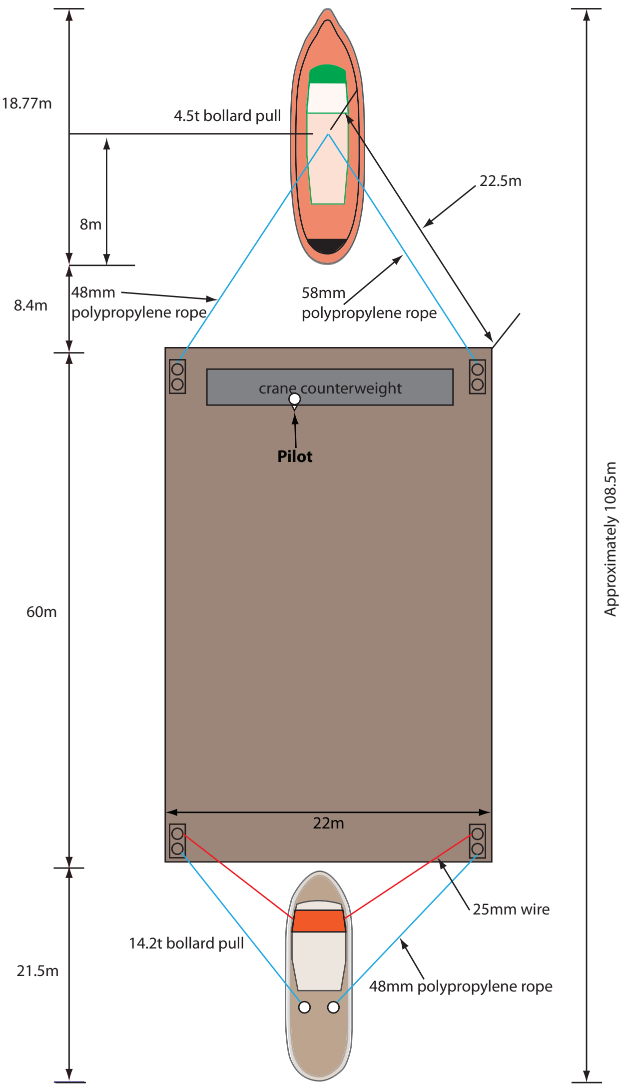


Figure 1: Tow configuration

An emergency stop trial was also carried out which showed that the barge could be stopped, using the pushing tug, within a distance of about 40 metres. The subsequent passage upriver went without mishap.

A few days later, after the linkspan installation work had been completed, the tow was reinstated for the downriver passage.

Once again, the difficult bridge transits went off without a hitch. It was a job well done and there was an air of relief as the open river passage started with the pushing tug set at 70-75% power and the pulling tug at 95% power.

The pilot had a clear view from the crane, but he had no need to give any helm instructions to the pulling tug and only occasional helm instructions to the pushing tug.

As the tow approached a bend in the river, it started to set quickly to the south, towards a mooring buoy, under the influence of the strong tidal stream. The late application of port wheel by the skipper of the pulling tug, and the pilot's subsequent ordered application of starboard wheel by the pushing tug, failed to "lift" the barge as expected. In the meantime, the skipper of the pulling tug tried to avoid contact with the fast approaching barge, but the tug had no reserve of power with which to do so. Very soon afterwards, the barge collided with the pulling tug, overrunning her and causing her to capsize and founder. The skipper was focused on turning the tug to starboard to re-align it with the barge and did not consider using the tow emergency release equipment during the rapidly developing but short-lived sequence of events.

None of those on board were wearing lifejackets at the time of the accident, but the skipper and mate were rescued from the river. Sadly the engineer/deckhand, who was a non-swimmer, drowned.

A survey of the salvaged tug (Figure 2) found that many of the watertight doors and hatches were open and it was not possible to release the towing hook.

Figure 2: Salvaged tug showing open hatches and doors

The Lessons

The pulling tug's lack of reserve of power, short towlines and the combined manoeuvres by the tug's skipper and pilot made the contact with the barge inevitable. This was largely due to the inexperience of the specific tug configuration used, and loss of situational awareness by the pulling tug skipper and pilot in counteracting the flood tide sufficiently early to prevent the set of the tow to the south. The open watertight doors and hatches contributed to the tug capsizing and foundering within about 30 seconds after the collision.

1. When preparing a non-standard tow, do undertake risk assessments and passage planning for the whole passage. The assessments should also be cross-referred to existing risk assessments held by contractors and other stakeholders.

2. While the total bollard pull was appropriate for the bridge transit, there was virtually no reserve of power available for the pulling tug during the downriver tow.

3. Had a propulsion or steering failure occurred, the pulling tug would have been overrun because of the short towlines used. Do consider adjusting towline lengths to help prevent this.

4. Despite the wide-ranging river experience of all concerned, there was virtually no experience with the specific type of tow used. If in doubt, seek expert advice and nominate a person to be in charge of the operation.

5. A contractor's method statement is a very useful management tool to help determine risk and identify roles and responsibilities. Do insist on one - it will be of benefit to you.

6. Towage is a risky business and it is always good practice to wear lifejackets when on deck. Had the deckhand been wearing one, and had it been fully functional and correctly adjusted, it is possible he would have survived.

7. It is the clear responsibility of tug operators and owners to ensure the towing arrangement emergency release system is properly maintained and regularly tested from all operation positions. Are you sure yours works?

8. Tug skippers can play an important part in risk reduction by simply closing all watertight and weathertight openings during towage. Maintenance of watertight integrity *can save your life* and the *lives of the crew*.

Stop!

Narrative

A general cargo vessel was departing port in ballast with a tug in attendance to help counter the effect of the wind, which was gusting up to Force 6. Once the vessel had cleared the berth, the tug let go and continued to assist, while the master used a combination of the CPP, bow thruster and Becker rudder to manoeuvre into the lock. A pilot was also on the bridge providing advice and communicating with the tug master, while the chief officer relayed positional information from the bridge wing and liaised with the forward and aft mooring parties.

All was going smoothly until just after the vessel entered the lock at 1.6kts, when a squall pushed her starboard quarter towards the lock side. Full starboard rudder was applied along with half ahead pitch to successfully kick the vessel's stern clear, but when the pitch demand was reset to zero, the pitch response failed to alter. A CPP control power failure alarm activated shortly afterwards, and despite further attempts to recover control of the CPP system, including use of the system back-up mode, the pitch remained stuck at around 40% ahead.

As the vessel continued to accelerate, a forward spring was deployed and placed on a bollard by the shore mooring party, who then moved to safety. Meanwhile, the forward onboard mooring party were directed by the bridge team to hold onto the spring, and therefore attempted to place figures of eight turns on the bitts; the rope, however, continued to be pulled through the bitts owing to the vessel's gathering speed. The tug, which had followed into the lock, also attempted to slow the vessel by pushing her against the lock side.

Figure 1: Salvage of sunken lock gate

In doing so, the tug sustained minor damage to its bulwarks and handrails on its starboard quarter.

Despite these measures, the vessel impacted heavily with the outer lock gates at 3.7kts, just under $1^1/_2$ minutes after the CPP control power failure alarm. One of the gates sustained major damage and subsequently sank (Figure 1), with the other outer gate suffering minor damage. The inner lock gates were immediately closed and they, too, sustained minor damage when the head of water in the dock caused them to slam shut. The vessel herself sustained only minor damage to her bulbous bow (Figure 2) and was later moved as a dead ship by two tugs back into the dock. There were no injuries or pollution.

The lock was closed to traffic for over 24 hours until the sunken gate could be recovered, causing severe disruption to the port operations. It was then only re-opened with vessel-length operational restrictions. The damaged lock gate was subsequently transported overseas by barge for inspection and repair.

Soon after the accident, ship's staff cleared the CPP control power failure problem. It could not be replicated later, nor could the cause be determined despite testing of the CPP system and analysis of the VDR. The nature of the CPP alarm was generic, and provided limited diagnostic information. The emergency engine stop button was not activated, nor was CPP control transferred from the bridge to the engine room until after the impact.

Figure 2: Damage to vessel's bulbous bow

Figure 3: CCTV footage of the accident before and after impact

The Lessons

1. This case represents the latest in a series of recent CPP-related accidents reported to the MAIB, many of which have had similar significant consequences. Analysis of such accidents suggests that the majority of CPP failures tend to result from control mechanism problems, typically relating to mechanical, electrical or hydraulic issues. However, in a surprisingly high number of cases the cause of the failure could frustratingly not be replicated or determined - the nightmare "intermittent fault".

2. Modern CPP systems are generally complex affairs, yet still often incorporate basic potential single points of failure; on this vessel a possible cause of the failure could have been "stickiness" of the single hydraulic control valve. Wherever possible, it pays to identify critical system elements and carefully consider the potential effects of their failure. From a manufacturer's perspective, meaningful system alarms and clear troubleshooting guidance can also greatly help in quickly determining and resolving a problem.

3. A crucial element of safety critical systems is to ensure robust pre-departure checks are carried out to help identify and eradicate technical problems. Although the CPP system had been operating correctly prior to the control power failure problem, it is possible that, had a full pre-departure system test been conducted, signs of the impending problem might have been identified.

4. In many respects this accident represents the classic emergency scenario: the loss of a safety critical system in enclosed waters, with 1½ minutes to try to retrieve the situation before a catastrophe. In similar circumstances how long would you spend trying to recover the system before using the emergency engine stop facility or getting the engine room to take control? And just how prepared would you and your crew be to quickly respond?

5. Although human nature is such that people will typically try to resolve a technical problem following an unwanted event, from an accident investigator's perspective it is fundamental that those involved resist the temptation to "fiddle" with the system. It is essential that evidence following an incident is preserved as far as is practicable to facilitate a robust technical investigation; in clearing the problem soon after the accident, key evidence was potentially destroyed.

CASE 4

Just One Kick Should Do It

Narrative

A container vessel had completed its departure formalities and it just remained for the gangway to be brought inboard and secured and the lines let go before she could make her way to her next port.

The gangway was attached to a turntable on board and was hoisted inboard using the vessel's small, after crane. It was a job that had been done numerous times before and the deck team were fully familiar with the procedures.

An AB was nominated to remove the gangway's stanchions and guardrails. It didn't seem to matter to him that he was not wearing a hard hat, safety harness or lifejacket despite being 10 metres above the water and 5 metres above the quay, and there would be no guardrails to prevent him from falling as they were being removed. Importantly, no one else raised any concerns about his lack of PPE.

Having removed all the stanchions and guardrails, the AB started to hoist the gangway. Unfortunately it became snagged on the back spring. He stopped hoisting and went onto the suspended gangway to try to push the back spring off the gangway with his foot - the inevitable happened.

The AB lost his balance but, fortunately for him, he fell into the water, narrowly missing the quayside. He was able to keep himself afloat and because it was slack water he remained close to the vessel. Luckily, another crew member saw what had happened and threw him an inflatable lifejacket and a heaving line. The AB was dragged towards a quayside ladder and he managed to climb from the water unscathed.

The Lessons

The AB was extremely lucky not to have landed on the quayside as he fell. If he had, then the outcome would have been far different; he avoided serious injury or worse by the narrowest of margins.

It had become custom and practice to remove the gangway stanchions and guardrails while the gangway was in its rigged position. However, they could easily have been removed after the gangway was hoisted inboard and before it was finally secured. Had this been done the risks would have been minimised.

1. **Make sure that risk assessments cover routine operations as well as those less regularly undertaken. Routine tasks are often not risk assessed because they are done so frequently. However, increased frequency can lead to complacency and the omission of safety precautions such as the use of PPE.**

2. **When reviewing risk assessments, check whether there is an alternative, safer way to do the job. In this case the stanchions and guardrails did not have to be removed while the gangway was rigged.**

3. **A worker has a responsibility to look after his own health and safety. However, if this AB had been properly supervised, then it is likely he would have been wearing the proper PPE (i.e. hard hat, safety harness/ lifejacket) and he would not have been allowed onto the gangway after it had been lifted.**

4. **When working at height, due consideration should be given to the use of a fall arrestor or other appropriate type of safety harness. Regulations specifically relating to work at height in ships and fishing vessels have recently been introduced, and risk assessments should reflect the new requirements[1].**

[1] Statutory Instrument SI 2010 No. 332 - The Merchant Shipping and Fishing Vessels (Health and Safety at Work) (Work at Height) Regulations 2010 came into force on 6 April 2010. The MCA's Marine Guidance Note - MGN 410 (M+F) - The Merchant Shipping and Fishing Vessels (Health and Safety at Work) (Work at Height) Regulations 2010 provides easy interpretation of the regulations.

Another Mooring Fatality

Narrative

The master of a cable laying ship had kept a close eye on the worsening weather forecasts and decided that, at the end of that day's work, he would moor the ship to a mooring buoy that had been previously anchored in a position in the lee of the prevailing winds.

The ship had moored there before, but since then, new cable-laying gear had been placed at the forward end of the vessel, which obscured the original securing point. A new method of making fast to the buoy had to be found.

The master and the mate discussed various options, and settled on using one of the four mooring winches which had been placed on board to hold the ship while laying cables. The eye of the wire on this winch would be secured with a shackle to the eye of the mooring rope which was already made fast to the mooring buoy.

The mate wrote a method statement for the operation and held a toolbox talk with the entire crew. The plan was that the master would manoeuvre the ship so that it approached the moving buoy from downwind, and the mate and an AB would go forward to make fast. The mate would direct the master via VHF radio as the ship got close to the buoy and then, once the mooring rope had been retrieved from the water, the two lines would be connected. Unfortunately neither the method statement nor the toolbox talk provided the step by step detail of how the connection would be made.

It was dark by the time it came to moor. The mate directed the master via VHF as planned, but once in position the mate put down the radio so he could prepare to make the connection. The only option available to the master was to hold station by monitoring his DGPS. The AB flaked out the winch wire on deck and fed it through a fairlead and back inboard over the ship's rail. He then used a boat hook to retrieve the floating mooring line and brought that inboard and handed it to the mate to shackle the two eyes together (Figure 1).

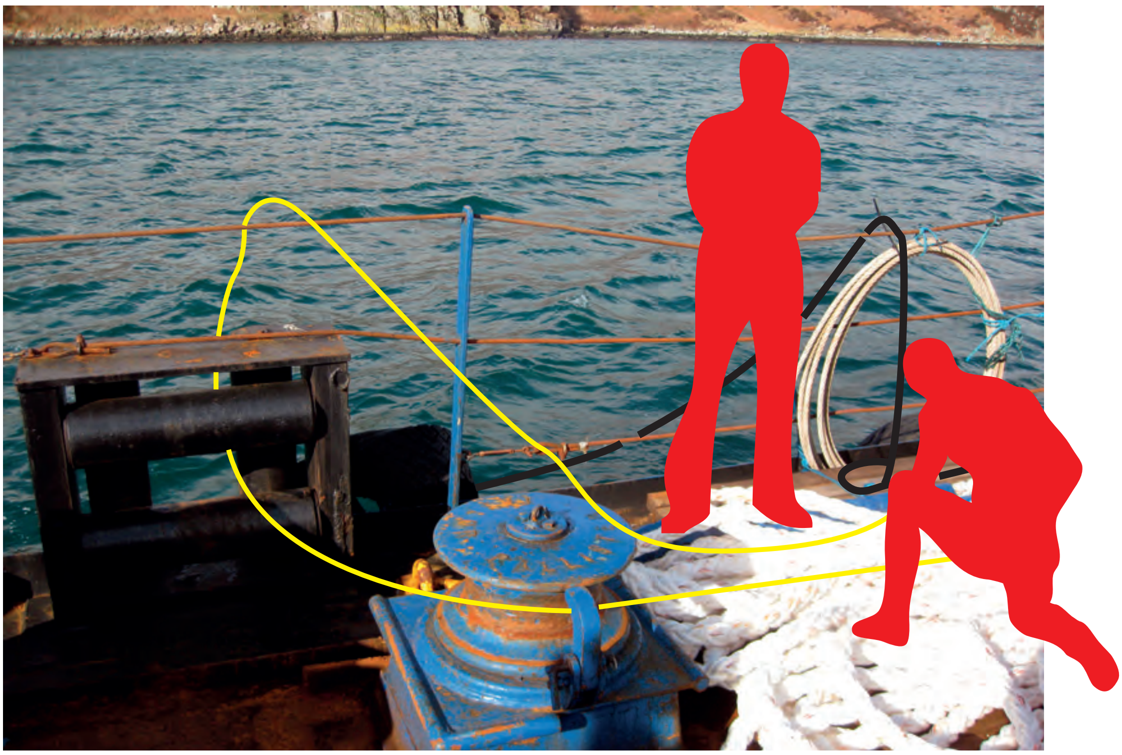


Figure 1: Able seaman standing in the bight

Crucially, he did this in such a way that when the mate shackled the two lines together, the AB was left standing in an open bight. With the mate now looking down and concentrating on securing the shackle, he was no longer able to monitor the operation or communicate with the master.

Undetected by the master on the bridge or the two men on deck, the bow drifted away from the mooring buoy and the weight suddenly came on the wire, snatching the now closed but not fully secure shackle out of the mate's hands. The wire went tight across the AB's chest, pinning him against the guardrail (Figure 2). The mate leapt up, but was unable to pull the wire off his shipmate. He radioed to the bridge, but before the master could do anything the AB was pulled over the top rail and into the sea.

The AB was unconscious and face down in the water, but because he was wearing a flotation suit and not a lifejacket, his face remained in the water. He drifted down the ship's side and crew members who had heard the manoverboard shout were able to pull him alongside using a boathook.

Meanwhile, the master called for assistance from other company vessels which were nearby. However, all conversations were on a working channel and no manoverboard broadcast was made on channel 16. The coastguard was eventually told of the incident by a company superintendent who had received a telephone call from the master of a sister ship that was assisting with the manoverboard. The coastguard despatched the local lifeboat and a rescue helicopter immediately.

The AB was recovered with the assistance of the rescue boat crew from another company vessel. He was then transferred to the lifeboat and, soon afterwards, airlifted to hospital. Sadly, he died of his injuries - the postmortem report concluded that he had died from *'a blunt force chest injury'*.

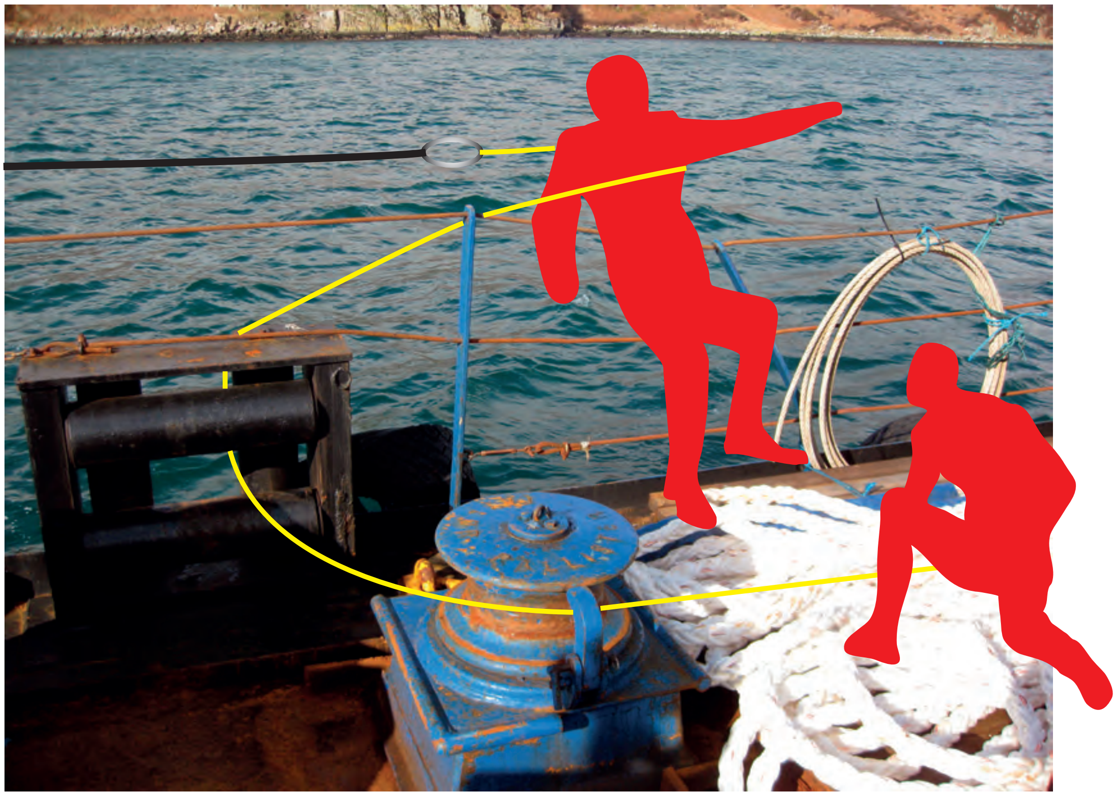


Figure 2: The wire pinning the able seaman against the guardrail

The Lessons

Making fast to a mooring buoy might be considered by many seafarers to be a fairly routine operation and not worthy of a toolbox talk or method statement. However, this accident clearly demonstrates that tasks requiring only basic seamanship skills can catch out the most experienced seamen - and sometimes end tragically.

1. A toolbox talk or a method statement is worthless if it doesn't consider every step of the operation. If the detail of connecting the two lines had been more fully discussed, the men would have realised that a third man was needed to retain an overview of the operation and continue communications with the bridge when the shackle was being closed.

2. Chapter 25 of the Code of Safe Working Practices gives invaluable advice regarding mooring operations, and ships' crews would be wise to refresh their knowledge and discuss how their own operations could be improved. The importance of the person in charge maintaining operational oversight, rather than becoming just another member of the workforce, is amply demonstrated by this accident.

3. The delay in alerting the coastguard did not affect the outcome of this accident. In other circumstances it could have made the difference between life and death. It is paramount that an emergency broadcast is made in DSC and on VHF Channel 16 to alert the coastguard at the earliest opportunity - if the situation improves, the call can always be downgraded.

Beach Party

Narrative

A 7000 tonne container vessel was on passage when, at around midnight, a number of her officers gathered on the bridge to celebrate a birthday. Normal navigational practice was then ignored as the men drank toasts to mark the birthday.

After a few hours, the OOW declared that everyone should leave the bridge, and the gathering broke up. A short time later, a substantial alteration of course was made, which took the vessel from her planned track onto a heading towards the coastline, 45 miles away.

It is not known why the course was altered, and only by analysing the vessel's VDR was it possible to establish an accurate account of events. The course had been altered gradually and smoothly using the autopilot, and whoever made the alteration then left the bridge unmanned. No lookouts were posted and the bridge watch alarm had not been activated, which appeared to be common practice on this vessel.

As a result, there was no one on the bridge as she crossed the tracks of other vessels in the area and steamed towards the shoreline. There, 3½ hours later, she grounded at full speed on a gently shelving, sandy shoreline. The vessel remained there, with her engine still running at full ahead, for a further 20 minutes before an officer finally came to the bridge. The master was then called and the propeller was stopped.

The master failed to respond immediately to calls from the coastguard, and initially he denied that the vessel was aground. This unnecessarily delayed any emergency response that might have been needed. Eventually,

Vessel aground with rescue helicopter and lifeboat in attendance the master admitted that the vessel was aground and the coastguard mobilised a rescue helicopter, lifeboat and a salvage tug to stand by the vessel.

The vessel remained aground for 1½ days before the coastal state approved the owner's salvage plan and the vessel was towed off the shore. She was then escorted to a nearby port, where a hull survey was undertaken.

Fortunately and remarkably, although the vessel had grounded at full speed, she was found to be relatively undamaged, and no injuries or pollution were caused by the grounding.

The Lessons

1. **The conduct of the officers on this ship was clearly below what would be accepted by the vast majority of responsible mariners. Companies should ensure that their drug and alcohol policies are clearly understood by their crews, and proactive measures taken to ensure full compliance. A regime of random testing can be very effective in this respect.**

2. **The effective use of lookouts, combined with an active bridge navigational watch alarm, should be standard practice on all vessels. These standard control measures could have prevented this accident - which had the potential to endanger many lives, and put other vessels in the area and the environment at considerable risk.**

3. **The coastal state should always be informed of any emergency situation on board. The master's reluctance to respond to the coastguard's call following the grounding could have imperilled the lives of his crew had the situation, which he had had no time to assess, deteriorated.**

The Importance of Good Bridge Watchkeeping

Narrative

A container ship on coastal passage was following a planned track of 030° in autopilot at a speed of 21kts. The OOW was accompanied on the bridge by an AB. It was dark, the visibility was good, the sea state was moderate, and the wind was from the north-north-west force 5.

At about 0150, the OOW gave the AB permission to leave the bridge to conduct a fire patrol and get a snack from the galley. By now, heavy rain had reduced the visibility to about 3nm; it had also adversely affected the quality of the picture on the bridge radar displays. The OOW was not monitoring AIS information.

Between 0153 and 0210 the OOW altered the vessel's heading to about 048° to avoid concentrations of stationary fishing vessels. During this period, he also saw an east-moving radar target 5nm to the north which was crossing from the port bow. This vessel, which was transmitting on her AIS Class B, was bound for fishing grounds 150nm offshore at a speed of 8.5kts.

As the container ship cleared a group of fishing vessels on her port side, the OOW remained concerned by the movement of the east-bound vessel, which was now within 2nm, so he sounded one blast lasting approximately 3 seconds on the ship's forward whistle. The east-bound vessel maintained her course and speed (Figure 1) so the OOW decided to make a bold alteration of course to port. He checked the radar display to confirm that the intended heading of about 330° was clear of other vessels. He then moved to the port bridge wing and looked over the port bow and the port beam to ensure that it was safe to alter course. The OOW then returned to the centreline console and began to adjust the vessel's heading to port using the joystick control on the vessel's track pilot system.

At about the same time, the east-bound vessel altered course to starboard to a heading of 220°, towards the path of the container ship. This alteration was not seen by the container ship's OOW, and the vessels collided 2 minutes later.

On impact, the container ship's OOW felt a sudden and unusual vibration from the forward part of the vessel. He did not know that his vessel had collided with another vessel, but quickly put the engine telegraph to stop. The OOW then telephoned the master and informed him that the container ship might have hit something, but he did not know what. The other vessel quickly sank without trace.

When the master arrived on the bridge he analysed the situation. Bearing in mind that the container ship was not damaged, there was no sign of another vessel in close proximity, no distress messages were heard, and the fishing vessels in the vicinity appeared to be getting on with their business as usual, the master concluded that the vibration felt during the alteration of course was possibly caused by waves hitting the hull. The container ship resumed her passage.

Eighteen hours after the collision, the coastal authorities were made aware that a fish transportation vessel was missing. An air and sea search was quickly commenced, and a review of AIS information indicated that the position and time of the missing vessel's final transmission coincided with the container ship's track. The wreck of the missing vessel was later located (Figure 2); all of her 11 crew were lost. She did not carry an EPIRB and the vessel's liferaft was never found. Anecdotal evidence suggests that it was customary to lash the raft to its cradle.

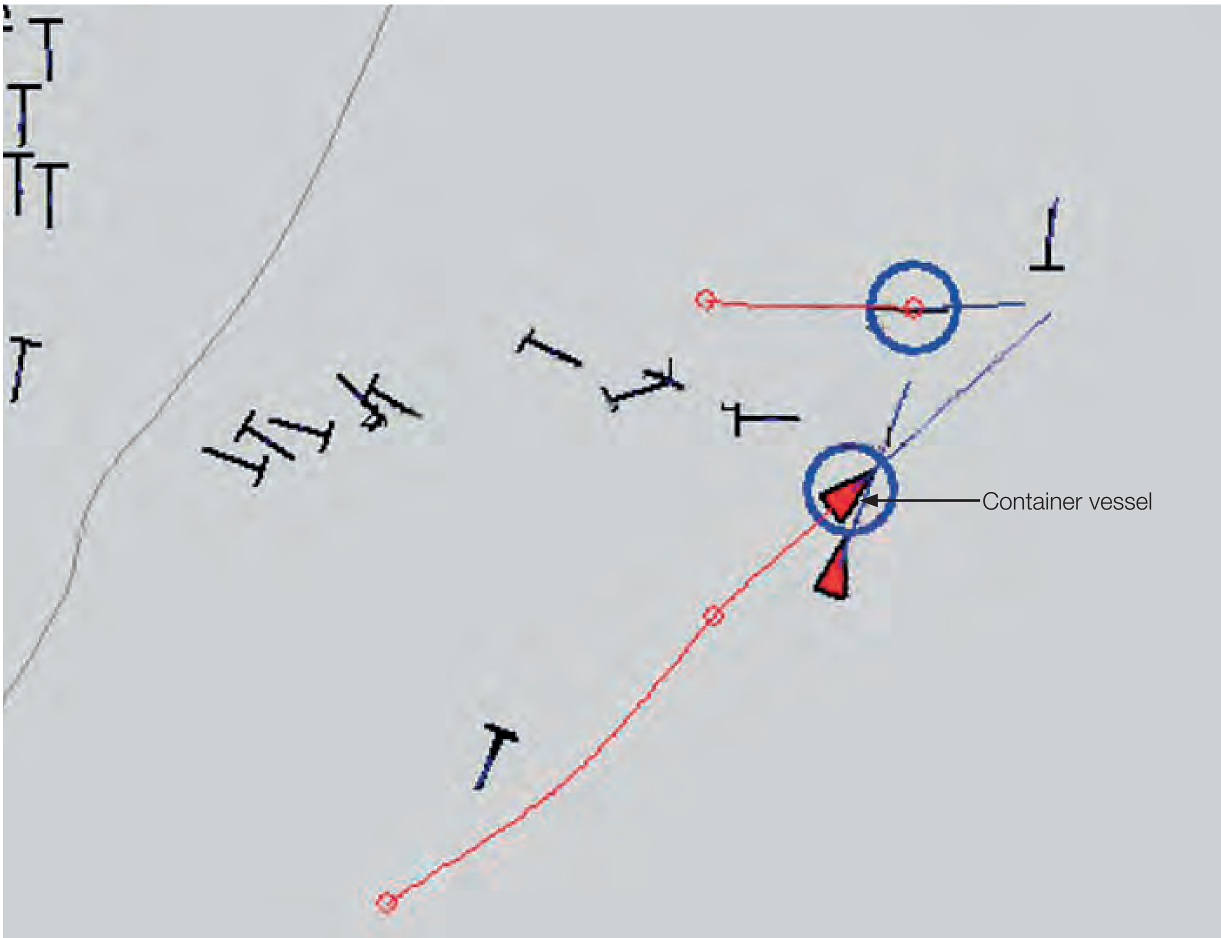


Figure 1: AIS screen shot of container vessel's course

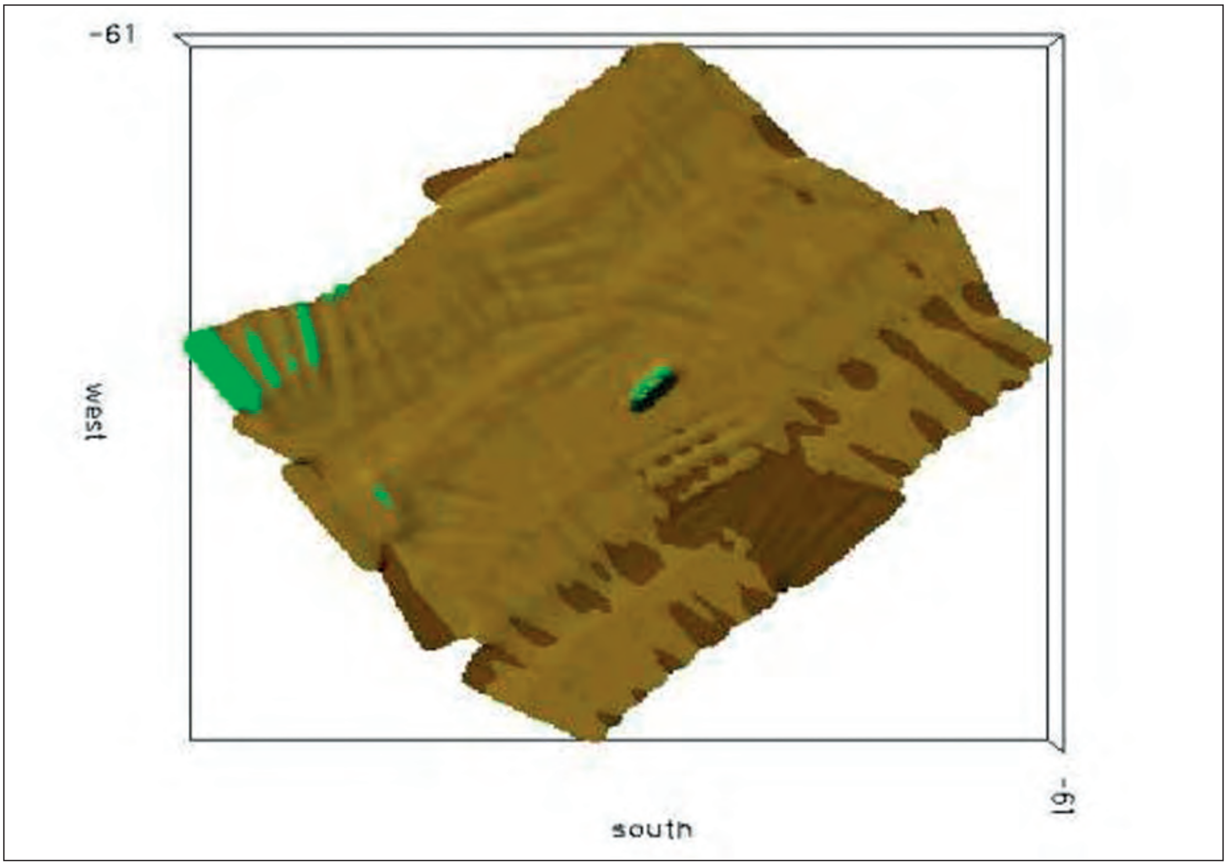


Figure 2: Side scan sonar image of the wreck

The Lessons

1. In some areas of the world, the size and extent of fishing vessel concentrations can make bridge watchkeeping nerve-racking, even for the most experienced officers. However, hours of anguish can often be avoided by early minor adjustments to the passage plan to head through less congested waters.

2. Following the COLREGS is crucial to safety at sea. When weaving through large concentrations of near-stationary fishing vessels, OOWs must think quickly on their feet, but the 'rules' must still be followed wherever possible. In this case, the alteration of course to port by the container ship, following the sounding of the whistle, was not only contrary to the 'rules', but it was also dangerous. It would certainly not have been expected by the wheelhouse watchkeeper on board the fish transportation vessel who simultaneously altered his vessel's heading to starboard.

3. The monitoring of any action to avoid a collision is essential to ensure a safe outcome. No matter how bold a course alteration or reduction in speed, the actions of other vessels should never be taken for granted.

4. The determination of safe speed is a bone of contention, but there is no doubt that a speed of 21kts in darkness, poor weather and sea conditions, and at close quarters with numerous fishing vessels, is far too fast.

5. At night, a bridge must be manned by at least an OOW and a lookout. However, in areas of higher traffic densities such as fishing grounds and traffic separation schemes, masters should not hesitate to enhance routine manning to meet the demands of the situation. Standing down the lookout is not an option.

6. The use of AIS is becoming widespread among vessels of all types and sizes. Although the system is extremely useful in highlighting the presence of smaller vessels in open waters and shipping lanes, there is a danger of AIS information overload in areas of high traffic density. In such circumstances, the AIS information stands a good chance of being ignored or filtered by OOWs on board larger vessels.

7. EPIRBs are a reliable means of alerting SAR authorities when things go horribly wrong. If a vessel doesn't carry one, the potential delay in starting a search and rescue can be the difference between life and death.

8. A liferaft's ability to float free is pivotal to its usefulness in an emergency. Keeping a liferaft lashed down at sea can render it worthless at just the time it is needed. To surface following a sinking, to find that the liferafts have stayed with a vessel, would not only be demoralising, it would also significantly reduce a person's chances of survival.

Familiarity Breeds a Dent

Narrative

A familiar port for the captain and a familiar ship for the pilot, yet a routine arrival for a car carrier still ended with a hole in the ship's side and part of a linkspan at the bottom of the sea.

The ship was making one of its regular calls at a port which formed part of a circular route with three other ports. The master came on to the bridge ahead of the pilot boarding and took the con from the second officer. When the pilot boarded, he and the master carried out an exchange of information that included details of the berth, notification that there was a large cruise ship berthed ahead of the ship's final position, details of the tidal stream and a discussion on the strengthening wind conditions. The two men did not discuss the ship's manoeuvring characteristics, the status of the propulsion or how the berthing manoeuvre would be carried out. They agreed that the pilot would have the con up until the berth and that the pilot would put the ship alongside.

The pilot had told the master that the wind was onshore at 16kts but was gusting up to 25kts. With that information, the master requested one tug to be made fast on the port quarter when the ship was in the final approaches to the berth.

The passage up to the berth was uneventful. At the agreed position the tug was made fast on the port quarter and the master took the con from the pilot. Other than the pilot informing the master that he would have 45m ahead of his berth to the cruise ship, and a comment that conditions were not as windy as during the vessel's last visit, there was no additional briefing between the two men.

The ship was to berth starboard side alongside and would sail close past the linkspan that protruded into the water as the vessel approached the berth. The master intended to use the bow thruster to counteract the onshore wind and hold the bow steady; the tug, under the direction of the pilot, would hold the stern. As the bow of the vessel passed the linkspan, the ship took a sudden shear to starboard and, despite the efforts of the master, the bow made heavy contact with the lower pontoon section of the linkspan.

The corner of the pontoon pierced the hull. As the master put the engines astern to clear the linkspan, he dragged the pontoon away from the dockside. The ramp section of the linkspan could not be held without the support of the pontoon, and its fixings gave way, sending it to the seabed. The pilot quickly notified VTS of the situation and nearby tugs assisted the ship to get alongside an alternative berth and prevented the pontoon from drifting out and becoming a hazard to navigation.

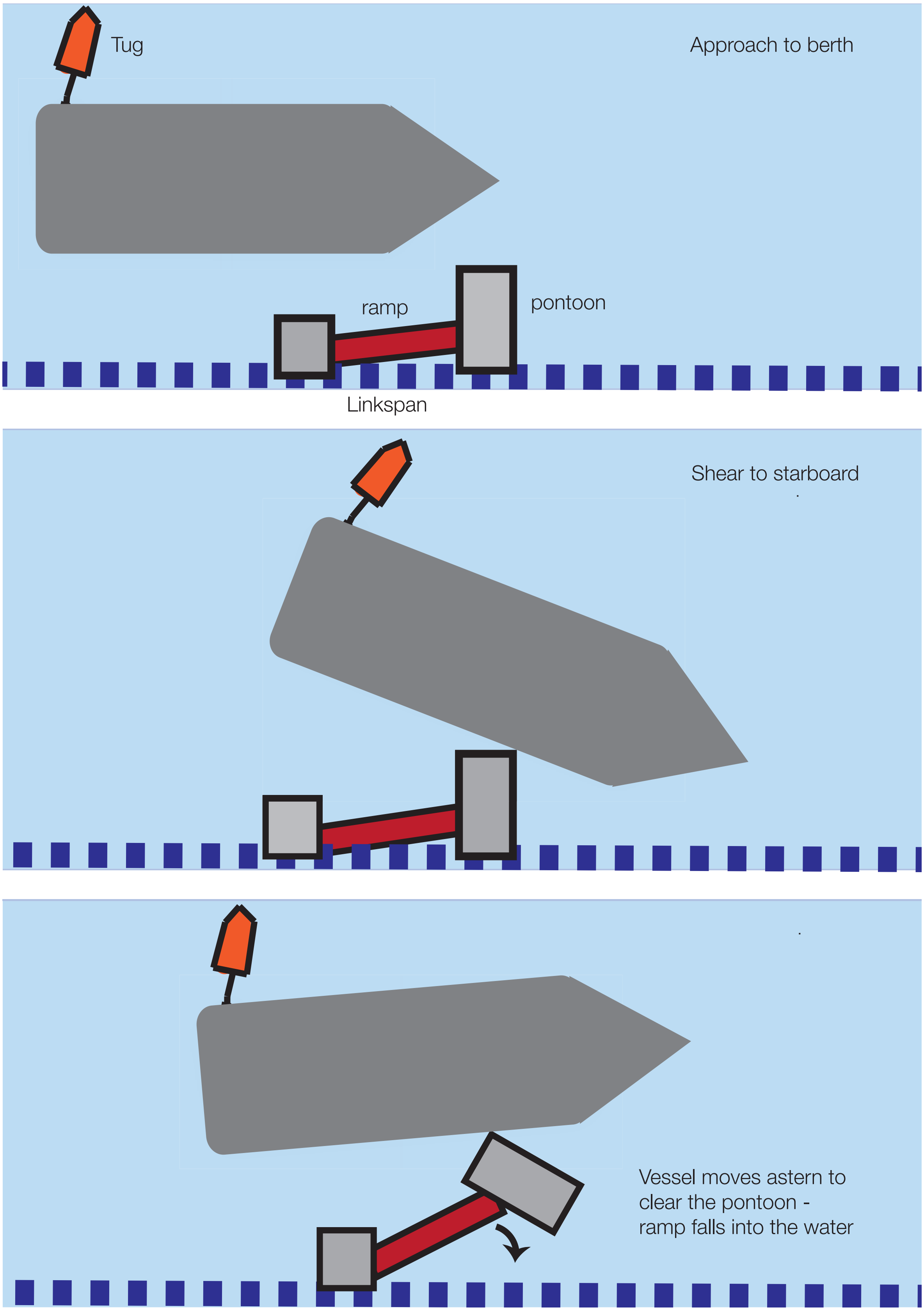


Figure 1: Sequence of the approach

Figure 2: Hull penetration damage to the ship

Figure 3: The linkspan with missing ramp

The Lessons

The sudden shear to starboard could have been attributed to several possible causes: the tug pulling with too much or unrequested power on the port quarter, the wind suddenly gusting, the bow thrusters failing, or a ship-handling error with too much starboard rudder or insufficient port thrust being applied.

Following the accident, the master's initial theory was that too much power had been used by the tug; the pilot had suspicions that the bow thrusters had failed but was unsure of the positions of the rudder and thrusters in the lead up to the accident.

The pilot also revealed that he had had concerns that the master's approach was too shallow and was taking the ship too close to the linkspan in the onshore wind conditions. However, the pilot did not raise his concerns with the master as he knew the ship was frequently in port, and he considered the master to be a well practised and competent ship-handler.

1. It should not matter how familiar the master and pilot are with the ship and the port, a full briefing is always necessary to make sure the entire bridge team understands the passage plan to the berth.

2. The briefing should also include the manoeuvre on to the berth. If the approach and manoeuvre are not discussed, it is impossible for other members of the bridge team to question the plan or monitor the execution of it.

3. A good synergistic bridge team should be able to question decisions or seek confirmation from others at any time. In this case, the pilot should have voiced his concerns with the master when he doubted the shallow approach the ship was taking. However, in other circumstances, it may well be the watch officer, the helmsman, the lookout or the cadet. The rank or role is unimportant.

4. The MAIB frequently finds that pilots are left to con a vessel up to the berth with little support from the ship's bridge team. On this occasion the roles were reversed. It is clear that while the master and pilot had an open dialogue during the passage to the berth, when the pilot handed the con to the master he was not providing a backup to him by checking the controls or actions taken by the master.

Vehicle Unloading - the Need for Close Control

Narrative

The delayed arrival of a ro-ro ferry at a non-UK port, meant that the pressure was on to unload the vehicles, which included individual trailers and combined truck/trailer units, as quickly as possible.

As the chief officer and the third officer discussed the unloading progress with the charterer's representative in the cargo control room, the stevedores busied themselves with removing the vehicle lashings. One of the stevedores had just completed removing them from two truck/trailer units which were parked nose-to-nose, when the driver of one of the vehicles started his engine and inadvertently engaged forward gear instead of reverse gear. None of the crew had given approval for the driver to start his engine.

The lorry unit moved forward and crushed the stevedore, who was out of the driver's line of sight, against the cab of the vehicle ahead (Figure 1). Fortunately, the driver heard a shout and immediately stopped his vehicle. The injured stevedore was immediately attended to by one of the ship's crew who was directing the unloading and who was heading towards the section of nose-to-nose parked vehicles.

Barely conscious, the casualty was evacuated to hospital where he was diagnosed with a fractured pelvis. He left hospital 4 days later and was off work for 3-4 weeks.

Position of the injured stevedore

The Lessons

The loading, unloading and lashing of heavy vehicles on ro-ro vessels can be a risky business. There will always be pressure to achieve the planned schedules, but this should never lead to the adoption of unsafe working practices.

In this case, the drivers were routinely allowed to retain their vehicle keys and move their vehicles before approval was given by the crew.

1. Consider how to prevent drivers starting their vehicles with the risk of moving them before approval is given by the person-in-charge of unloading. In this case, the drivers are now required to hand in their keys once parked, and these are returned when the vehicle is approved to be moved.

2. Do not feel pressurised to take short-cuts in vehicle loading and unloading management. The end result will invariably be an accident. In this case the stevedore was fortunate that his injuries were not fatal.

3. Other priorities can result in distraction from the important role of controlling vehicle movements. Section 2.3 of the MCA's publication "Roll-on/Roll-off Ships - Stowage and Securing of Vehicles Code of Practice", emphasises that a ship's safe system of work should prevent drivers from moving vehicles until directed to do so by a trained person.

4. Regularly review risk assessments and refresh them to improve vehicle handling safe systems of work.

5. It can often be a challenge to exert control over foreign stevedores who do not share a common language with the crew. Nevertheless, it is important that ship's staff remain vigilant and persevere in maintaining oversight of stevedores' work. Avoid the temptation to simply "let them get on with it" - complacency is one of the major causes of accidents.

6. In addition to the Code noted at bullet 3 above, general advice regarding vehicle operations on ro-ro ferries can be found in the MCA's Code of Safe Working Practices for Merchant Seamen. The publication can be accessed and downloaded from the MCA's website at www.dft.gov.uk/mca/coswp2010.pdf

It's Good to Talk

Narrative

A pilot boarded a fully loaded product tanker as it approached the port entrance. The master and pilot carried out a brief master / pilot exchange that included a discussion on the use of two tugs to assist in turning the ship off the jetty and berthing. The pilot took the con and gave instructions directly to the helmsman and the officer controlling the engine telegraph.

As the tanker made the first of two challenging turns the pilot was informed by the jetty manager that, as the cargo documentation was incorrect, the berthing had been aborted and the ship should return to anchor in the port approaches. The pilot was annoyed by the decision. The pilot asked the master, who was trying to establish the reasons for the decision to abort, if he agreed that the two tugs were no longer needed to turn the ship in the available sea room; the master agreed. The pilot then called the two tugs by VHF radio and told them that they were not required.

As the ship entered the second turn, the pilot realised that the ship's speed was double what he considered appropriate to make the 180^{o} turn to starboard.

The pilot attempted to slow the ship by stopping the engines, but the ship started to turn to starboard even with the high lift rudder hard to port. The pilot gave a kick ahead on the engine and the vessel started to turn to port towards another terminal on the other side of the river. In the meantime, the pilot and master discussed a revised anchorage plan. As the rate of turn to port increased towards the jetty, the pilot ordered the engine astern, the rudder hard to starboard and the bow thrust full to starboard. The pilot then ordered the anchors to be dropped. The ship continued to sheer to port and hit another tanker that was discharging fuel at the jetty, at a speed of 5kts, causing significant damage to both vessels and the jetty (see figure).

Repairs to the stern of the vessel discharging alongside

The Lessons

1. The plan was not properly agreed between the pilot and the bridge team from the start; the officers on the bridge were content that the pilot conned the ship to the berth without their active involvement in the passage plan. *The master / pilot exchange is a requirement, but rather than an exchange of factual information, this time should be used by both pilot and the bridge team to establish and agree an effective plan for the passage.*

2. The berthing was aborted unnecessarily by the jetty manager; the problem with the cargo documentation could have been resolved once the vessel was alongside the jetty prior to the start of loading. The manager's actions required the ship to turn round in a busy waterway and carry out an unplanned and challenging voyage back to anchor, and then make the voyage back in again on the following tide. *Shore personnel have a responsibility to consider not only their own risks, but also the impact that their actions can have on board the ships that they work with.*

3. The pilot's decision to dismiss the tugs was not challenged by the master or the bridge team. *The dismissal of the two tugs - which had already been paid for - was not properly considered, caused an unnecessary distraction, and removed a possible safety barrier.*

4. The pilot became increasingly anxious as he realised the speed of the ship was much faster than usual, and focused solely on reducing speed prior to making the turn. The pilot did not communicate to the master that the ship's speed was unusually high, or that this worried him. Indeed, the master and pilot distracted themselves by discussing the new anchorage position. *Had a proper relationship been established between the bridge team and the pilot, and the relevant information effectively exchanged, the master would have been more likely to have questioned the ship's speed and the pilot's intentions to turn the ship, rather than discussing aspects of the plan that could wait.*

The Silent Killer

Narrative

A man-made fibre rope can part without warning, resulting in serious or fatal injuries. That is what happened to one seaman who was looking forward to some shore leave when his vessel called at an exotic port.

The container vessel was being manoeuvred starboard side alongside with the assistance of a pilot and two attending tugs. The master gave instructions for a headline, a forward backspring and an aft backspring to be passed ashore. He then told both the forward and aft mooring parties that the vessel was required to move 10 metres astern, using the vessel's mooring lines.

The chief officer, who was in charge of the forward mooring party, signalled the bosun, who was operating the winch controllers, to heave on the forward backspring and to slacken the headline, which had been passed from the centre mooring winch through the vessel's centreline Panama fairlead. Meanwhile, two seamen, who were members of the forward mooring party, began passing two further headlines ashore from the port side of the forecastle.

When the vessel was about 2 metres from her intended final position, the master instructed the mooring parties to start taking weight on their respective mooring lines. The chief officer estimated that the headline from the centre mooring winch, which was now stopped, had appropriate slack to allow the vessel to move astern 2 metres while gradually taking the load. He then focused his attention aft.

The pilot gave instructions for the tugs to stop pushing. Soon afterwards, the chief officer noticed the vessel's bow paying off the berth. This happened as one of the seamen approached the centreline fairlead, through which he would be able to visually estimate how much slack was required on the headline he was in the process of sending from a port side fairlead.

Without warning, the centreline headline parted, snapped back, and struck the seaman. Despite wearing a safety helmet and receiving prompt medical assistance, the seaman died of fatal injuries to his head.

Following the accident, a representative sample of the mooring rope was analysed to confirm the condition of the rope and establish the mode of failure. It was concluded that the sample had suffered abrasion damage and had lost 34% of its original strength.

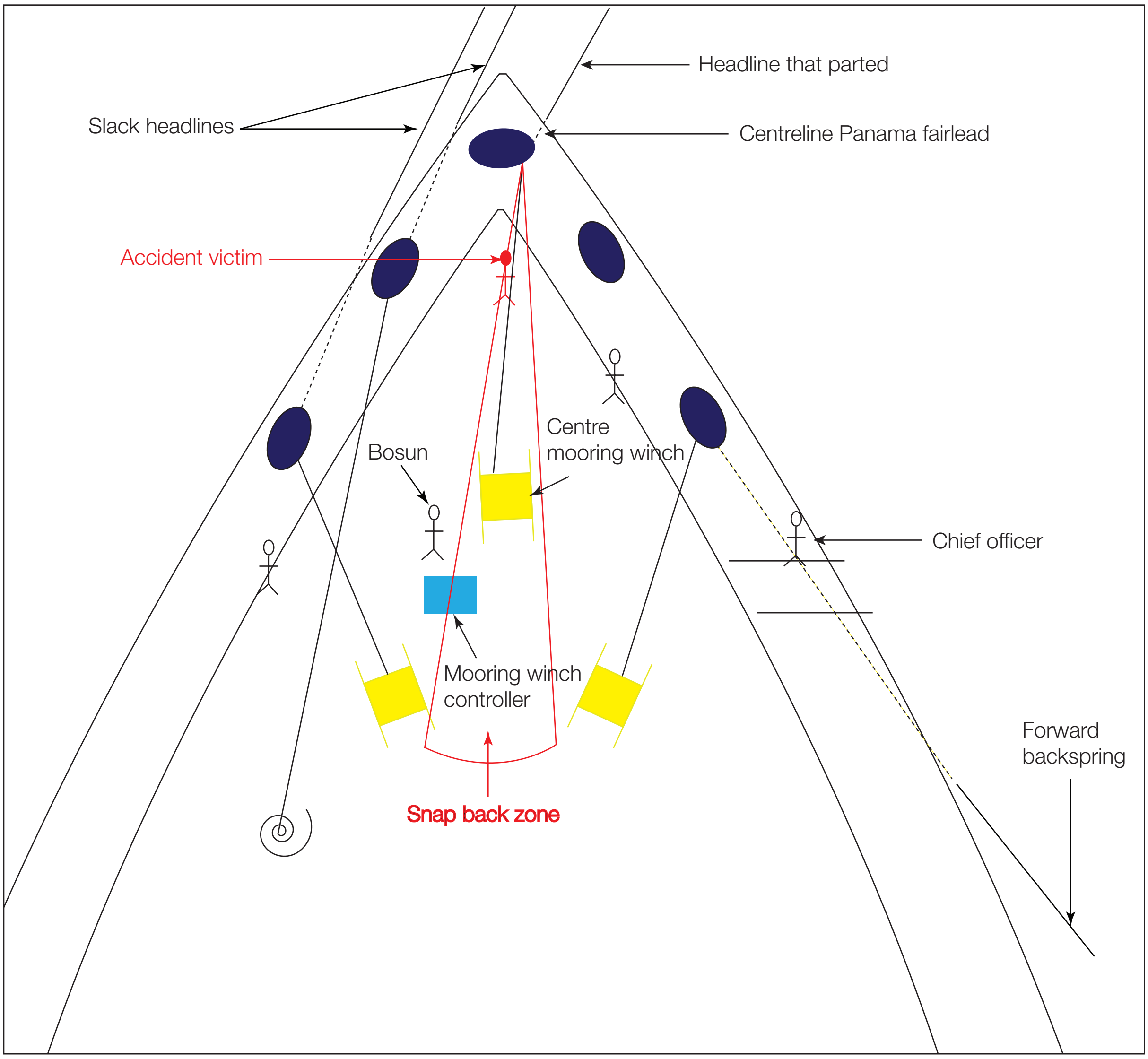


Figure 1: Forecastle deck arrangement

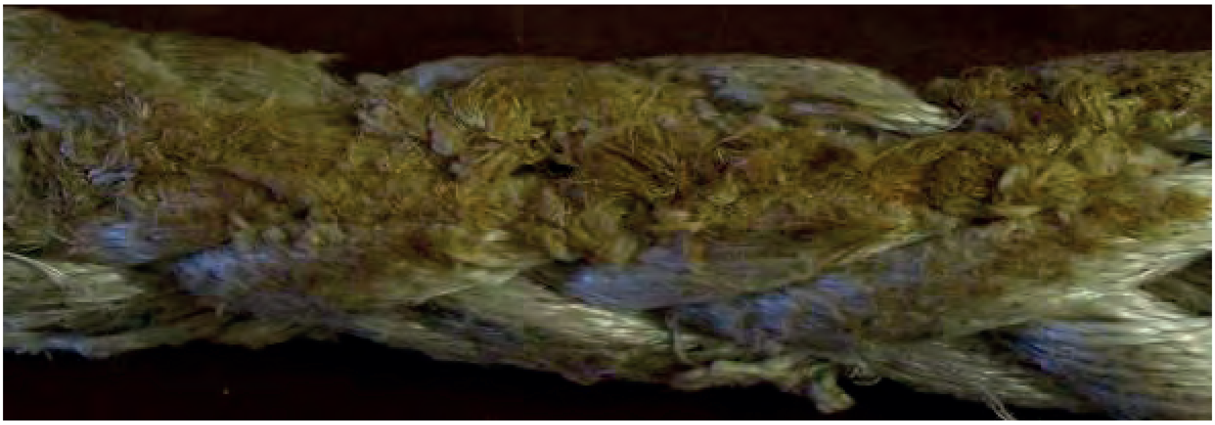


Figure 2: Section of the mooring rope failure zone showing extreme abrasion rope

The Lessons

1. The combined effect of the vessel's movement astern and her bow paying off the berth resulted in a snatch loading on the headline, which caused an already weakened rope to part without warning.

2. The winch controllers had recently been repositioned and required the winch operator, in this case the bosun, to face aft, removing his ability to monitor the loading on mooring lines and the movements of mooring party members. Had the bosun been located in a central position facing forward, it is likely that he would have recognised that the seaman was entering a snap-back zone at a time when the headline was coming under tension, and been able to provide a warning to the seaman and to the chief officer.

3. The high frequency of port calls and the absence of roller fairleads meant that ropes were routinely subject to external abrasion damage. The mooring rope had been inspected on a monthly basis and the company had provided the vessel with criteria for when a mooring rope should be changed. However, the rope's condition at the time of the accident suggests that a lower standard of acceptability was being applied on board than that required in the company's instructions.

4. Man-made fibre ropes are highly elastic, and the broken ends of a parted rope under tension can snap back far beyond the points of restraint. Snap-back zones become greater when a rope has been passed around an inboard pedestal lead. Although a snap-back zone was marked on the forecastle deck in the vicinity of the centreline fairlead, the snatch loading occurred without the audible warning that often occurs when a synthetic rope comes under tension. The seaman was therefore unaware of the imminent danger.

5. The chief officer was unaware of the risk of the mooring rope parting until it was too late to give a warning, and the bosun was unaware that the seaman was standing in the snap-back zone behind him. This left two inexperienced members of the mooring party who could have given him a warning. They were both aware of the bow paying off the berth but did not recognise the potential risk before the rope parted. Despite the frequency and routine nature of mooring operations, a toolbox meeting conducted before each operation can serve to remind everyone involved, of the safety considerations to take into account as well as encourage further communications and interaction during the operation.

6. Valuable guidance on safe mooring operations can be found in Chapter 25 of the Code of Safe Working Practices for Merchant Seamen.

Assumptions and Misplaced Confidence

Narrative

A bulk carrier was transiting a narrow sound at a speed of 12kts. Her deepest draught was 10.63 metres. It was daylight and visibility was good with a moderate breeze.

The bridge was manned by the master, who had the con, the third officer and a helmsman. Two radars and an ECDIS were being used to provide navigational and anti collision information. The ECDIS was set with the following safety parameters: a safety contour of 10 metres; a cross-track deviation limit of 0.2 mile either side of the planned track; and an anti-grounding warning zone that covered an arc 1° either side of the vessel's track out to a distance equivalent to 10 minutes' steaming. The alarm on the ECDIS should therefore have activated if the vessel deviated more than 0.2 mile from her planned track, or the anti-grounding warning zone crossed a safety contour or other user-defined danger.

The master instructed the helmsman to engage the autopilot and then handed the con to the third officer, who stood facing the starboard radar display, with the ECDIS display to his right. The master then moved to the communication centre on the port side of the bridge to send routine departure messages.

The third officer interpreted from the ECDIS display that the vessel was about 1 mile from the next planned waypoint; he also estimated that a yacht he could see on the starboard bow would be ahead of his vessel when she was steady on her new course. Intending to leave the yacht to port, he decided to turn early and, by adjusting the autopilot, initiated a slow alteration of course to starboard towards the next planned course of 314° (T).

During the turn, the third officer acquired on the radar an AIS target of the yacht at a range of 3.6 miles and on a bearing of 318.5°(T). He decided to continue the alteration to starboard to place the yacht on the vessel's port bow. On a heading of 321° (T), the third officer observed another small vessel right ahead at about 1 mile range. With the intention of leaving the small vessel to port, he continued altering course to 324° (T). The ECDIS anti-grounding warning zone alarm then activated on the display, but no audible alarm sounded.

The bulk carrier subsequently grounded, resulting in bottom damage to her hull, including a 3-metre fracture to one of her water ballast deep tanks, which flooded. There were no reported injuries or pollution and the vessel was able to continue unassisted to her next port of call.

The Lessons

1. The third officer's decision to prematurely initiate a turn to starboard before the vessel's next waypoint was based on an assumption that the yacht would follow an approximately reciprocal course to the next planned course. The third officer then saw another small vessel ahead, which he assumed was crossing from starboard to port. In again opting to leave this vessel to port, the third officer altered course further to starboard and onto a track that would cause the bulk carrier to run aground within 10 minutes.

   Analysis of the bulk carrier's radar recording indicates that, had the third officer followed the planned track in accordance with the passage plan, the other two vessels would have passed clear on her starboard side.

   Never assume – always confirm your vessel's current position and projected track before deciding an appropriate action.

2. While the third officer relied on the ECDIS as the primary means of navigation, he did not appreciate the extent to which he needed to monitor the bulk carrier's position and projected track in relation to the planned track and surrounding hazards. The following factors probably contributed to this:

   - The ECDIS display was orientated so that the OOW had to face to starboard to look at the screen. Although this might have been ergonomically satisfactory for routine navigational watchkeeping, the third officer's overriding priority during the period leading up to the accident was collision avoidance, which required him to look ahead. Had the ECDIS display been located in front of him, he would have been more likely to routinely consult it when monitoring the navigational situation.

   - Traditional navigational techniques require an OOW to regularly plot a series of historical positions on a paper chart from which to project the vessel's track. The ECDIS display provided the third officer with an ability to immediately identify the vessel's current position and projected track at any time without the need for regular plotting. Furthermore, the third officer was aware that the ECDIS anti-grounding warning zone feature was designed to automatically determine and alarm if the vessel was running into danger. Consequently, he felt no obligation to check the vessel's position and projected track during the 15-minute period leading up to the grounding.

   Effective position monitoring is fundamental to navigational best practice. Navigational aids are there to help, but their limitations need to be identified and taken fully into account.

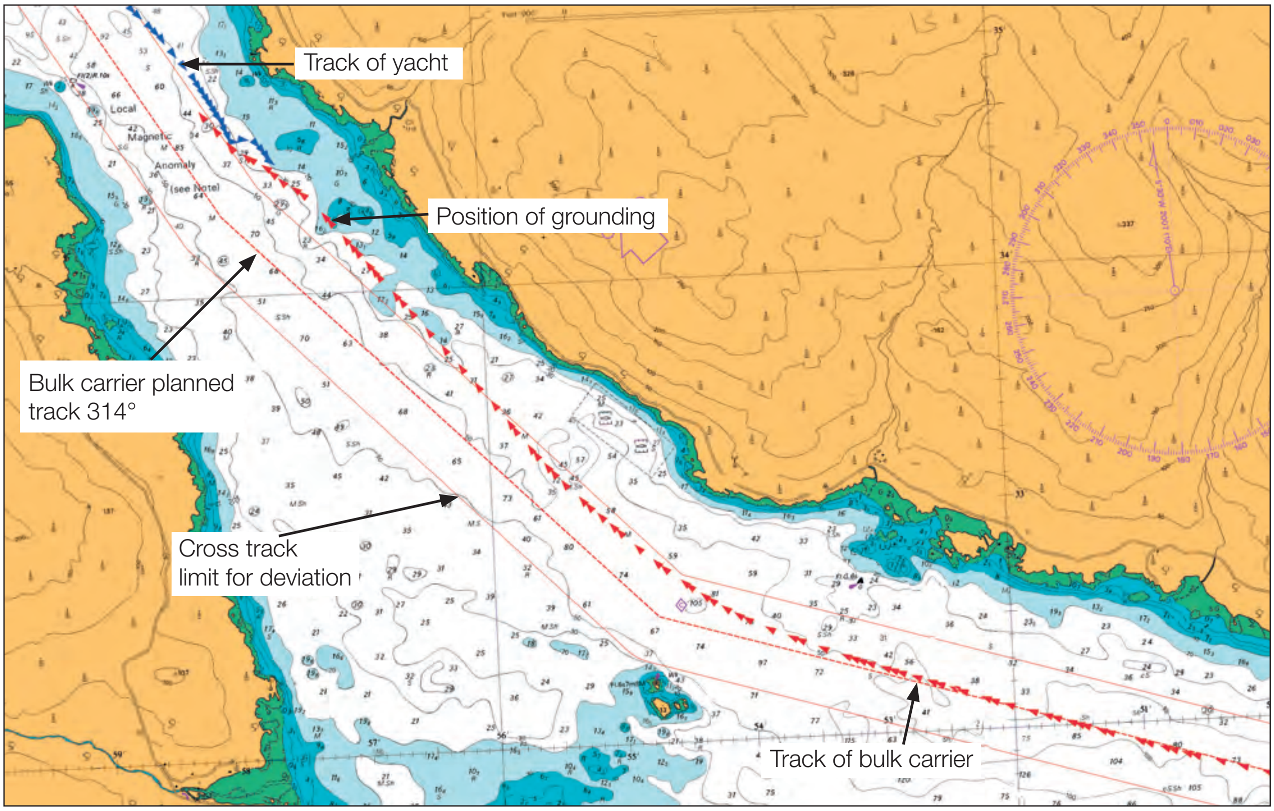
3. A safety contour setting of 10 metres was inappropriate for the bulk carrier's draught of 10.63 metres. Taking into account the height of tide of 1.4 metres and an estimated squat of 0.9 metre, the vessel would have grounded at a charted depth of 10.13 metres, before crossing the safety contour.

continued overleaf

Despite having attended training courses that met the standards of the IMO model course for ECDIS, the vessel's master and bridge watchkeepers lacked an understanding of the ECDIS equipment's safety features and/or their value. The ECDIS audio alarm was found disconnected following the accident. On joining the vessel, neither the master nor the other bridge officers had questioned the absence of the alarm.

The above shortfalls can be addressed through equipment-specific training and onboard instructions and guidance.

4. The bulk carrier required careful navigation in view of the restricted sea room and the likelihood of her encountering other traffic. The master was confident of the third officer's abilities and, on handing him the con, was content for him to navigate alone. However, his confidence was misplaced. The third officer lacked experience and, given the navigational demands of the passage, needed the support of the master, who should have avoided sending the routine departure messages until the vessel was clear of the sound.



Tracks of bulk carrier and yacht

A Risky Climb

Narrative

A general cargo vessel had completed cargo discharge operations. The weather was wintery with ice forming on many surfaces. As evening approached, the air temperature dropped below zero and the sea temperature was just 2°C.

The vessel was fitted with a straddle lift crane (Figure 1) to move the hatch covers, which had an operating platform on each side. It was normal procedure for the bosun to control the lift from the starboard platform, with a deckhand assisting on the port platform. The crew normally used the deck guardrails and foot/hand-holds (Figure 2) that were fitted to the aft upright of the lift to access the platforms. Once the crew had climbed to the top guardrail, they would step across to the platform.

The chief officer asked the bosun and deckhand to close the cargo hatch covers. Accordingly, the bosun and a deckhand went to the main deck; the bosun towards the starboard platform and the deckhand towards the port platform. The bosun and deckhand were unable to see each other due to the height of the hatch coaming. The bosun climbed up onto the starboard platform using the deck guardrails and then waited for the deckhand to appear on the opposite platform.

When the deckhand did not appear, the bosun walked across the hatch covers to look for him. The bosun immediately saw the deckhand, floating face-down in the river, close to the ship's side, and quickly raised the alarm. Although the deckhand was subsequently rescued from the water, he did not regain consciousness.

Figure 1: Straddle lift crane

No one witnessed the accident. It is assumed that the deckhand slipped while he was climbing up to the platform. He had been wearing wellington boots that were almost entirely bare of tread (Figure 3), and his gloves had been worn smooth (Figure 4). On the wet or icy metal surfaces of the guardrails and foot/hand-holds, neither the gloves nor the boots would have provided much grip. The postmortem examination of the deckhand showed that he was nearly 2.5 times over the alcohol limit allowed for professional seafarers in the UK.

Figure 2: Deck foot/hand-holds

Figure 3: The wellington boots that were worn

Figure 4: The gloves worn at the time of the accident

The Lessons

1. The method employed by the crew to reach the platform was unsafe, indicating that the risks involved in using the guardrails as a means of access had clearly not been adequately assessed. In most cases, if it doesn't look or feel safe, it probably isn't, and action needs to be taken. There is no point in waiting for an accident to happen before taking action - it is too late by then.

2. Alcohol can impair motor co-ordination, slow down reaction times and reduce peripheral and night vision. It can also promote a feeling of over confidence. It goes without saying that consuming alcohol immediately prior to, or during, a duty period should be avoided at all cost. In many cases, failure to do so can place other people's lives at risk too.

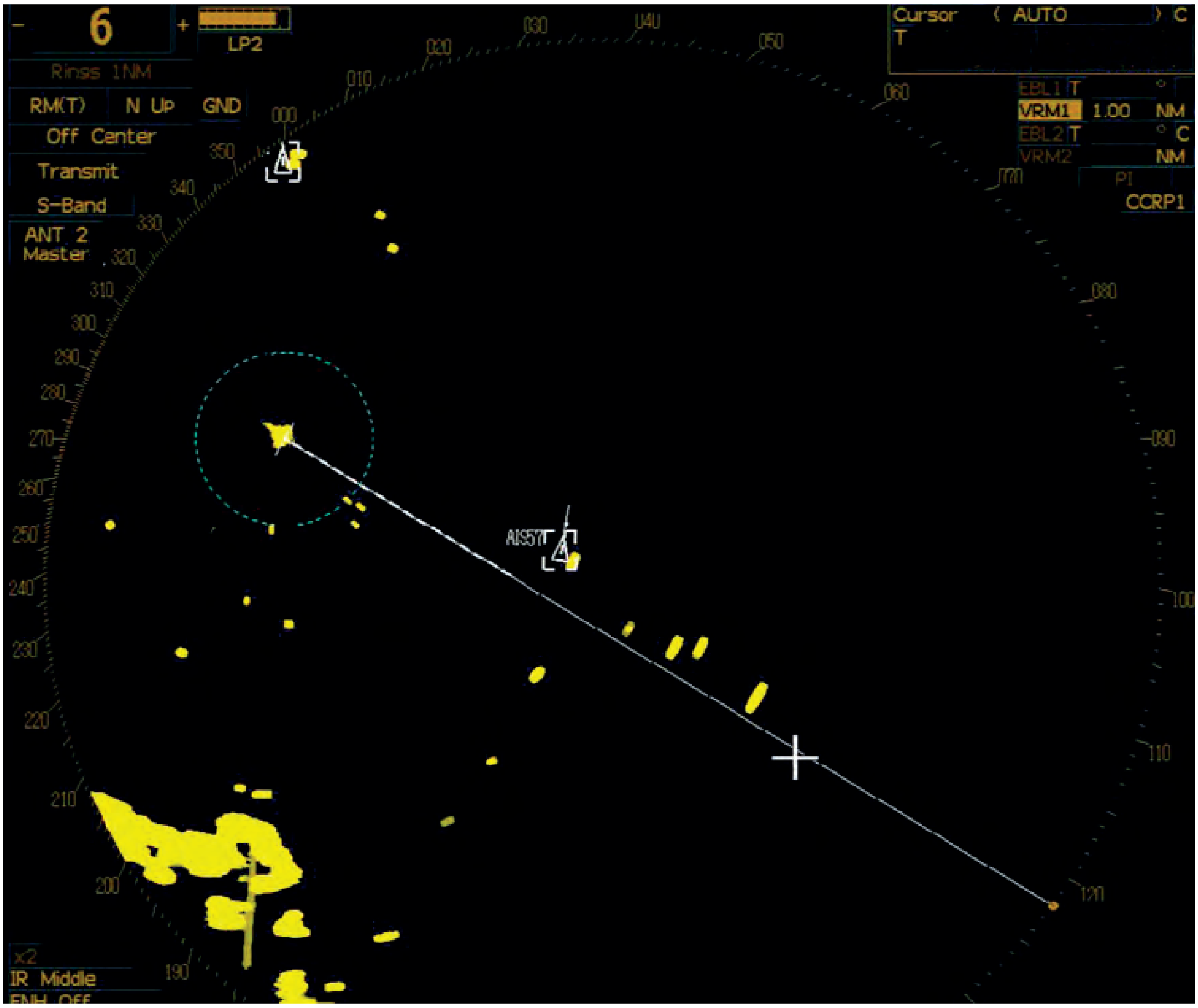
3. PPE is the last defence against industrial accidents. However, if it is not maintained properly and frequently checked it will be of little use when needed.

Watchkeeping Standards

Narrative

A large ferry left port on a clear and calm evening. The master handed the watch to the second officer and left the bridge. Traffic was light and, although there were some targets on the radar, none of them had been acquired for plotting.

Soon afterwards, the second officer plotted the vessel's position on the chart and initiated a planned alteration of course from 110º to 118º using the autopilot. He then interrogated an AIS target about 6.5 miles on the starboard bow and altered the vessel's course again, to 122º to increase the CPA with this vessel to about 1 mile. The second officer and AB on watch sighted three fishing vessels on the starboard bow. Their radar targets were not plotted and their bearings were otherwise not monitored. When the nearest fishing vessel was at about 1 mile range, the AB expressed his concern at what appeared to be a close-quarters situation with three crossing vessels (figure).



Radar display showing three fishing vessels on the starboard bow at 1 mile range

With an ever-decreasing range, and thinking he had insufficient sea room in which to alter to starboard, the second officer initiated an alteration of course of about 10° to port. While the two trailing vessels took action to avoid an imminent collision, the nearest fishing vessel continued on a collision course. The second officer sounded a short blast on the whistle in an attempt to attract attention, and ordered the AB to place the wheel on hand-steering and alter hard to port. However, this did not prevent the fishing vessel colliding with the ferry despite her skipper taking last minute avoiding action.

The fishing vessel sank rapidly. The skipper was rescued immediately but, despite an extensive search and rescue operation, the other crew member was not found.

The Lessons

The ferry was the give-way vessel. Although the second officer had sighted the fishing vessels, he did not take early and sufficient action to avoid a collision.

1. **One of the fundamental requirements of the COLREGS is that vessels maintain a proper lookout. If they do not, many of the regulations intended to avoid collisions in varying circumstances cannot be applied.**

2. **When determining if there was a risk of a collision with the three crossing fishing vessels, the second officer on board the ferry should have, as a minimum: monitored or plotted their radar targets using the cursor or ARPA facility; taken a series of compass bearings using the radar's electronic bearing line; and/or taken a series of visual compass bearings using the azimuth ring.**

3. **Rule 8 of the COLREGS requires any action to avoid collision to be positive, made in ample time, and be large enough to be readily apparent to another vessel observing visually or by radar. This collision could have been easily avoided if the second officer on board the ferry had made an early and bold alteration of course in accordance with the requirements of a give-way vessel.**

4. **Although the fishing vessel's wheelhouse had been left unattended intermittently, she was the stand-on vessel in a crossing situation and was required to maintain her course and speed. However, Rule 17 (b) of the COLREGS requires action by a stand-on vessel when collision cannot be avoided by the give-way vessel alone. The fishing vessel's skipper's last-minute avoiding action was too late to be effective.**

5. **The navigating officers on board the ferry had a preference for interrogating AIS targets on the radar display. While there are some distinct advantages in interrogating AIS data for collision avoidance, this can engender a misperception that only targets with AIS symbols warrant interrogation, with the potential for all other targets on the radar display being ignored without determining if they actually pose a danger.**

6. **The second officer ordered the AB to engage hand-steering and take the wheel at a very late stage. Hand-steering should be engaged when a situation is developing so that any planned alteration of course or an emergency action can be executed without delay.**

Fast Rescue Craft Recovery Drama

Narrative

An FRC was being recovered following a drill. The assistant bosun and one AB, who were in the boat at the time, were both FRC qualified. The second officer, who was in charge of the operation, was on the launching deck and he also had control of the single davit arm's slewing and hoisting controls. Another AB was with the second officer to assist in the FRC's recovery.

The FRC came alongside as normal and the painter, one end of which was permanently secured to the forecastle, was connected while the FRC was in the water, and immediately afterwards the second officer selected "hoist" on the control lever. As the FRC neared its half cradle stowage position the painter became tight and, as no one was attending it on the forecastle, it held the FRC's bow into a downward position.

As the FRC was still partly suspended over the deck edge, the assistant bosun and the AB left the boat to help attach a bowsing line to assist in pulling the FRC around the deck edge. Critically, the bowsing line was passed through the thimble at the end of the painter and not secured to the FRC itself. Both ends of the bowsing line also passed over the FRC hoisting/slewing control lever and were secured to an adjacent guardrail. However, the danger of this was not recognised.

The second officer then assisted in pulling on the bowsing line to help move the FRC around the deck edge. At the same time, the assistant bosun got back into the FRC to help manoeuvre the FRC onto its stowage cradle. As the painter was tight, he decided to let it go and, in doing so, he also released the bowsing line, which became entangled around the control lever. As a result, the davit winch rapidly veered, and the winch wire became slack as the FRC slid from its precarious position on the edge of its stowage cradle. Luckily, the assistant bosun was able to jump back onto the ship's deck as the FRC slipped over the ship's side.

Figure 1: FRC in final position

Figure 2: Winch wire snagging self-righting chamber

The FRC dropped, and assumed a 45°, bows-down position as it fell about 3 metres until it was stopped as the wire's slack was taken up (Figure 1). As the FRC fell, the winch wire became trapped around the self-righting chamber at the after end of the FRC, causing some structural damage (Figure 2).

The FRC was later lowered into the water and hoisted a number of times. However, no defects were found with the operating system. It was then removed from the vessel for repair.

The Lessons

The design of the recovery system did not promote easy stowage of the FRC, but its recovery should have been a routine operation. However, there was very little control exercised by the second officer. He did not intervene to stop the assistant bosun, who was lucky to escape serious injury - or worse - from re-entering the FRC when it was unsecured. Indeed, the second officer lost his oversight of the operation when he tried to assist the crew by pulling on the bowsing line.

1. All too often, distraction and inattention is the catalyst for accidents. Those in charge of operations should concentrate on the task in hand. The dangers of the tight painter, the method of securing the bowsing line, and the assistant bosun going back into the FRC, were not recognised and so were not acted upon.

2. Do consider the method of securing lines. The painter was inappropriately secured away from the FRC securing/launching position, and it became tight, resulting in the bows down situation. If it is unavoidable to secure the painter close to the control position, it should be manned, and a method of communication established with the person in charge.

3. The danger of passing the bowsing lines across the control lever seems obvious, but it was not fully appreciated at the time. Do consider the route that lines take not only to prevent persons stepping into bights but also to avoid the risk of inadvertent system operation as weight comes onto the lines.

4. It was well known that the FRC's cradle position made recovery awkward. Officers and crew should be encouraged to report such shortcomings; the Safety Committee is a suitable forum for doing so. In the majority of cases, modifications can be made to make systems safer - often at minimal cost.

Part 2 - Fishing Vessels

April 1962

I left school the summer of 1961 at 16 years old and started my fishing career aboard the 34ft yawl Grateful FR270 which my father had got built at Tommy Summers Boatyard in Fraserburgh the year before. We were working the seine net (fly dragging) for flats south of Aberdeen and towing the net before (along with) the tide in a southerly direction.

At some point the net came fast on the bottom and we could not get it loose. The net was about six coils of rope (1400 metres) behind the boat, each coil being 120 fathoms (6ft). We had to get the boat turned north in to the tide and steam back to where the net was caught on the bottom, but the tide was running fairly strong (maybe 2kts) and we could not get the boat to turn.

My father, who was skipper, decided to take the ropes out of the cage roller on the starboard quarter and let the boat pivot on the shooting bar forward of midships. We came astern up into the tide and when the strain come off the towing ropes we took the ropes out of the roller and let them slide forward to the shooting bar. By this time the boat was beam on to the tide and turning to starboard into the tide, which resulted in the ropes and the shooting bar being under a lot of strain. I was standing on the foreside of the shooting bolt, which buckled under the strain, and the ropes caught me on the chest and catapulted me over the side. At this time I was wearing thigh length sea boots and a full length oilskin smock with a hood.

I can remember seeing the sun shining away up above me and fighting to get to the surface, managing to kick one sea boot off and swimming to the surface, where I think the other boot must have come off by itself. At all times I was conscious and very aware of what had happened. My twin brother Victor was going to jump in for me but my father stopped him because there would have been no way that my father would have managed to rescue two of us.

The boat was now turned stem to tide and the net was still stuck to the bottom, and I was being swept away by the tide although I was swimming as hard as I could and getting more and more exhausted by the weight of two jumpers and being fully clothed. I don't know how I managed to stay afloat, but my father told Victor to cut the two ropes binding the boat and, as soon as the ropes were cut and the boat free, my father turned her round and came after me. I cannot remember much of being picked up, but can still see my father's hand outstretched ready to grab me. By this time I was at the end of my tether, completely exhausted, and I had swallowed half the North Sea. I was pulled over the rail by my father and brother and the course was set for Aberdeen, while I emptied the contents of my stomach on the deck and pulled myself together.

Like all "accidents" this one could have been avoided by NOT being in the wrong place at the wrong time as this could so easily have ended in tragedy and heartache. People say I was lucky, but I believe it was providence that I am still here 50 years afterwards.

50 years ago there was no MAIB to examine and investigate the many “accidents” that happened in the fishing industry, but had there been such an organisation, possibly the rate of injuries and even fatalities would have been cut. We see that in the last 2 or 3 decades, with all the safety and prevention of accident aspects of the fishing industry being investigated and assessed, and the relevant steps that are taken, only good can result for those who crew the fishing boats. I have read the MAIB Safety Digest for a number of years and would endorse all their recommendations that have been published.

Albert Sutherland

Albert Sutherland M.B.E

Albert Sutherland, born at Banff on 30 August 1946. Parents and family moved to Fraserburgh 2-3 weeks later from the village of Sandend. He is a twin, the youngest of 10, 7 sons and 3 daughters. Six sons were fishermen, as was his father and his brothers who all owned family boats.

Albert and his twin started at sea with their father in a new 34ft yawl, fishing for crabs, codling and mackerel in season when they were 15 years old. Albert was at sea until April 1986 (25 years) when he came ashore to be coxswain of the Fraserburgh Lifeboat and also got a job as a berthing master with Fraserburgh Harbour progressing to pilot boat coxswain the following year. Albert was retired from the lifeboat at 55 years old, after 22 years on the boat, and at that time (2001) was made Assistant Harbour Master, a post which he held until he retired at 65 years of age in 2011.

For job satisfaction the lifeboat could not be beaten even though Albert spent some long hours in some horrendous weather. They were awarded a Bronze Medal in 1997 and Albert was made an M.B.E. in 1999.

CASE 16

Self-Shooting Needs Self-Discipline

Narrative

An experienced and competent single-handed skipper set sail in the early morning to carry out his routine work of hauling and shooting creels. The weather conditions were close to the limit for working safely.

The skipper's boat was well maintained and rigged for a self-shooting operation. This was normally carried out by shooting away the marker buoys and anchor weight, retreating to the wheelhouse, and allowing the creels attached to the back rope to be dragged up the ramped stern of the boat and overboard in succession for a total length of 0.5 mile. He would then leave the wheelhouse to shoot the second marker buoys.

Occasionally the creels shot foul, but the skipper normally let them go and sorted out the mess during the next hauling operation. Hauling was carried out by bringing the back rope over a powered "V" wheel hauler and allowing the rope to coil freely on the deck beneath the hauler. As each successive creel came on board, they would be cleared, re-baited and carried to their stowed position ready for shooting away again. This left a trail of rope from the creels to the hauler on the starboard side deck, which was often walked on while the next creels were worked.

The skipper was well into his day's work and was shooting a fleet of creels with the wind and seas just forward of the beam when, for some unknown reason, he left the safety of his wheelhouse. Out on deck the skipper became entangled in the back rope, possibly as a result of being unbalanced by the heavy rolling, and he was dragged overboard.

Unfortunately he was not carrying a knife and was unable to reach one to cut himself free. The skipper was also not wearing a PFD, locator beacon or remote engine shut off.

The fleet of creels continued to shoot out until the second set of marker buoys became snagged on an onboard obstruction, causing the creels to be dragged behind the boat for several hours. Eventually the buoy rope chafed through, allowing the boat to continue unmanned until she finally ran aground.

Since the creels had been dragged well away from the boat's known fishing grounds, they were not located for several days. When they were finally discovered and hauled, the skipper's body was found entangled in the gear.

The Lessons

1. Single-handed working is inherently dangerous. Therefore, wherever possible, precautions and safety enhancing features should be implemented to maximise your chances of coming home alive. Evaluate your working operation; think long and hard about what can be done to make the job safer. Once you have considered and put controls in place for safe working, discipline yourself to not breach those self-imposed safety rules. Self-shooting needs self-discipline.

2. Self-shooting is a safe method provided crew stay off the deck during that shooting process. It is unknown why the skipper left his wheelhouse on this occasion, but without doubt it cost him his life.

   It has to be accepted that if the creels shoot foul during self-shooting, the boat must either be stopped to clear them or they must be cleared during the next hauling. On no account must any attempts be made to clear them as they continue to shoot.

3. Although the skipper had carried out this operation many times, he had no system of separating himself from the back rope. Stowing the back rope behind fore and aft positioned pound boards would have provided a safe walkway should there have been any need for him to go onto the deck.

   Stowing the rope in such a fashion would also reduce the chances of it becoming fouled with your feet during the hauling operation. Segregation between man and gear is crucial for safe fishing operations; wherever possible, consider methods of doing this - they provide a guard around what is effectively moving equipment.

4. Self help in the form of accessible knives is essential in such an operation. Ensure that knives are placed in strategic positions around the boat and, ideally, on your person.

5. This skipper wore no PFD, locator beacon or remote engine shut-off. Had he been fortunate enough to free himself from the gear in the sea, he would have been in the terrible position of watching his boat disappear over the horizon with no means of alerting anyone to his situation.

   Give yourself the best possible chance; take advantage of developments in technology and PPE.

CASE 17

When Late Detection is Just Too Late

Narrative

During the early evening watch, a container ship was transiting a shipping lane between two traffic separation schemes where concentrations of fishing vessels were often encountered. The container ship was making good a course of 240° at a speed of 18kts.

On watch were the master, and a cadet, who was acting as the lookout. At times, the isolated rain showers reduced visibility to between 1 and 2 nm, but only one of the two operational radars fitted was in use. It was getting dark and there was a moderate sea and swell.

The master checked the vessel's planned course and heading on the autopilot; he also satisfied himself that there were no radar targets which would pose a problem. As everything was quiet, the master took the opportunity to inspect the deck logbook and found that the entries were incomplete. Consequently, he called the second officer to the bridge and started to explain to him the errors of his ways.

During this conservation, the cadet reported a single light fine on the container ship's port bow. The master again checked the radar display, but he still could not see any targets ahead so he looked at the light through binoculars. He saw that the light was on a fishing vessel, which he quickly assessed his ship to be overtaking.

To allow more sea room between the two vessels, the master adjusted the autopilot heading 10° to starboard. Moments later, as the master was adjusting the radar's sea and rain clutter controls to try and locate the fishing vessel, the cadet reported that the light was now very close. The master was shocked to see that the light was now so close that he immediately switched the steering to manual and ordered the second officer to put the helm "hard to starboard". It was too late. The fishing vessel was towing her fishing gear on a north-easterly course at slow speed and had already crossed onto the container ship's starboard bow. The container ship struck the fishing vessel's starboard side causing the fishing vessel to list heavily to port and throwing two of the fishing vessel's deckhands overboard. Neither of the deckhands were wearing lifejackets.

One of the deckhands lost overboard was quickly recovered by the fishing vessel, but the second was in the water for over 30 minutes until he was eventually found and recovered by the container ship's rescue boat. The fishing vessel suffered substantial damage during the collision (figure) and had to be towed back to port. The fishing vessel was fitted with a Class B AIS which was switched on but was set to receive data only.

Damage sustained to the fishing vessel

The Lessons

1. Radars are excellent, and it would be difficult to operate ships safely without them. However, although their increased sophistication and reliability is a positive, they are not infallible. Radars invariably require a degree of fine tuning, and two are always better than one.

2. When all seems quiet during a bridge watch, it is very easy for bridge watchkeepers to focus their attention on other matters. Consequently, when a problem suddenly crops up valuable time is lost while he or she takes stock of the situation, and decisions are frequently based on scanty information. Bridge watchkeepers, including masters, must keep their eye on the ball at all times. If they don't, they are likely to compromise their vessel's safety.

3. Recovering persons from the water is virtually never straightforward, particularly at night in rough sea conditions. In this case, both the fishing vessel skipper and the crew of the container ship were sufficiently well trained to respond positively to the situation. Nonetheless, the recovery of the deckhands would have been made easier and their chances of survival increased had they been wearing lifejackets when working on deck.

4. Many fishing vessel skippers choose not to transmit on AIS because they do not want to let their rivals know where they are. This action might make commercial sense but it makes no sense when a fishing vessel is operating in or near busy shipping lanes.

CASE 18

Mind Your Back

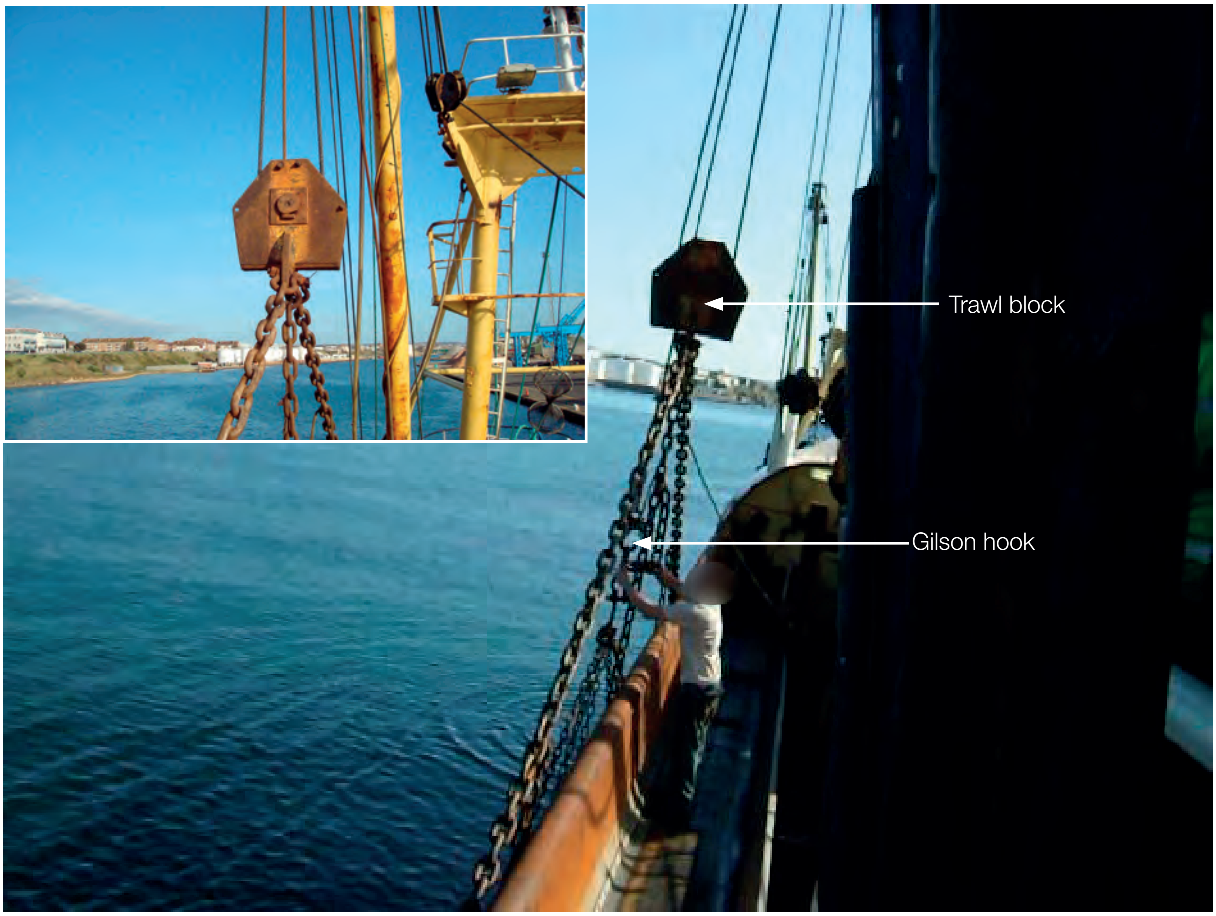
Narrative

The crew of a twin beam scallop dredger had hauled the beams inboard and had secured them in position with the safety chains ready to empty the catch of scallops.

One crewman stood on the port conveyor and attached the gilson wire to the tipping bar (see figure). The trawl block was then hauled and tensioned. The main trawl wire parted and the trawl block and bridle chains fell onto the crewman below. As he was hit by the bridle chains, he fell from the conveyor onto the deck. The crewman was in considerable pain and had difficulty breathing.

The crew considered what action to take, and contacted the owner for advice. Meanwhile another company vessel, with a more experienced skipper on board, came alongside to assist.

As the injured man's condition deteriorated, one of the crewmen contacted the coastguard, who established communication with a doctor. The doctor requested helicopter evacuation for the injured man, who was subsequently airlifted to hospital for treatment. The crewman went on to make a full recovery.



Crewman standing on catch bin attaching gilson wire

The Lessons

1. The main trawl wire parted because it was worn and had become brittle; this was not unexpected as the trawl wire had parted on several previous occasions.

   Regular inspection of wires, particularly those that are used heavily, such as trawl wires, is essential to ensure they are safe for use.

2. A vessel's owner and skipper are responsible for ensuring that lifting and work equipment is suitable for use, as required by the LOLER and PUWER regulations.

   To ensure that crew are working in a safe environment, a planned maintenance system is required by law to verify that fishing gear is suitable for use. The skipper and owner are legally and morally responsible for the safety of the crew.

3. The crew chose to delay contacting the coastguard to evaluate the condition of the injured man.

4. Letting the coastguard know of a problem as soon as possible will ensure that the emergency services are aware of the situation and can provide the optimum response.

CASE 19

Keep it Simple, Keep it Safe

Narrative

A 15.5m wooden fishing vessel (Boat A) left port early in the morning for the fishing grounds. Once clear of the harbour, the skipper handed the wheelhouse watch to one of the vessel's deckhands. The skipper instructed the deckhand to keep the vessel on a south-south westerly track which was shown on the chart plotter. The weather and sea conditions were good, but it was dark, so navigation lights and aft deck lights were switched on. All was set for a good day's fishing, so the skipper went below to get some sleep. Another fishing vessel (Boat B) was 5 cables off Boat A's port bow, and was heading for the same fishing grounds. Both vessels were making good about 8kts.

Meanwhile, a 155m container ship was on passage on a heading of 298° at 15kts. On the bridge were her OOW and an AB lookout. The OOW was sitting in front of an electronic chart system; an ARPA radar screen was to his left (see figure). When the lookout reported the two fishing vessels 1.5nm on the starboard bow, the OOW acknowledged the report but did not acquire the associated targets on radar. Instead, he assessed the fishing vessels' aspects from their navigation lights and altered the autopilot heading about 10° to port to pass ahead of them.

Soon afterwards, the nearest of the fishing vessels (Boat B) passed very close down the starboard side. However, Boat A was now only 7 cables ahead, so the container ship's OOW made a further small alteration to port. As a result, the container ship continued to turn towards Boat A until the vessels collided.

The deckhand on watch on board Boat A had seen the container ship and had initially assessed that she was passing clear. When he saw her closing rapidly from abaft the beam just before the impact, he tried to manoeuvre clear, but without success. Boat A suffered considerable damage to her bow and had to be towed back into harbour.

Bridge control station on container vessel

The Lessons

1. Many OOWs pride themselves on having a 'good seaman's eye' when judging distances and relative movements. Indeed, with experience many have. The only problem is, no one gets it right on every occasion, and there are no excuses for not using navigational aids such as ARPA and compass repeaters to aid the accurate assessment of close quarters situations. The failure to use them is often an indication of laziness or complacency, rather than poor competency.

2. Straightforward crossing situations are routinely encountered and effectively dealt with by most OOWs by simply adhering to the COLREGS. When the COLREGS are ignored, the risk of collision is increased dramatically, particularly when vessels are in close proximity.

3. Although an approaching vessel might seem as though it is passing clear, the actions of others can never be predicted with total certainty. Consequently, when a vessel is abaft the beam, it might be out of sight, but it should not be out of mind, particularly when she's faster than you. Keep checking until you are sure she is past and clear.

Rock Steady - an Abrupt End to a Good Day's Fishing

Narrative

A skipper was new to his vessel, but he had taken the opportunity to go out with the previous skipper a couple of times to familiarise himself with the vessel's handling and with the fishing operation. So what could really go wrong?

It did not seem to matter too much that two out of the three crew had no safety certificates, or that the written risk assessments were not supported by adequate control measures, including those for wheelhouse operations. And he was not concerned that the vessel was not fitted with a watch alarm because he would always be alert to the navigational situation - or would he?

Figure 1: Position of autopilot

After a good day's fishing, the skipper headed back to port at between 7.5 and 8kts. He noted a set of bright lights about 8 miles distant, which he regularly used, near the harbour. He then adjusted the autopilot and set the unstabilised radar display on a 1.5 mile range with 0.25 range rings.

Close to the harbour entrance the skipper indicated he was distracted by one of the crew on the deck, during which time he leaned out of the starboard wheelhouse window, which was immediately above the autopilot (Figure 1), to converse with him. Soon afterwards, the vessel grounded heavily on rocks to the north of the harbour entrance.

The skipper remembered the dangers of taking a vessel off the rocks until the hull's integrity could be established, so he reduced engine power and left the gearbox engaged ahead. He then pressed the DSC on the VHF radio, but not for long enough to activate it. However, he also immediately made a "Mayday" transmission. As the skipper put one of the bilge pumps on the forepeak suction, the crew confirmed that the forepeak and accommodation were flooded but that the fish hold wooden forward collision bulkhead was holding firm (Figure 2).

While waiting for support, the skipper continually monitored the flooding boundary, the crew donned their lifejackets, and the liferaft was deployed in case they had to evacuate the vessel. However, the liferaft inverted. The two crewmen had not completed the Sea Survival Course and were not sure what do. Fortunately, the skipper managed to right the liferaft and, soon afterwards, the local inshore lifeboat arrived and safely recovered the crew.

Figure 2: Collision bulkhead

Figure 3: Stem post emergency repair

After a further stability assessment of the vessel, it was agreed with the coastguard and harbourmaster that an attempt should be made to refloat her to prevent her breaking up and causing pollution within the confines of the harbour. The recovery was successful and the vessel managed to get alongside the quay under her own power, where initial repairs to the foot of the stem post were carried out (Figure 3).

Why did the vessel ground? The skipper was unable to recall any navigational observations, the vessel's relative position to lights, including the sector light, or the distance from land. In addition, no reference was made to the radar to determine the vessel's position and no action was taken to reduce speed or alter course immediately before the grounding.

Although it was suggested there might have been an inadvertent adjustment to the autopilot as the skipper leaned out of the wheelhouse window, the recovered GPS data confirmed that no alteration was made to the vessel's course or speed during the passage towards the harbour. All the signs indicated that the wheelhouse was unmanned at the time of the grounding. It was probable that the skipper was helping the crew to process the large catch so as to minimise the time they would have to spend on board after they arrived alongside.

This was also partly a good-luck story. Once the grounding occurred, the skipper recalled previous lessons learned from similar accidents. Although each grounding incident must be assessed on a case-by-case basis, it is usually prudent to leave the vessel in its grounded position until the integrity of the hull can be established. There are many instances where a vessel has been driven off the rocks, only to founder, and unfortunately all too often with loss of life. Luckily in this case, there was only one minor bruising injury.

The Lessons

Unfortunately there are still too many examples of wheelhouses being left unattended, either while defects are being rectified or while crew are assisting in dealing with a fishing catch. It is at this point that the crew and vessel are at most danger from collision, contact and grounding.

Rule 5 of the COLREGS emphasises the importance of lookouts. The MCA's MGN 313 F (Keeping a Safe Navigational Watch on Fishing Vessels) reinforces Rule 5 of the COLREGS and specifically states that the wheelhouse should never be left unattended and that the person in charge of the watch should not undertake any duties that would interfere with the safe navigation of the vessel.

Both of these publications are available on the MCA's website at www.mcga.gov.uk.

1. It is of the utmost importance that a safe navigational watch is maintained, including lookout, while the vessel is at sea. Not to do so, on the pretence that you have got away with it in the past, is courting disaster.

2. Although watch alarms are not mandatory for fishing vessels, they are a very useful tool for keeping those on the navigational watch alert, especially when in autopilot control.

3. It is the owner's and skipper's responsibility to ensure that the crew have completed the mandated safety courses. Details can be found in MGN 411 (M+F) - Training and Certification Requirements for the Crew of Fishing Vessels and their Applicability to Small Commercial vessels and Large Yachts.

4. Do familiarise yourself with the DSC facility on your particular make and model of VHF radio. The button is normally required to be held depressed for 5 seconds to activate the emergency transmission. Do check the manufacturer's manual.

5. Risk assessments are important, but they are only as good as the effort put into compiling them. When a hazard is identified, do make sure that it is recorded and that any control measures are implemented. It is no good for the solution to remain within the pages of the risk assessment folder - the danger will still exist!

Five Go Fishing

Narrative

During a weekend camping expedition five men went out to fish on a large, remote tidal lake in an open wooden boat. The boat was approximately 3.7m long and had an outboard engine and two oars (figure).

All of the men wore buoyancy aids as they fished. As the wind increased during the day, they found shelter on the far side of the lake. At the end of the day they headed back across the lake to the campsite. The wind increased further, and the heavily laden boat started to take water over the low gunwale. The boat was quickly swamped. The men abandoned the boat as it sank beneath them, and swam towards the shore.

Despite the objections of his friends, one of the men removed his buoyancy aid to enable him to swim better. The four men wearing buoyancy aids all made it safely to the shore. The man without a buoyancy aid did not reach the shore, and drowned.

Due to the lake's remote location it took well over an hour for the alarm to be raised and mobilise a search and rescue operation.

The open wooden boat

The Lessons

1. The fishing boat was not suitable for five men, particularly for the weather conditions on the day. Applying thought as to the boat they were about to use, and taking a considered look at the weather forecast, should have alerted them to the dangers.

2. As the weather deteriorated, rather than return to their campsite the men decided to continue to look for sheltered spots so that they could continue fishing. Had they realised the danger they were in, they could have remained on the far side of the lake and waited for the wind to decrease, or found another way back to their camp.

3. All the men had the foresight to wear buoyancy aids, and these probably saved the lives of four of them. Tragically, the fifth man's decision to remove his buoyancy aid cost him his life. A buoyancy aid will keep a wearer's head out of the water and reduce the effort required to swim. Without this additional buoyancy a person can quickly tire and drown.

4. In remote locations the time it will take to get help can be significantly longer, particularly when there is no mobile phone coverage.

CASE 22

Who Will Help Me If Something Goes Wrong?

Narrative

A lone fisherman took an 8m potter out to fish for the first time. Previously, he had either crewed for the owner or, when skipper, had taken a second crewman with him.

The exact course of events will never be known for certain, but it is likely that the fisherman was either knocked or dragged overboard when the back rope came off the rope hauler as the creels were being hauled on board.

A fresh wind was blowing against a spring tidal flow, and the swell steepened closer to the shore where the boat was working, making it roll. The boat was fitted with a potting roller at the gunwale rather than a more traditional davit and open block arrangement (Figure 1). While this reduced the work of handling the creels, there was always a chance that, if the boat yawed, the lead of the back rope could change, allowing the rope to come out of the hauler.

The fisherman was not wearing a PLB or a PFD. The alarm was not raised until several hours after he fell overboard.

His body has not been found.

Figure 1: Potter showing potting roller - fishing single-handedly

Figure 2: Additional vertical roller fitted close to the 'V' hauler

The Lessons

1. The condition in which the boat was found after the accident, its contents, and the location of its gear, provided significant clues as to how the accident happened. It is considered most likely that the fisherman was knocked or dragged overboard when the tensioned back rope led aft on the potting roller, allowing the back rope to ride out of the 'V' hauler.

   Careful boat handling is needed to make sure that the back rope leads onto the hauler correctly. This is best achieved by steering the boat so that the back rope leads from an angle forward of the beam. However, this is not always easy to achieve, particularly when working alone in demanding weather and tide conditions. If the back rope is allowed to lead from aft of the beam, there is a chance that it will ride out of the hauler, and the tension from the other creels still in the sea will quickly drag any creels that are on board back over the side. A modification to the system, such as the fitting of an additional vertical roller on the baiting table, can help prevent this from happening (Figure 2).

   Single-handed fishing introduces new hazards and increases the threat from existing hazards as the workload grows. There is nobody else to raise the alarm or help in an emergency, so fishermen working alone must consider how they might raise the alarm. Help could be some time in coming, and lone fishermen should think about how best to use lifelines to prevent them from falling into the sea, and personal flotation and location devices to improve their chances of survival if they do go overboard.

2. The pros and cons of wearing PFDs are well known. However, in this case if one had been worn, and a PLB had activated, the rescue services might have had sufficient time to find the fisherman alive.

   Fishermen operating single-handedly should carefully consider the benefits of carrying a PLB to alert the coastguard of a problem, and wearing a PFD to increase their survival time while rescue is on its way.

3. The topics discussed above are not just for the fisherman's benefit. Death, and a missing body, causes grief and great stress to relatives and friends. If you have any reservations about the usefulness of PLBs and PFDs, think about the effect your loss at sea will have on your loved ones.

Part 3 - Small Craft

Getting out on boats of all shapes and sizes, whether for commercial purposes or just for fun is something that literally millions of people do every year in the UK. Whether their vessel of choice is a sailing dinghy, a personal water craft, a high speed RIB, a sailing yacht or a motor cruiser - the boating population gets afloat in their droves.

Clearly part of the attraction of boating is that it can be challenging at one level or another. Whether your idea of a challenge is a cruise on a sunny day in familiar waters in 10kts of wind or a cross channel race, overnight in 30kts of wind there is something out there for everyone. If we didn't like the idea of a challenge we would sit around talking about boating and playing nautical computer games rather than getting out and enjoying the sun (or rain) on our faces and wind in our hair.

For the most part these activities happen safely and without incident, but every now and then something goes wrong. The MAIB Safety Digest is an excellent vehicle for communicating the lessons learned as a result of some of the incidents and accidents they investigate where small craft are concerned. The RYA continues to work closely with the MAIB when it comes to identifying common themes and communicating the key messages to prevent recurrences. The MAIB Safety Digest is an essential part of this process.

One element that is often identified as a common thread with accidents on the water is that of complacency. Whether that complacency relates to passage planning, navigation, safety, communication or maintenance of a vessel or its equipment the effects can be equally devastating.

A common problem seems to be that many boaters plan for operating under "normal" circumstances and when something out of the ordinary comes along they are not properly prepared for it. The first two cases of the Small Craft section in this edition of the Safety Digest are perfect examples of where something "unusual" happens - catching the skipper and crew unprepared. In one case a skipper operating in familiar waters did not have a plan in place for when visibility closed in. In a second case a crew was faced with a man overboard in unusual circumstances (the MOB was the skipper and was still attached to the boat) and the ideal solution was not immediately evident.

The final example in this edition highlights the need for vigilance in the checking of boats and their equipment with regards preventative maintenance.

The news is not all bad. With the tens of thousands of people who take to UK waters in small craft every week the rate of incidents and accidents is relatively low. However, through reading, digesting and passing on the important lessons learned from each of these incidents we will be able to ensure that these activities become safer still.

This publication is best placed face up on a coffee or reception table rather than vertically on a bookshelf if we are truly committed to improving safety at sea on large ships and small!

Richard Falk

Growing up in Australia Richard has always had a keen interest in all things involving the sea. From early childhood he has pursued a variety of interests on the water including SCUBA diving, kayaking, fishing, power boating, windsurfing and sailing.

20 years ago he developed a serious addiction to sailing on board yachts and when he found work was getting in the way of his pastime he decided it was time to leave his corporate career and turn his hobby into a profession.

Richard has gone on to own several marine businesses both in Australia and in the UK and has set up RYA recognised sailing schools in several countries. His experience in both commercial power and motor boats and extensive sail racing and cruising background in locations all over the world have provided him with a great insight into the small craft sector internationally.

Having raced yachts in Australia for many years Richard was selected to skipper the Singapore entry in the 2005 / 2006 Clipper Round the World Race finishing a respectable 5th. Since then he has been involved heavily in sail training both in the UK and overseas.

In 2010 Richard joined the RYA and took over as Training Manager and Chief Examiner with responsibility for all RYA training schemes across more than 2,500 training centres as well as the renowned RYA Yachtmaster qualification.

CASE 23

Are We There Yet?

Narrative

It was the end of summer, the sea temperature was still reasonable, and it seemed like a good day for a group of five adventurous sports divers to hone their skills diving off an island 7 miles from the coast. The group were known to each other, and the skipper - who ran the local Sub-Aqua Club to which they were attached - knew the area well.

Although there had been sea mist earlier in the day, it appeared to be clearing and the visibility had increased to about 1 mile as the group set off in the dive RHIB during the early afternoon. However, it wasn't long before the skipper felt uneasy. The swell had increased, the weather was closing in, and it was decided that the conditions would make diving unsafe. The group unanimously agreed to return to port.

A short time later the fog quickly rolled in, reducing the visibility to about 30 metres. The skipper had previously noted from the GPS the course made good towards the port, and he continued to steer in the severely restricted visibility.

Very soon, the skipper sighted breakers about 30 metres from the shore, but the port was not in sight. He decided to run parallel to the coast, at about 10kts, knowing that the RHIB could be brought to a rapid stop if needed, as he headed in the direction of the port.

The group continued to watch for any signs of waves breaking over hidden obstructions when suddenly the RHIB hit a submerged reef and came to an abrupt stop. The engine was immediately disabled, leaving only the two paddles to control the RHIB. Despite the group's best efforts, the swell quickly drove the RHIB onto the rocky shore. Luckily the group managed to scramble over the rocks to safety, and while the skipper contacted the coastguard for assistance another of the group went inland to find out their location. It was found that the RHIB had come ashore about $1\frac{1}{2}$ miles north-east of the port.

The group managed to remove their dive equipment to lighten the RHIB, which had been holed in a number of areas. The lifeboat arrived on scene some time later after the fog had lifted (figure) and took the RHIB under tow back to the port.

Recovery of the dive RHIB

The Lessons

The group were lucky to escape the grounding without injury. Had the sea conditions been worse the outcome could so easily have been different.

1. While the skipper and the group knew the area, there was an over-reliance on their personal knowledge, and this resulted in a degree of complacency. There were early indications to suggest changeable weather conditions, but these went largely unheeded in the pursuit of diving until the changing sea state forced a re-assessment.

2. The importance of planning a passage for both clear and restricted visibility cannot be over emphasised. There was virtually no consideration given to navigation because this was supposed to have been a straightforward, local trip, within sight of land and the home port. This case shows just how quickly circumstances can change, and how easily disorientation can occur once visibility reduces.

3. As a minimum, the GPS should have been programmed with waypoints for the dive site and the harbour entrance, and any other turning points between the two. This would have ensured the skipper could navigate home, and would have alerted him to the effects that the wind and tide were having on the RHIB's track.

Racing to Disaster

Narrative

A very experienced and competitive skipper of an offshore racing yacht had assembled a crew for what was to be a demanding cross-channel race. Some of the crew had attended a training weekend, during which about half had practised one man overboard drill.

Despite some crew changes due to unavailability of the regular team, the skipper was very optimistic that his yacht and crew would perform well. Not even the very poor weather forecast, predicting gale force winds and very rough seas, dampened his enthusiasm.

The crew arrived at the marina in good spirits and looked forward to the challenge ahead. Just before sailing at 1720, the skipper gave a short briefing on the race strategy and the weather. Notably, he did not discuss the actions to be taken in the event of an emergency, particularly how to deal with a man overboard situation, and no one was nominated to replace him should he become incapacitated.

Just before the race start, the crew had problems managing the sails. The reefing lines had not been put in the mainsail, and the genoa's forestay luff groove was very stiff, which caused difficulties in hoisting the sail. One of the spinnaker halyards was "shot up" the mast and there was a tear in the genoa's luff. Having overcome these problems, things settled down. A number of genoa changes took place and, on each occasion, the replaced sail was stowed below in the cabin.

Just before midnight, as the wind gusted up to 38kts and the seas built to 3.5m, the skipper decided to replace the No. 1 genoa with a No. 3 genoa. Contrary to the skipper's normal practice, the No. 1 genoa was secured to the port forward stanchions and guard wires (Figure 1). Soon afterwards, the skipper and two crewmen went to the cabin for a short rest. Just after midnight, in poor visibility, the helmsman spotted that the No. 1 genoa had slipped into the water as the port toe rail dipped below the surface.

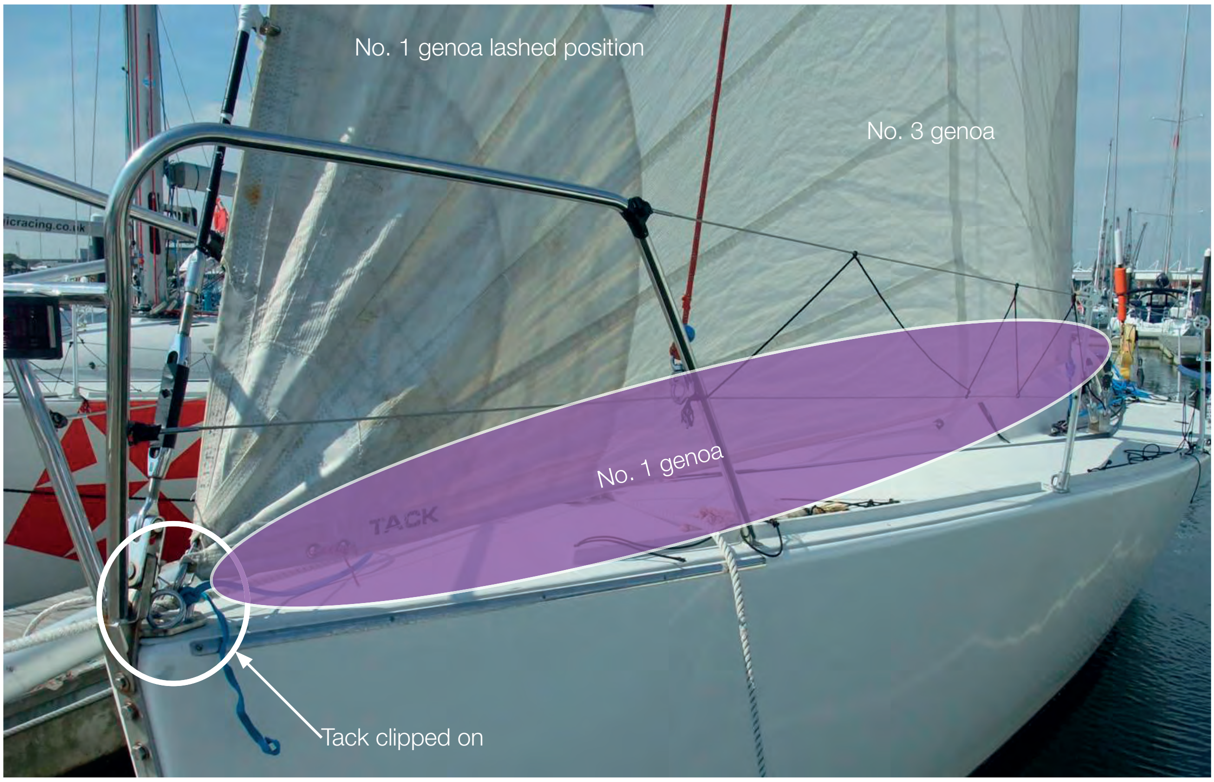


Figure 1: No.1 genoa lashed to the port forward stanchions and guard wires

Figure 2: Tether connected to the starboard jackline

The skipper was roused, and he and two crewmen clipped onto the starboard jackline (Figure 2) with their 1.8 metre-long tethers, and made their way forward, on the high starboard side.

As the sail was recovered and taken down the starboard side, it became snagged on the forward centreline cleat. The two-man recovery team were facing aft as the skipper released the snag. Moments later, they saw a lifejacket strobe light on the port side, through the pale rigged genoa. They immediately shouted “man overboard”.

The helmsman, knowing that the skipper was still tethered to the yacht, opted to drop the mainsail and, a short time later, the genoa. This slowed the yacht down to about 1.5kts through the water. He then concentrated on keeping the yacht as upright and steady as possible to aid the skipper’s recovery. As the skipper was still clipped on, the helmsman thought his recovery would be easier than if he had not been clipped on.

Unfortunately, it was anything but easy.

The skipper’s tether was clipped to the starboard jackline. He had passed over the spinnaker pole and under the bottom guard wire (Figure 3). The skipper’s inflated lifejacket bladder was partially covering his face, which made it difficult to check for signs of life. The situation was confused and was hampered by poor communications because no one was in overall control during the early stages of the accident as no one had been nominated to take over from the skipper.

There was no response from the skipper as the crew fought hard to keep his head above water, but with limited success. After about 10 minutes of strenuous effort, a spinnaker halyard was connected to the skipper’s tether and he was hauled clear of the water (Figure 4).

The helmsman then put the yacht onto a port tack, which further aided the skipper’s recovery. Just as the skipper was hauled on deck, his lifejacket was pulled from his body and over his head.

Sadly, despite the crew’s best efforts, the skipper had drowned.

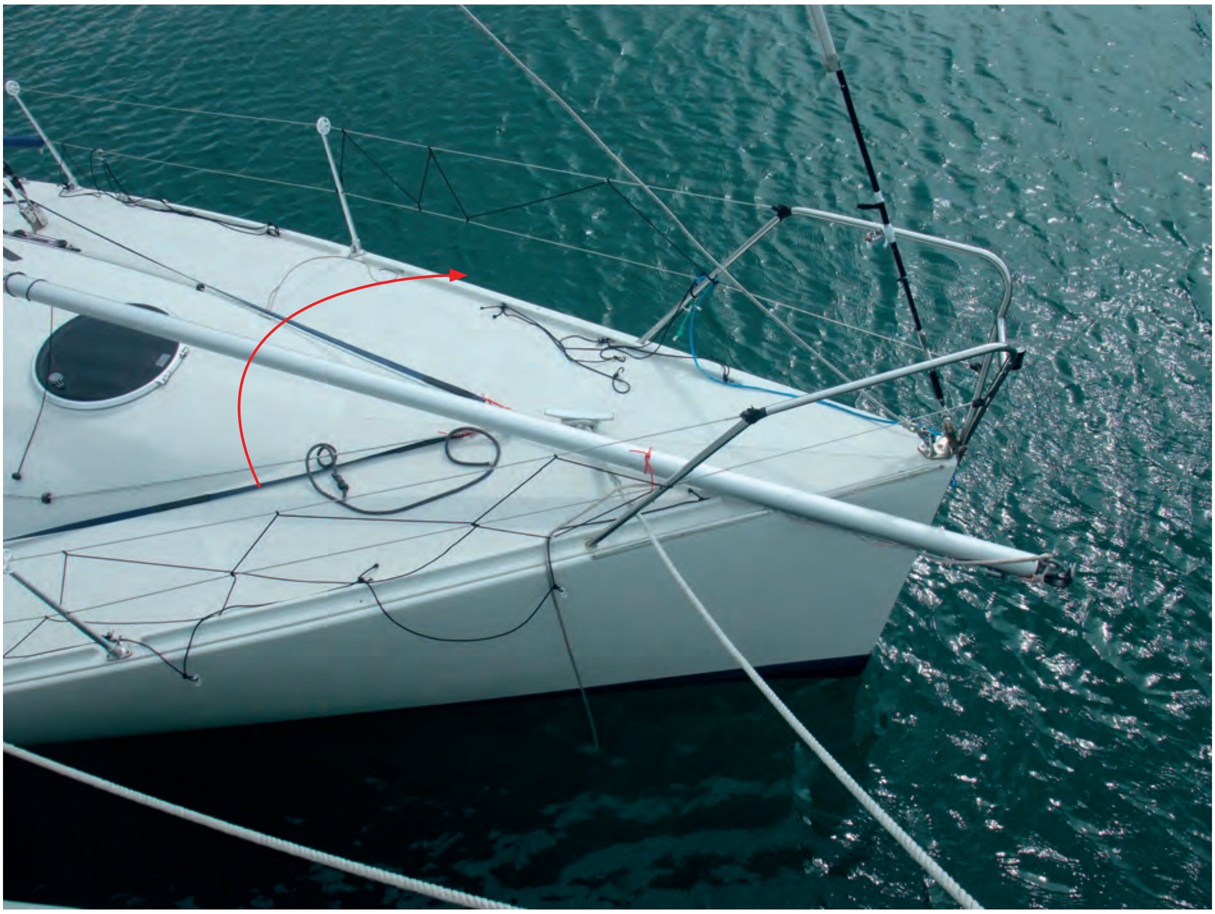


Figure 3: Path of the skipper falling overboard

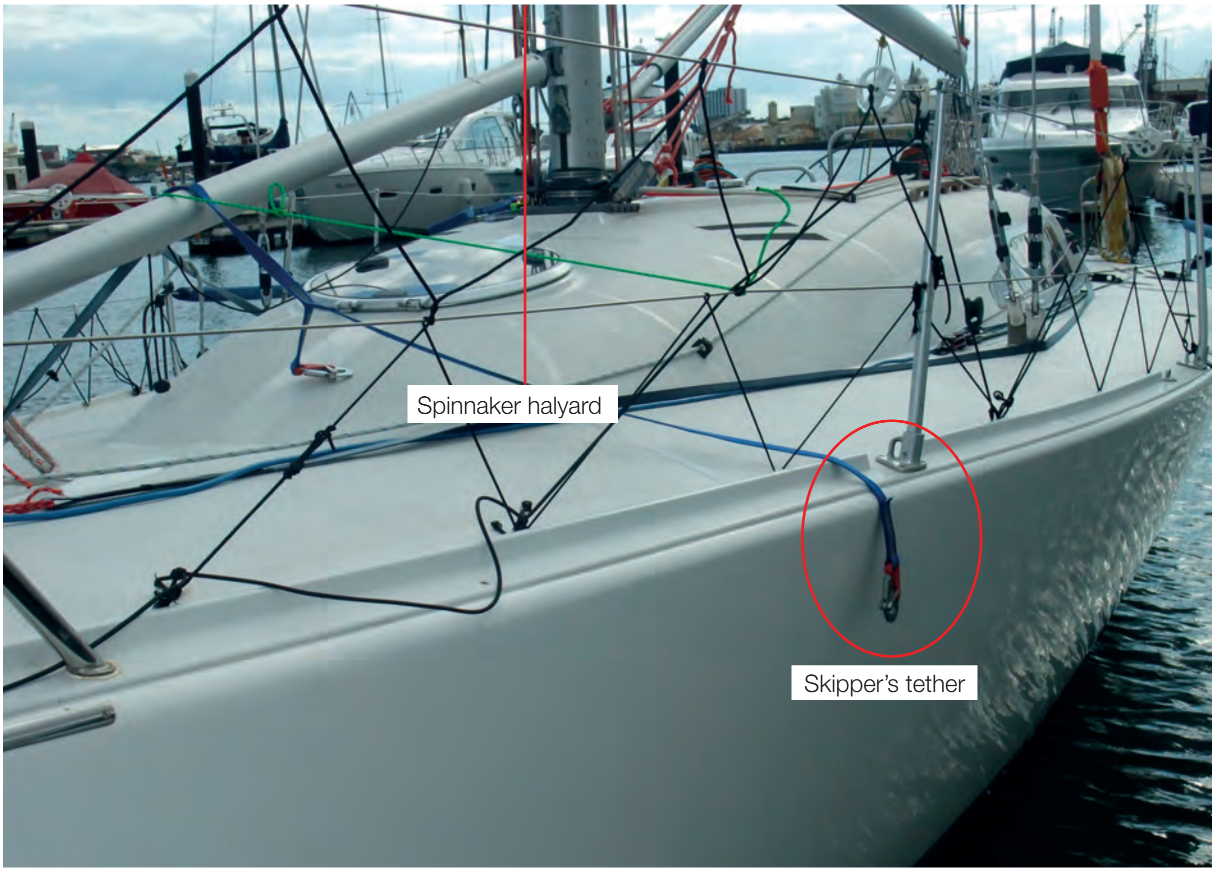


Figure 4: Spinnaker halyard connected to the skipper's tether

The Lessons

Although none of the crew saw the skipper go overboard, all the evidence points to him having lost his footing, probably due to a combination of the yacht's motion and intermittent seas washing across the deck as he started to make his way towards the cockpit along the high, starboard side.

Had the skipper clipped on using one of the 800mm short tethers which were on board, it would have constrained him and he would not have gone overboard.

1. It is inevitable that there will be a mix of old and new crew members on board racing yachts. It is therefore very important that emergency procedures are fully understood and that manoverboard drills are carried out regularly.

2. Remember - recovering a heavy, unconscious, tethered person is extremely difficult. Add to this the problem of darkness, gale force winds and very rough seas and it becomes clear that much thought needs to be given to the problem. Think through the problems NOW - do NOT leave it until it is too late.

3. Briefings are an essential part of the safe operation of the vessel. Crew need to know what to expect if their actions are to be instinctive and safe during an emergency. Your life could rely on the prompt action of your fellow crew members.

4. It is all too often assumed that "of course someone will take over if the skipper goes over the side". Are you sure you know who that person would be? Would it be YOU? Prompt incident management and good communications between the helm and those involved in the recovery are essential if a safe outcome is to be achieved. It is therefore prudent to always nominate a skipper's replacement.

5. The skipper's lifejacket rode up his body and over his face and was pulled from him during the latter stages of the recovery. Do ensure that waist and crotch/thigh straps are properly adjusted to prevent this. If the lifejacket is not your own, retain it for the duration of the race so that re-adjustment is not needed in an emergency.

6. Tethers or lifelines can be of the two or three-hook variety; the latter incorporates a short tether of about 800mm. Use short tethers where the risk of falling overboard is high - especially in the pulpit area when in hostile weather conditions. Although they can restrict movement, their prudent use may well save your life.

Boom Bang a …!

Narrative

A charity organisation's aim was to encourage injured and disabled persons to undertake the physical and adventurous sport of competitive sailing. Many people took up the challenge and thoroughly enjoyed the opportunity to sail and race on equal terms with their able-bodied counterparts.

As had often happened, the charity bareboat chartered a 3-year old J80 yacht from a separate charity to compete in a race involving 23 other yachts. Both organisations were well known to each other and the arrangement had always proven to be very successful.

The yacht-chartering charity took great pride in maintaining its vessels to a high standard, and the size of the J80 made it ideal for crewing by the two disabled and two able-bodied people who intended to race it. Although the able-bodied crew fulfilled a "minding" role, the charity also provided its own boat, with a medical doctor on board, to provide immediate extra support for the disabled crew, and this was in addition to the race organiser's safety boat.

Although on the day of the race the weather was challenging, the crew were experienced and were very much looking forward to putting in a good performance. The race got underway and the crew and the yacht were doing well (Figure 1). Unfortunately things were about to take an unexpected turn.

Figure 1: J80 race

Figure 2: Failed boom

The yacht was bearing away with the kicking strap still under tension as the skipper set up for a gybe. As the able-bodied bowman crossed the boat under the boom it snapped without warning. The sharp and jagged ends of the failed boom (Figure 2) landed on the bowman's head with considerable force, causing deep lacerations. A crew member immediately applied pressure to the wound as the injured person slipped in and out of consciousness. While the skipper transmitted a "Mayday", the doctor transferred to the yacht from the charity's safety boat and took over the medical care. Soon afterwards, the casualty was transferred to hospital by a rescue helicopter.

Fortunately there was a happy ending as the casualty was released from hospital 36 hours later. Had it not been for the prompt action of the crew and doctor in administering first-aid, the outcome could have been far more serious.

On investigation, it was found that the aluminium boom's point of failure was at the kicking strap boom connection point. In particular, the stress failure occurred in line with one of the rivet holes which fastened the stainless steel kicking strap connection to the boom (Figure 3).

The boat-chartering charity undertook a thorough check of all of its yachts and no further defects were found.

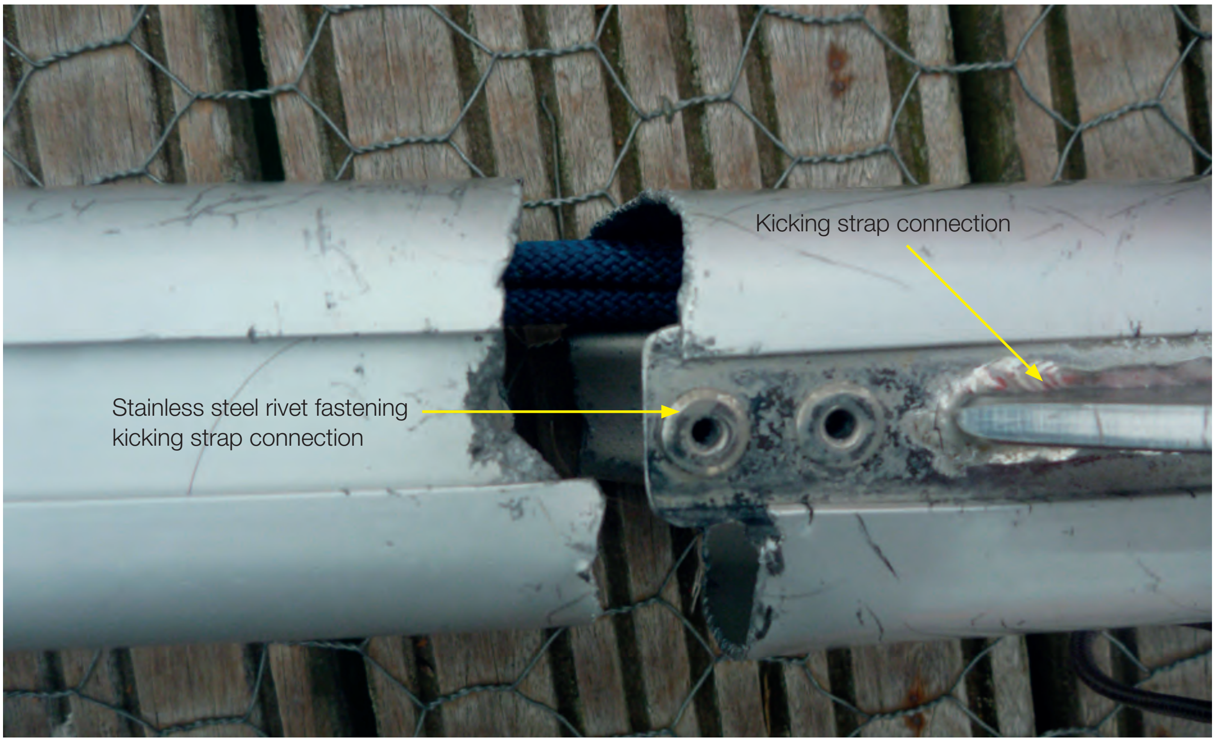


Figure 3: Stress failure point of boom

The Lessons

A yacht's spars (masts, booms, spinnaker poles and associated equipment) are subject to very high loading and are designed to be capable of functioning correctly and safely in often extreme conditions. It is the nature of sailing that cyclic loading will occur, and the kicking strap arrangement is a good example of this.

Stress levels will increase where corrosion exists, and this can often be set up where dissimilar metals are used without insulation between their interfacing surfaces. The stress levels will also increase where there is a change of direction or discontinuation, and are exacerbated by cyclic loading. In this case, the stainless steel kicking strap connection point was attached to the aluminium boom. The subsequent stress failure occurred where there was a discontinuation, which was at the drilling where one of a number of rivets was used to secure the kicking strap connection point.

1. The imminent failure of spars can be very difficult to detect. However, regular inspections of connection points and, where dissimilar materials are used, are good areas on which to focus.

2. Keep equipment clean and remove salt build-up to reduce the chances of corrosion-induced cracking.

3. The extent of hairline cracks can be difficult to ascertain, but there are a number of non-destructive techniques to determine their severity. Do consider the use of a specialist in this area if you are in doubt.

4. Look for signs of loose connection points as cyclic loading will further loosen them, leading to possible failure, and attend to their rectification as soon as possible.

5. If a failure occurs, it is always worthwhile alerting the builder as this may be a "class" defect which may warrant a safety alert or other action.

Investigations started in the period 01/03/2012 to 29/08/2012

Date of Occurrence	Name of Vessel	Type of Vessel	Flag	Size (gt)	Type of Occurrence
7/3/2012	*Stena Feronia*	Ro-ro vehicle/ passenger ferry	UK	21856	Collision
	Union Moon	General cargo	Cook Islands	1543	
10/3/2012	*Timor Stream*	Regrigerated cargo	Liberia	9307	Collision
	Seagate	General cargo	UK	17590	
24/3/2012	*Spring Bok*	General cargo	Netherlands	12113	Collision
	Gas Arctic	Gas carrier	Malta	2985	
24/3/2012	*Saga Sapphire*	Passenger vessel	Malta	37301	Accident to person
3/4/2012	*Carrier*	General cargo	Antigua and Barbuda	1587	Grounding
11/4/2012	*Onward*	Fishing vessel	UK	202	Fire
17/5/2012	*Purbeck Isle*	Fishing vessel	UK	5.5	Foundering (3 fatalities)
10/6/2012	*E.R Athina*	Platform supply ship	Liberia	4488	Accident to person (1 fatality)
2/7/2012	*Coastal Isle*	General cargo	Antigua and Barbuda	3125	Grounding
9/7/2012	*Denarius*	Fishing vessel	UK	113	Fire
23/7/2012	*Betty G*	Fishing vessel	UK	13.96	Capsize
1/8/2012	*Alexander Tvardovskiy*	General cargo	Russian	2319	Collision
	UKD Bluefin	Dredger	UK	4171	
	Wilson Hawk	General cargo	Barbados	2811	

APPENDIX B

Reports issued in 2012

About Time – fatal man overboard, off Pembrokeshire on 14 June 2011
Published 8 March

Blue Note – derailment of the hatch-lid gantry crane while alongside in Londonderry, Northern Ireland on 22 July 2011
Published 29 March

Cameron – serious injury to a chief officer, Crosby Channel, Liverpool on 21 November 2011
Published 1 June

Chiefton – collision, capsize and foundering, with the loss of one crew member at Greenwich Reach, River Thames on 12 August 2011
Published 23 May

Clonlee – electrical blackout and subsequent grounding of the feeder container vessel on the River Tyne on 16 March 2011
Published 28 March

CSL Thames – grounding in the Sound of Mull on 9 August 2011
Published 1 March

Dette G – man overboard during cargo operations, Queen Elizabeth Dock, Hull on 16 January 2012
Published 17 May

Golden Promise – grounding on the Island of Stroma on 7 September 2011
Published 1 March

Karin Schepers – grounding at Pendeen, Cornwall on 3 August 2011
Published 17 May

Lion – fatal man overboard from the Reflex 38 yacht, 14.5 miles south of Selsey Bill, West Sussex on 18 June 2011
Published 8 March

Morfil/Sun Clipper – collision between the rigid inflatable boat *Morfil* and the passenger vessel *Sun Clipper* by Blackfriars Road Bridge, River Thames on 1 June 2011
Published 18 April

Moyuna – grounding at the entrance to Ardglass Harbour, Northern Ireland on 21 November 2011
Published 9 July

Pride of Calais – machinery failure leading to contact with berth, Calais, France on 22 October 2011
Published 9 July

Saffier – failure of the controllable pitch propeller of the cargo ship, resulting in heavy contact with a berthed tug in Immingham harbour on 25 June 2011
Published 10 May

Tempanos – fatality while berthed in Felixstowe, UK on 17 December 2011
Published 3 August

Tombarra – fatality of a rescue boat crewman, Berth 3, Royal Portbury Docks on 7 February 2011
Part A – the failure of the fall wire
Part B – the weight of the rescue boat
Published 19 July

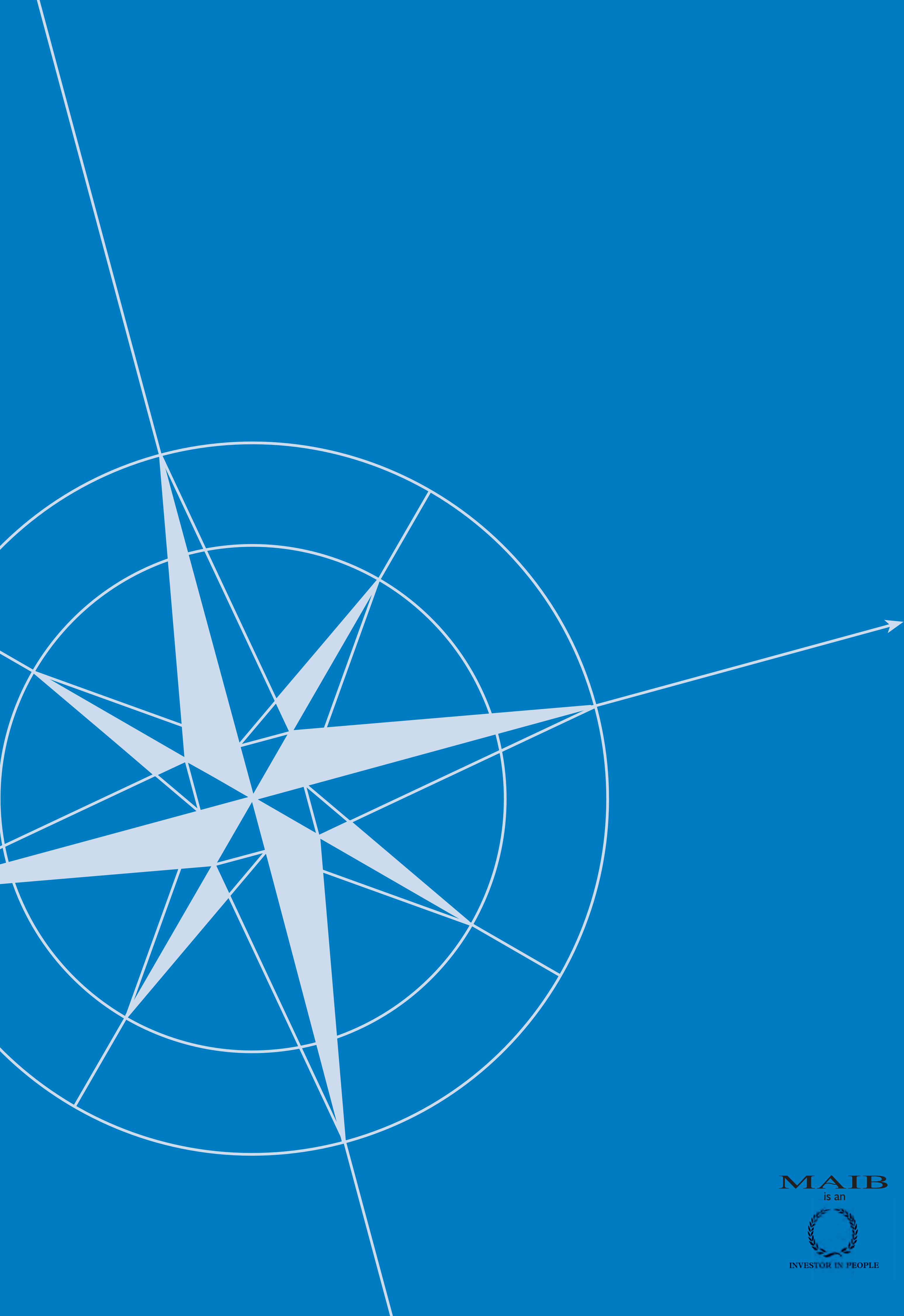
Vellee – flooding and foundering in the Little Minch on 6 August 2011
Published 23 February

Safety flyers issued in 2012

Chiefton – collision, capsize and foundering with the loss of one crew member at Greenwich Reach, river Thames
www.maib.gov.uk/cms_resources.cfm?file=/Chiefton_flyer.pdf
Issued May 2012

Starlight Rays – fatal accident to a crewman while operating a petrol engine-driven pump in fishing vessel's hold
www.maib.gov.uk/cms_resources.cfm?file=/StarlightRaySafetyFlyer.pdf
Issued June 2012

Tombarra Part A – fatality of a rescue boat crewman at Berth 3, Royal Portbury Docks
www.maib.gov.uk/cms_resources.cfm?file=/TombarraPartA_SafetyFlyer.pdf
Issued July 2012



MAIB

is an

INVESTOR IN PEOPLE