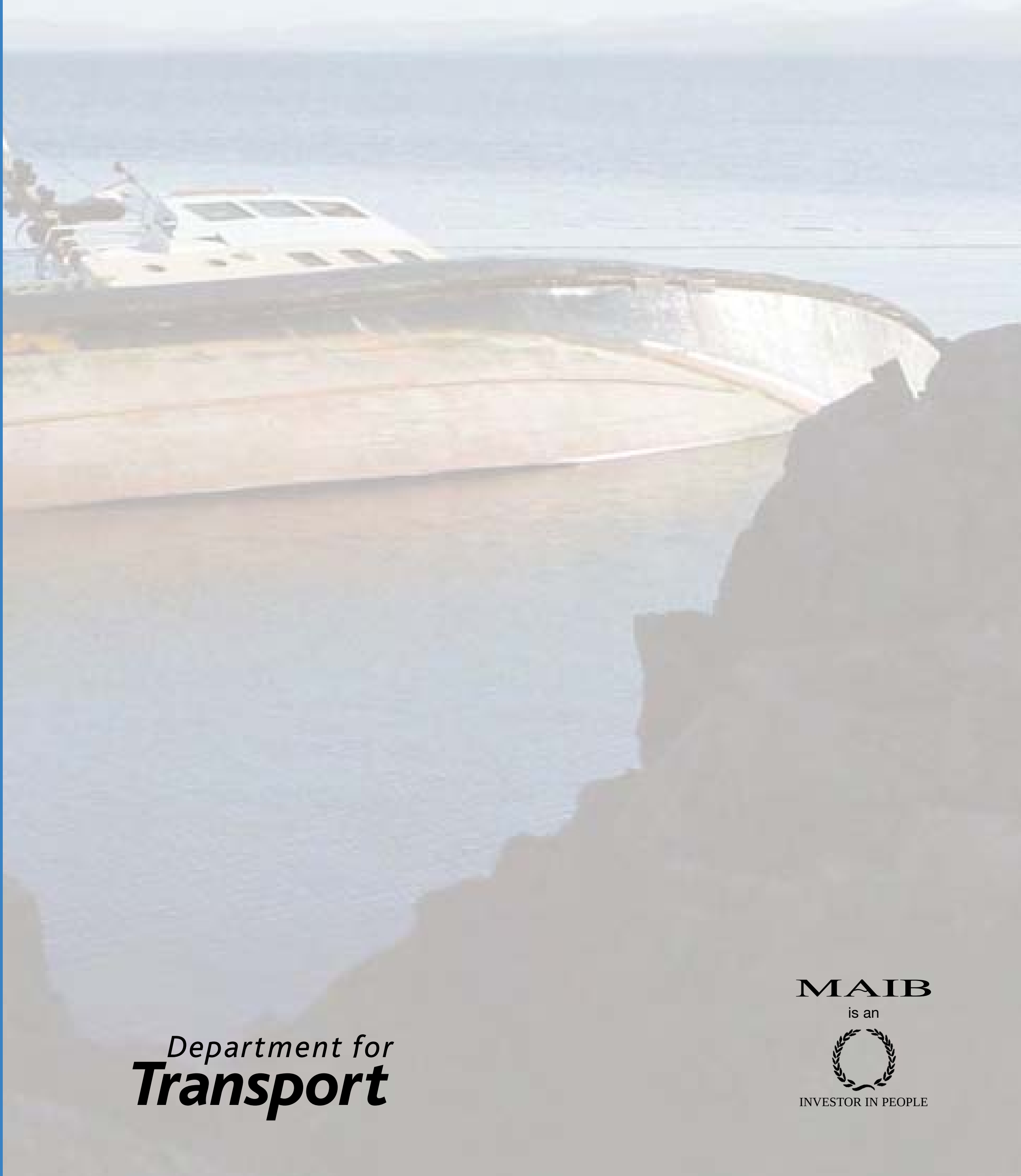
MAIB

MARINE ACCIDENT INVESTIGATION BRANCH

SAFETY DIGEST

Lessons from Marine Accident Reports 3/2005



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Department for Transport
Eland House
Bressenden Place
London SW1E 5DU
Telephone 020 7944 3000
Web site: www.dft.gov.uk

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MAIB
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MARINE ACCIDENT INVESTIGATION BRANCH

The Marine Accident Investigation Branch (MAIB) is an independent part of the Department for Transport, the Chief Inspector of Marine Accidents being responsible directly to the Secretary of State for Transport. The offices of the Branch are located at Carlton House, Carlton Place, Southampton, SO15 2DZ.

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 facts which have 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.

The Safety Digest and other MAIB publications can be obtained by applying to the MAIB.

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 2005 – Regulation 5:

"The sole objective of the investigation of an accident under the Merchant Shipping (Accident Reporting and Investigation) Regulations 2005 shall be the prevention of future accidents through the ascertainment of its causes and circumstances. It shall not be the purpose of an investigation to determine liability nor, except so far as is necessary to achieve its objective, to apportion blame."

INDEX

Glossary of Terms and Abbreviations

AB	–	Able Seaman
ARPA	–	Automatic Radar Plotting Aid
CO_2	–	Carbon Dioxide
ECDIS	–	Electronic Chart Display and Information System
GPS	–	Global Positioning System
GRT	–	Gross Registered tonnes
IMO	–	International Maritime Organisation
ISM	–	International Safety Management Code
ISO	–	International Standards Organisation
LOLER	–	Lifting Operations and Lifting Equipment Regulations
“Mayday”	–	The international distress signal (spoken)
MCA	–	Maritime and Coastguard Agency
MGN	–	Marine Guidance Note
OOW	–	Officer of the Watch
PEC	–	Pilotage Exemption Certificate
RFA	–	Royal Fleet Auxiliary
Ro-Ro	–	Roll on/Roll off
SMS	–	Safety Management System
VHF	–	Very High Frequency
VTS	–	Vessel Traffic Services

Introduction

The wide variety of accidents and incidents covered in this Safety Digest is an excellent reminder of just how broad our industry is – and a warning that hazards lurk everywhere.

There are some good-news cases, where we should learn how others have done things well: an engine room fire well handled by a practised and confident crew; an heroic jettison of cargo to save a listing ship; a pilot's concern at the stability of a vessel he was about to take to sea; the quick reaction of an angling boat skipper, who cut his anchor rope to avoid being run down; and the fitting of a cheap smoke alarm to a new yacht that saved a major fire.

But there are also tragedies, with loss of vessels and loss of life. We need to consider these too, to see if we can make sure that such things could never happen to us.

One of our greatest dangers at sea is complacency. We may do things a thousand times – and get away with them. But when what we are doing becomes so second-nature to us that we do not think about it, then we have become a danger to ourselves and others. In reading the cases in this Safety Digest, consider how they apply to you. Hopefully they will make you think . . .

Stephen Meyer
Chief Inspector of Marine Accidents
December 2005

Part 1 – Merchant Vessels

It is a privilege to be asked to write an introduction to the Safety Digest, but it came as some surprise to note that one of the case studies covered an incident with which I was very familiar. However, I was pleased to note that the lessons learned were in line with my own analysis of the incident, and reinforced my belief that challenges will always rise up to confront the best of Safety Management Systems.

Isn't hindsight marvellous! It enables all of us to explain in extremely articulate and knowledgeable terms why the incident occurred and, more importantly, how it would never have occurred had we been in charge! You only have to read "the lessons" that follow each set of case notes in the "Safety Digest" to see that most of these incidents could have been prevented if the individuals or organisations involved had really thought about how they managed their activities.

If we spent as much time on accident prevention as we do analysing the after effects of an incident there is a real possibility that we could reduce loss and suffering, and maybe we would all sleep more comfortably. There is no doubt that we can learn from our mistakes, but if we really applied the principles of the IMO International Safety Management Code, carried out thorough Risk Assessments, analysed our critical systems and ensured our Safety Management Systems were credible and healthy, most of our "losses" could be prevented.

So how do we, as responsible operators, implement acceptable, compliant, proactive and cost effective loss control? I strongly believe in the principles of the ISM Code, and am convinced that the most effective tool in its armoury is the requirement to identify and analyse critical systems; it is unfortunate that this obligation appears in section 10 under "Maintenance of Ship and Equipment" and implies that a critical system is equipment related. However, the principles can clearly be applied to people, management systems and processes. If applied across this broader spectrum, we can really start to be proactive. As you read this issue of the "Safety Digest", test each case with the ISM criteria "the sudden operational failure of which", apply this across the SMS and decide if your own systems are sufficiently robust to withstand close scrutiny.

David Preston

David Preston is a Captain in the Royal Fleet Auxiliary and has recently finished a three year appointment as Chief Staff Officer (Engineering) with the Royal Navy's Commander in Chief Fleet. His responsibilities included Availability Management, Flotilla Safety Officer and DPA. He has now been seconded to Rolls Royce for two years to develop his programme management and business development skills.

David started his Officer Cadetship with the Royal Fleet Auxiliary in 1973 and rapidly gained his Class 1 Steam and Motor Certificates of Competency. He has served on all types of RFA, undertaking military operations across the world including the Persian Gulf, Falkland Islands and Sierra Leone. He has also worked within the headquarters unit specialising in Nuclear, Biological, Chemical Defence and Damage Control, Occupational Health and Safety and Quality Management Systems.

He is a Chartered Engineer, Fellow of IMarEST and a Member of the Institute of Occupational Safety and Health. He has been a member of the Maritime Advisory Board of the Confidential Hazardous Incident Reporting Programme (CHIRP) for two years.

Ro-Ro Ferry Bow Door Failure in Port

Narrative

During a routine inspection of the bow door space of a ro-ro passenger ferry, by ship's staff, cracks were found in the upper hinge assembly of the starboard bow door (Figures 1a and 1b). The company, classification society and flag administration were informed. The following day, a classification society surveyor inspected the cracks to determine a suitable and safe course of action.

Taking into account a number of factors, including a reasonable weather forecast, the surveyor placed a condition of class on the vessel, which allowed the company time to organise permanent repairs. Over the following few days, the technical staff on board maintained regular inspections of the cracks, while the vessel continued to operate normally.

At a European port 5 days later, the vessel had completed discharge and loading, and was preparing for departure when the upper hinge of the starboard "clamshell" type bow door failed. As soon as the operating lever for the bow door's hydraulic operating cylinders was moved to the "door close" position, a bang was heard and the door was seen to drop. The 20 tonne weight of the door came to bear on the hydraulic cylinder and the lower hinge assembly. The door came to rest partially supported by the cowcatcher (an external structure attached to the bow, which enabled the vessel to connect to the linkspan), with the lower part of the door submerged about a metre in the water (Figure 2).

Figure 1a: Starboard door upper bearing arrangement

Figure 1b: Starboard door upper bearing hinge in detail showing crack

The starboard door could not be closed and the vessel was rendered unseaworthy. The passengers and their vehicles were disembarked via the stern doors, and the vessel was moved to a lay-by berth for temporary repairs. A condition of class was issued which allowed the vessel to sail to another port for permanent repairs. Unfortunately, the failed hinge components were disposed of without any analysis being carried out.

The subsequent investigation discovered that, for a number of years, the starboard bow door had been making contact with the cowcatcher when it was in the open position (Figures 3a and 3b) and that there had been a history of previous cracking to its support structure. However, this was not recognised as a recurrent problem by ship's staff or management, despite repairs, involving welding of cracks and replacing distorted steelwork, having been necessary on a number of occasions. The ship's classification society had not been aware of this history.

The investigation found that the contact between the door and the cowcatcher caused the operating cylinder to overload the door operating equipment and supporting structure, which led to the cracking.

Figure 2: View of damaged starboard bow door

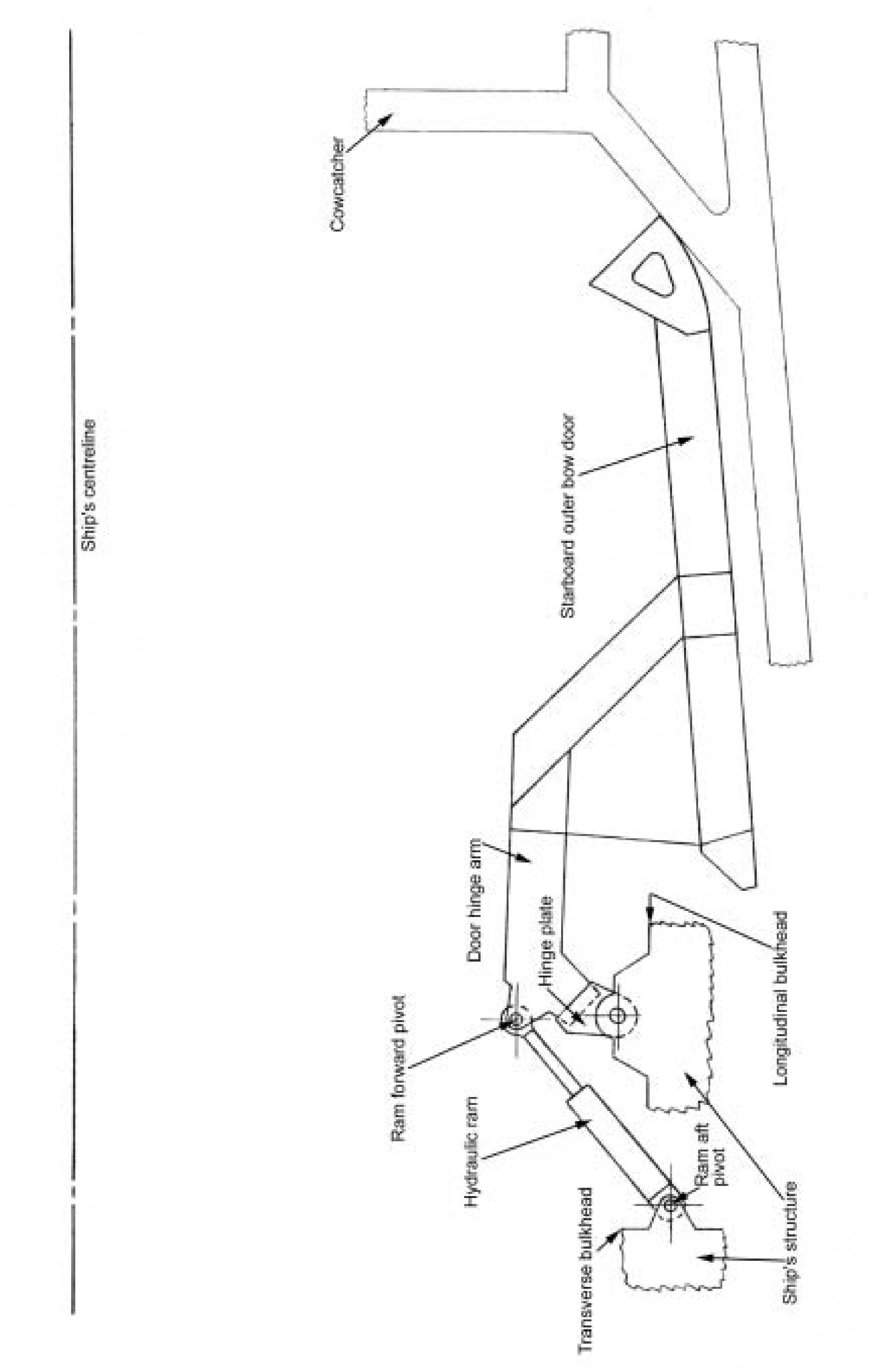


Figure 3a: Diagram of starboard outer bow door looking down on top hinge – door open

Figure 3b: Starboard door in contact with 'cowcatcher'

The Lessons

1. The bow doors on a ro-ro ferry are critical items of equipment, and the consequences of their failure have been tragically demonstrated in the past. Although class requirements for their construction have been updated in recent years, this incident clearly illustrates that serious failures can still occur. Bow doors must be treated with the greatest of respect, and any problems associated with their structure or operating equipment must be dealt with urgently.

2. If repeated repairs to vessel structure or equipment are required, think about why they are occurring and what can be done to prevent further problems. If a problem persists, consult the vessel's classification society, which will be able to provide suitable technical expertise to help resolve a recurrent fault.

3. Had a suitable method of Non-Destructive Testing (such as Magnetic Particle Inspection) been carried out on the door hinge components, after the cracks were discovered, it might have been possible to determine the depth and extent of the cracks. This, in turn, might have provided the surveyor with valuable information on which to base his decision. Consider all the options available to assist in diagnosing a fault condition rather than relying purely on the Mk I eyeball.

4. The investigation was hampered because the failed components were removed and disposed of before they could be thoroughly analysed. After any significant incident or accident, ensure key evidence is retained for forensic examination so that the root causes can be identified.

Well Practised, Instinctive Reactions Save Vessel From Potentially Serious Engine Room Fire

Narrative

A ro-ro ferry was 8 miles from its destination when the navigating officer noticed, what he thought to be, smoke or vapour on the engine room camera monitor situated on the bridge. The chief engineer, whose position was also on the bridge, quickly scanned the display channels. He, too, saw the smoke/vapour and advised the captain to bring the starboard engines to idle, which he did.

While the chief engineer was looking at the display, he saw the vapour ignite and heard the fire alarm immediately sound. The chief engineer attempted to contact the assistant engineer who had just left the bridge. Unable to do so, he called the electrician who was in the engine room annex, and immediately sent him to the engine room. Simultaneously, he advised the captain to bring the port engines to idle. The captain was content with the navigational situation; the vessel was in safe water and so the engines were set to idle.

Flames were clearly visible on the bridge monitor. The chief engineer followed the correct emergency routine for an engine room fire, and initiated the compartment shutdown procedure. In doing so, the starboard engines were shut down, fuel systems isolated and the compartment ventilation flaps closed. The

Figure 1: Low pressure fuel pipe arrangement

Figure 2: Failed low pressure fuel pipe

electrical load was also transferred from the starboard generators to the port units, and the busbar-linking breaker opened. Almost immediately, the flames were seen to abate.

The reduction in vessel speed, and interruptions in the electrical supplies alerted the assistant engineer. He contacted the chief engineer and was immediately ordered to the engine room. Meanwhile, the ship's emergency party was activated and the passengers advised of the situation by the captain.

On entering the engine room, the assistant engineer took the foam extinguisher from the electrician and proceeded forward along the floor plates to fight the fire on the engine, which by that time was shut down. Despite the presence of smoke, visibility was reasonably good except immediately in front of the fire. The assistant engineer fought the fire aggressively, and a short while later he reported the fire had been extinguished.

As the assistant engineer vacated the engine room, he was replaced by the fire party, who were wearing breathing apparatus. They dampened down the area and kept a presence in the engine room throughout the remainder of the passage in case of re-ignition. Meanwhile, the captain kept the passengers fully informed of the situation as the vessel continued her passage on the port main engines.

On investigation, it was found that one of the low pressure fuel pipes, supplying a cylinder fuel injection pump, had failed. The steel pipe (Figure 1) had a banjo fitting at the pump connection, and a steel ferrule compression fitting at the low pressure fuel rail. The pipe had suffered circumferential cracking adjacent to the banjo connection braze (Figure 2), which allowed fuel to escape at pressures up to 2.2 bar. The fuel vapour was then ignited by the hot test cock situated adjacent to the leak. The test cock lagging pads were worn, and the vapour barrier in some cases was no longer intact.

It was discovered that a minor fuel weep had resulted in the pipe being replaced just 2 days before the fire. Unfortunately, the pipe, which was slightly over length, had been fitted incorrectly. This caused stressing in the area of the banjo connection, and this, coupled with the engine vibration, resulted in eventual failure.

The Lessons

Because of the amount of high pressure, flammable liquids in an engine room, a fire, no matter how small, has the potential to rapidly escalate to a major incident. In this instance, the accident was rapidly brought under control by the vigilance and rapid reactions of the crew. They worked well as a team, were practised, confident and were familiar with the emergency procedures. The fact that the time between the fire occurring and it being extinguished, was less than 3 minutes, is testament to the professional manner in which the accident was handled. Could your team do the same?

Despite the sound accident management, the fire occurred because of some weak engineering practices:

1. Diesel engine low and high-pressure fuel systems are subject to high-level pressure pulses. This, coupled with engine vibration and the often frequent dismantling and re-assembly of the systems for maintenance purposes, makes them vulnerable to leakage. It is, therefore, essential that piping system connections are correctly aligned before final tightening. This will reduce stresses that could lead to pipe or connection failures. Do not assume that those involved in maintenance are aware of alignment procedures.

2. It is good engineering practice to uniquely identify matching pipes to injection pumps, by etching or banding. This will ensure that pipes are refitted to their original position, reducing the risk of stressing that could lead to failure.

3. Any damaged insulation may act as a wick. This can soak up fuel and increase the risk of fire. Damaged lagging pads should be replaced without delay and should, where possible, be secured away from fuel lines.

4. It is essential that fuel leaks are investigated *immediately*. The cause must then be identified and measures implemented to prevent re-occurrence, wherever possible. Never accept fuel leakage on any system: a minor weep may originate from a small crack, which can propagate very quickly under vibration and engine loading conditions.

CASE 3

Calm Weather Leads to a False Sense of Security

Narrative

A 39-metre sea-going tug was making a familiar passage off a Scottish island to rendezvous with a vessel. The weather was calm and the visibility was excellent. No passage plan had been prepared and course lines had not been marked on the chart. The skipper decided to take an inshore route between the island and some rocks and shoal patches that were a few cables offshore. This was unnecessary because there was plenty of time to follow the normal route which would have taken the vessel well clear of all dangers.

The skipper navigated mainly by eye, but he did use his radar to some extent to judge his distance from the island. While transiting the inshore route, he used binoculars to search the sea area ahead for the vessel they were to meet. The skipper was alone on the bridge and he did not know his precise position; no lookout had been posted, despite the close proximity to navigational hazards.

The vessel grounded on a submerged rock. The skipper put the engine astern and was able to manoeuvre clear. The passage was resumed, but a new course was chosen to pass well away from dangers.

The engineer began a damage survey and found a large inflow of water in the engine room. The bilge pumps were started, but they could not cope with the flooding, so the skipper called the coastguard and then headed for a cove on the other side of the island. About 30 minutes later, the vessel was deliberately grounded on a gently sloping rocky shore in the cove. The tug initially remained upright and the crew were able to evacuate to the vessel's boats. After a short period of time, the tug listed over.

The tug was a constructive total loss.

The Lessons

1. Every passage should be planned in advance. This tug's intended track should have been marked on the chart, and her progress along the planned track closely monitored. The plan should have included clearing distances from known dangers and a full consideration of how the vessel would be navigated safely.

2. The radar was not used to good effect. Parallel indexing could have been used to ensure that the vessel stayed in safe water, but the skipper was unaware of this technique. Although well-qualified and experienced, he had obtained his qualifications many years previously, and had not kept up to date with modern navigational techniques.

3. The skipper was capable and experienced, yet the calm conditions lulled him into a false sense of security. The inshore route should not have been taken without prior planning and the certainty that the vessel could be navigated safely. Additionally, by searching ahead for the vessel with which he was to rendezvous, the skipper became distracted from his main task: ensuring the vessel's safety. He should have posted a lookout in such confined waters.

CASE 4

Shift of Timber Deck Cargo

Figure 1

Narrative

Large packages of sawn timber were stowed in the holds, as well as up to 5 high on the deck of a 132-metre general cargo vessel. It was autumn. While on passage, the vessel encountered storm force south-easterly winds and large swell waves coming from the south-west. In those conditions, the master found it difficult to find a comfortable heading on which to ride out the storm.

Just after midday, a combination of sea and swell waves caused the vessel to roll to port by 30–40°. This shifted the deck cargo, which led to an angle of port list of about 30°. The vessel continued to roll, reaching alarming angles to port (Figure 1).

The vents to the daily service tanks for the main engine and generators were on the port side, and were submerging as the vessel rolled. Seawater seeped into the tanks, even though ball valves were fitted in the vent heads. The engineers had to work rapidly to drain off this water before it got into the engines. Additionally, the engineers discovered that the main engine oil suction was above the inclined level of the oil in the sump. The chief engineer added more oil from a storage tank to raise the level.

The list could not be significantly reduced by adding ballast, so the decision was made to jettison some of the deck cargo. A plan was agreed, and volunteers were sought to face the storm and to climb on to the top of the cargo to release the slip hooks on some of the lashings. A deck party was assembled and they donned lifejackets and attached themselves to a previously rigged safety line. Braving the heavy weather, the deck party released three out of every four cargo lashings on about 20% of the deck cargo. Having achieved this dangerous task, they returned to the

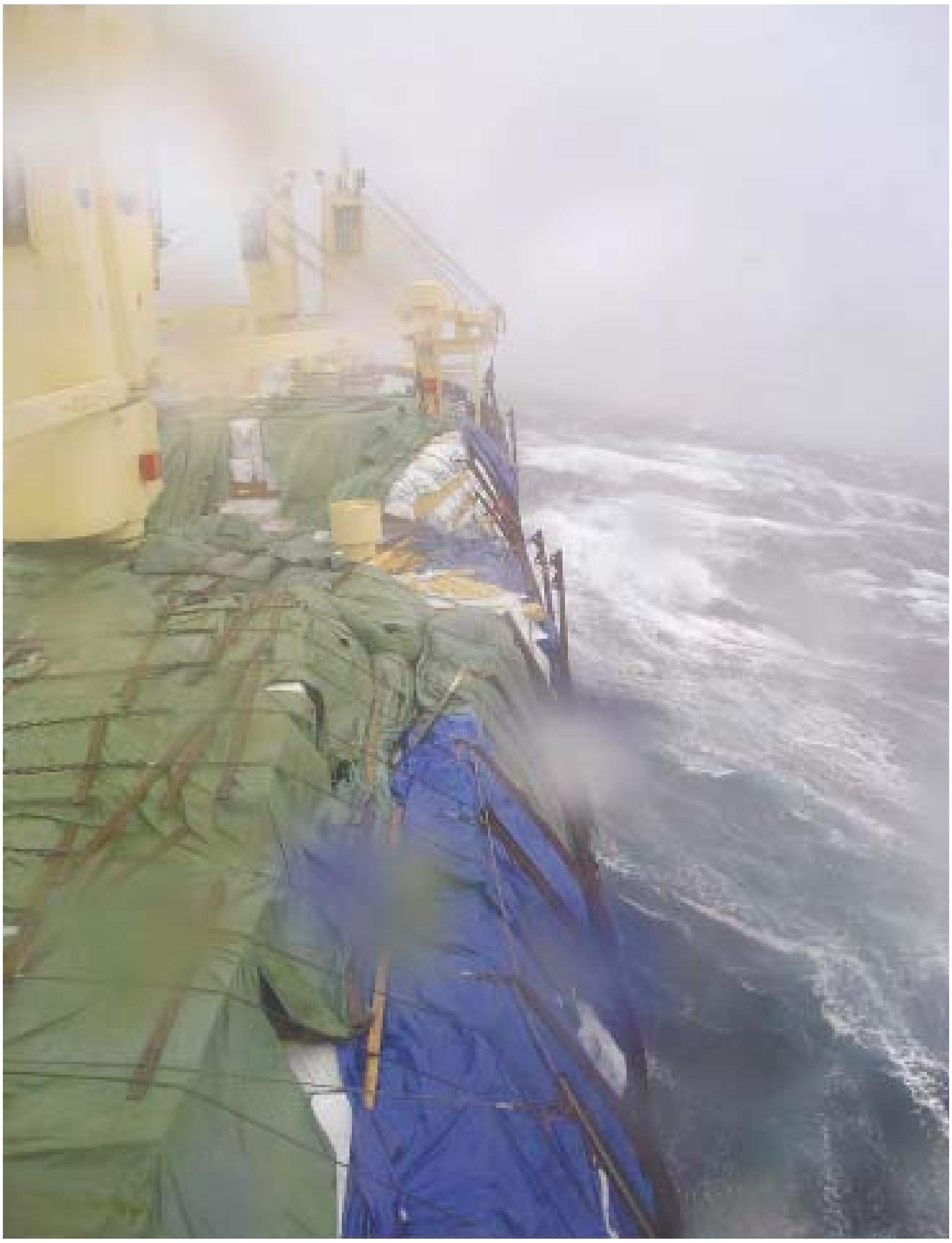


Figure 2

Figure 3: Lashings parted

Figure 4: Timber packages sliding over the side

comparative safety of the accommodation. The master then turned the ship so that the weather was on her starboard beam. In this situation, the remaining lashings parted and a large quantity of timber packages slid over the side (Figures 2 and 3).

The jettisoning reduced the list to a manageable 15°. After informing the coastguard of the hazard to navigation posed by the jettisoned cargo, the vessel sailed to the closest suitable port to have the remaining deck cargo re-stowed.

There was a substantial overhang of packages on the port side (Figure 4), but the ship arrived safely (Figure 5) having sustained only minor damage and no injuries to any crew members.

Figure 5

The Lessons

1. The master, officers and crew undoubtedly coped admirably with the emergency. If propulsion or electrical power had failed, the ship would have been very vulnerable and could have been lost. The quick actions of the engineers prevented this catastrophe. The deck party showed bravery in venturing out on to the cargo in the storm. Their action, and that of the master, substantially reduced the angle of list; this, too, probably saved the ship.

2. In 2002, a spate of similar accidents prompted the MAIB to carry out a safety study into the carriage of timber deck cargo. The report of this study is available on the MAIB's website at www.maib.gov.uk/publications/safety studies. Anyone involved in the carriage of timber on deck is advised to read this – the accidents it describes include many valuable lessons.

3. The principal publication that illustrates best practice for this trade is the Code of Safe Practice for Ships Carrying Timber Deck Cargoes, 1991, published by the International Maritime Organisation. The MAIB believes it is time for the Code to be reviewed. With this in mind, the Timber Deck Cargo Safety Study recommended the Maritime and Coastguard Agency to sponsor research. This work is now underway.

4. The MAIB believes it may ultimately be necessary to impose weather limitations on ships carrying large quantities of packaged timber on deck. In the meantime, masters of these ships are advised to consider the risks and, as far as possible, to steer clear of storm force conditions.

5. Ball valves on fuel tank vent pipes may not be 100% secure if they are being intermittently submerged as the vessel rolls.

Lifting Appliance Survey and Testing. Are You Up to Date?

Narrative

A third engineer was conducting diesel generator maintenance on board a foreign-owned and foreign-flagged ferry while alongside a UK port. He was wearing no personal protective equipment.

A fixed "H" beam with a four wheel trolley was fitted directly above the engine (Figure 1). A shackle was fastened to the eye plate of the trolley, from which a 1 tonne chain lifting block was fitted. The chain block was used at an angle to lift engine components, and the trolley was then used to move them away from the engine.

While the third engineer was applying tension on the chain block, the flange and one bolt on the trolley cheek plate connecting bar fractured, causing the chain block and trolley to fall from the "H" beam.

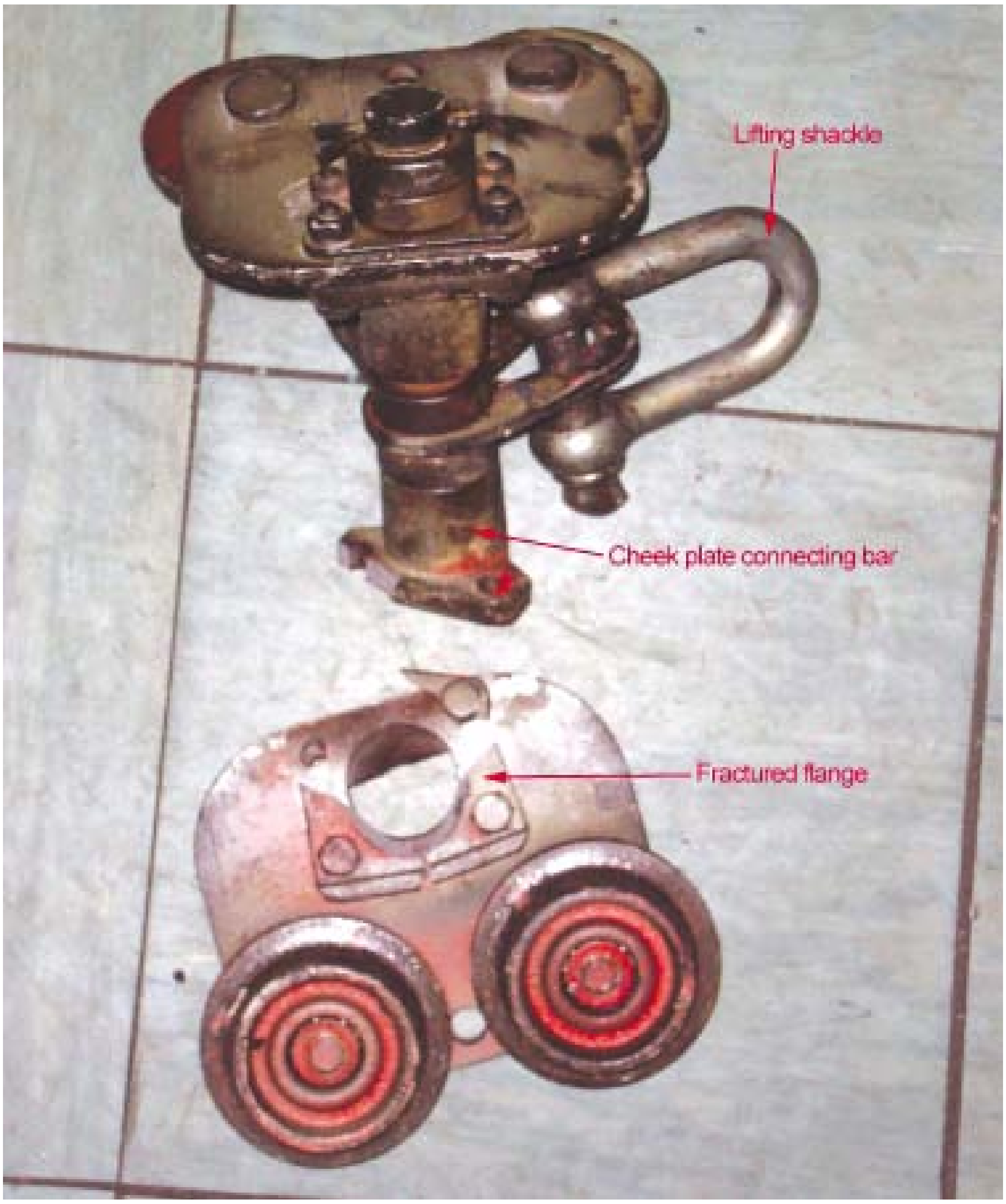


Figure 1: Four wheel trolley

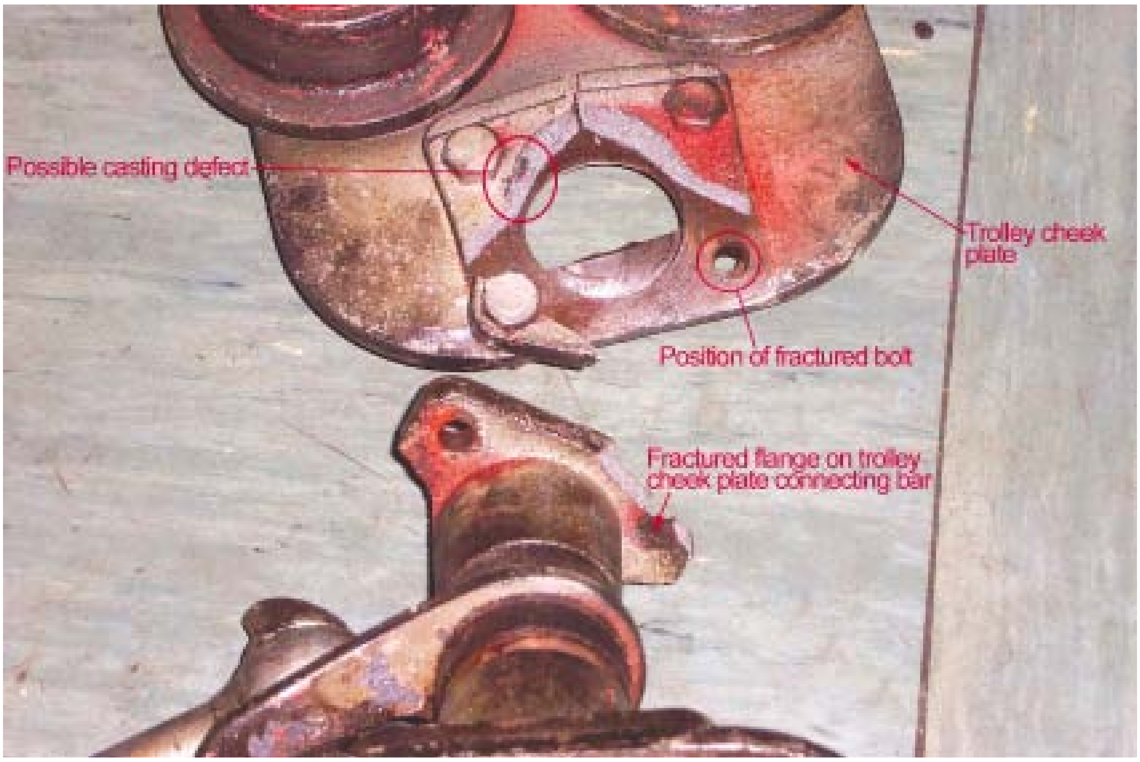


Figure 2: Detaill of fractured components

The third engineer received a glancing blow to the side of his head and arm. He was immediately taken to hospital for a check-up, but his injuries were not regarded as serious and he was released 2 hours later. He was able to return to the vessel.

On investigation, it was found that the flange had suffered brittle fracture. It is possible that the flange bolts were not fully fastened, causing the flange to flex and fail while the trolley was under tension. There was indication of a possible casting defect, close to one of the flange fastening bolts (Figure 2). This could have weakened the casting and caused the catastrophic failure.

The vessel had been under her current ownership for about 2 years. There were no records of lifting plant survey or testing on her transfer, and no tests had been conducted since that time.

Inspection of other lifting plant subsequent to the accident revealed no defects.

The Lessons

1. **The third engineer was fortunate to escape serious injury. Stringent lifting equipment survey and testing, and the use of personal protection equipment significantly reduce risks related to lifting operations.**
2. **Lifting equipment should always be in date for survey or test before it is used.**
3. **The line of lift should be directly under the lifting equipment, whenever possible, in order to reduce stresses.**

Go it Alone and See What Happens

Narrative

The master and chief officer manoeuvred their loaded ro-ro ferry out of a harbour and began the passage to their usual port of destination. By that time, the winds were gale force and from the south-west. Once on passage, the second officer relieved the chief officer on the bridge. The second officer's responsibility was to navigate the ship during the sea passages between the two ports: he did not carry out any berthing or cargo duties.

The master remained on the bridge until just before the ship crossed the traffic separation scheme. When he left the bridge, the vessel was on course to the entrance of the port of destination, and no discussion had taken place with the second officer regarding contingency planning in the event of the wind gaining strength.

After clearing the traffic separation scheme, the wind increased to force 9 or 10 and was on the vessel's beam. The second officer decided

Photograph showing the video plotter in use to alter course to port on to a westerly heading, so that the seas would be more on the port bow and thereby would ease the rolling of the vessel. The vessel was now heading directly for the middle part of the north/south lying sandbank, where the second officer hoped he would find a lee. Once in the lee of the sandbank, he intended to turn to starboard and make for the entrance to the port, which was some distance to the north of the sandbank.

The second officer did not find the lee from the sandbank he had hoped for. Using his video plotter, he decided to get as close to the sandbank as possible, before turning to starboard. At the last moment, he attempted to turn the vessel to starboard. But she did not turn as expected and ran aground.

The second officer called the master, who, on arriving on the bridge, sounded the general alarm.

The vessel grounded about an hour before low water, and remained aground for about 6 hours when she refloated without assistance and was able to complete her passage.

Damage to the vessel was confined to the starboard rudder and the connecting steering gear.

The Lessons

1. **The second officer believed that, while acting as OOW, he was solely responsible for the safety of the vessel and her cargo, and he took it upon himself to make quite a large deviation from the passage and head directly for the hazard of shallow waters.**

   The master's standing orders had allowed the OOW to deviate from the passage plan to ease the motion of the vessel in heavy weather. However, on arriving on the bridge, the master was surprised, after the grounding, at how far the vessel was away from the planned track. Standing orders should be specific about the extent of permitted deviation from the plan.

2. **Masters should actively encourage junior officers to consult them, at any time, if they are faced with a situation which could lead to a major departure from the passage plan.**

3. **This was not the first time this particular second officer had made a large deviation from the passage plan. He had done so only a week before the grounding took place, during heavy weather. Nonetheless, none of the senior officers had queried his actions, even though the details had been entered into the logbook. Had they checked the log entries, they might have prevented the second officer from deviating again, or at least not without first seeking advice. Regular review and appraisal by the master of junior watchkeeping officers, during their navigational watches, may prevent them from taking actions which could endanger the vessel.**

Poor Hot Work Control Results in Costly and Potentially Fatal Errors

Plate in position

Narrative

A 16000 tonne foreign-flagged general cargo vessel was on passage to a UK port to discharge part of her cargo of plywood. The vessel was behind schedule. While still a day away from port, the captain instructed that No 3 hold covers be released and the cargo prepared in advance for offloading, in an attempt to recover lost time. The weather conditions were good and the forecast equally kind.

The chief officer had instructed the deck fitter to weld a doubler plate to a corroded steel box section on the upper deck, adjacent to the deck coaming of a 5845m^3 tween deck hold coaming. The box section covered a redundant deck opening that gave direct access to the hold. The chief officer had made no provision for a fire watcher or hot work permit to work, despite being fully aware of the requirements and the instructions which were clearly laid out in the vessel's safety management system.

At 1300, the chief officer checked the fitter's progress. The fitter had not yet started the weld repair, having been involved in other general deck repairs. At about 1440, the fitter went into the hold to check it for flammable materials, but the lack of light there rendered the check superficial. He then equipped himself with a 9-litre foam extinguisher and a bucket of water. Having assessed the job, the fitter decided that a more effective repair would be to cut out the front of the corroded box section and to weld an insert plate, rather than to simply weld a doubler plate over the section.

Plywood fire damage on jetty

View into lower hold from bridge

As burning progressed, molten steel fell into the hold and ignited the plywood stowed immediately under the box section. At about 1500, the fitter noticed smoke issuing from the (now open) box section. He poured the bucket of water into the hold and ran to inform the bosun, who was working in No 1 hold. The bosun hurried to the bridge to collect the fire locker key and to inform the OOW. Meanwhile, the deck crew set up hoses for boundary cooling.

The OOW noticed the smoke at the same time as the ship's fire alarm system was activated. He immediately sounded the general fire alarm as the captain, chief engineer and chief officer rushed to the bridge. At 1545, after the hold hatches were fully battened down, the captain ordered the first shot of 58 bottles of CO_2 to be injected. Soon afterwards, a further 32 bottles were discharged into the hold. Boundary cooling continued, and adjacent compartment temperatures were monitored. Neither the harbour authorities nor the coastguard were informed as the vessel continued on her passage. The vessel arrived at the port anchorage at 2255, at which time the captain informed the VTS of the situation.

Following discussions with the vessel's DPA, and after the temperature within the hold had stabilised, the hatches were cracked open at 2330. The inrush of oxygen to the hold caused the fire to re-ignite. The hatches were again battened down. At 0030 the following morning, a further 36 bottles of CO_2 were injected. At 0430, VTS informed the vessel that the dock master was prepared to allow the vessel to berth and that the fire and rescue services would attend on her arrival. The captain ordered 22 more bottles of CO_2 to be discharged into the hold at 0715.

The fire and rescue services began fighting the fire at 1300 after the hatch covers had been partially opened. It was not possible to open the hatches fully because the fire had damaged the hatch operating system. However, it was possible to dampen down the cargo and cautiously remove it to the jetty. The fire was finally declared extinguished at 2200.

The Lessons

1. It is essential for the safety of the ship and its personnel that the proper procedures are followed when conducting hot work operations. These operations include burning, welding and grinding work. Completion of an approved hot work permit to work should detail the necessary checks to ensure that the planned operation can be conducted safely. Should ignition occur, it can then be dealt with quickly by the welder or the fire watcher, using appropriate fire-fighting equipment.

2. The chances of being able to successfully fight a large fire, in a compartment fitted with a fixed fire-fighting system, are vastly improved if the compartment boundaries remain intact. In the case of CO_2 systems, it is essential that the compartment be fully closed down, prior to injection of the smothering gas. Careful consideration must be given to the implications of intentionally opening up compartment boundaries, and how this could affect the prompt deployment of fixed fire-fighting systems.

3. Fixed CO_2 fire-fighting systems extinguish fires by reducing the compartment oxygen content; they have no cooling properties. Extreme caution should be exercised in deciding whether or not to open up a compartment subjected to CO_2 drenching. The decision to do so, in this case, resulted in the fire re-igniting, with the clear potential for an already dangerous situation to escalate. Where possible, it is prudent to leave compartments closed, and to proceed into harbour for the situation to be dealt with by the emergency services.

4. The captain decided to delay reporting the fire to the harbour authorities and coastguard by 8 hours, believing he had the situation under control. Had the situation rapidly deteriorated, the crew's chances of survival could have been reduced by the delay in activating the appropriate level of emergency services support. Clearly, the situation was deemed serious from the moment the decision was made to inject CO_2. Had the accident been reported promptly, the emergency services would have been prepared and professional fire-fighting advice provided.

Scrap Metal Carrier Nearly Goes Belly Up

Narrative

An 82-metre general cargo vessel loaded a cargo of scrap metal. With the vessel ready to sail, the pilot boarded in the early evening. On embarking, he noticed a small angle of list to starboard. When the lines were let go, and the vessel moved off the berth, the angle of list increased to about 10° to starboard. The pilot expressed his concern about the vessel's stability to the master. When it became evident that the crew were unclear why the list had developed, the pilot suggested that they return to the berth. The vessel listed to port while turning, and lolled from side to side as she approached the berth.

Eventually, the vessel was safely re-secured alongside, without mishap.

The centre of gravity of the scrap metal cargo had been assumed to be one third of the height of the hold. Investigation of the loading condition revealed that the scrap metal that was loaded initially, was a lot lighter than that which was loaded on top later. This meant that the cargo's centre of gravity was considerably higher than had been assumed, so high, in fact, that the vessel's initial metacentric height was negative. This caused her to assume an angle of loll, and manoeuvring back alongside generated forces that made her "flop" from side to side.

The Lessons

1. The pilot was correct to suggest that the vessel should be returned alongside. She had been in a very dangerous condition and might have capsized if she had proceeded to sea.

2. Ships' officers who are responsible for loading scrap metal, or other similar non-homogenous cargo, should ensure that any assumption about a cargo's centre of gravity is valid. Where possible, the heaviest cargo should be loaded first, not last – as was the case here.

3. Shippers should tell the vessel the stowage factors of cargoes that are to be loaded. A vessel's officer should closely monitor loading, to check that the information supplied is accurate. The vessel's chief officer should be aware of estimated stowage factors when he is drawing up the cargo stowage plan prior to loading. As stowage factors are expressed as a ratio of volume over mass, it is important to note that the higher the stowage factor, the lighter the cargo; conversely a low stowage factor indicates a heavy cargo.

Get a Grip(e) With Your Brakes

Narrative

A vessel in the middle of a scheduled maintenance period had already received contractor assistance to overhaul the lifeboat launching and lifting equipment. A classification surveyor, together with ship's staff, had been available to oversee the work.

Crew safety drills continued apace throughout the duration the vessel remained alongside the repair berth, and as part of her abandon ship training it was planned to lower both starboard side lifeboats to the water. The crew of the first lifeboat had completed their muster, and were briefed on the launching procedure by the boatswain.

After winding the boat up two or three turns by hand to release the weight, the harbour pins were removed. The order was then given to release the gripes, which, although done simultaneously, allowed the aft gripe to clear first. As the weight of the boat was released by the gripe, the boat momentarily moved. As the forward gripe released, the boat started to move outboard under its own momentum. The officer and petty officer in charge checked the brake, and found that it was fully on. The boat continued to move outboard at speed.

The forward gripe, which had not been cleared, fouled on a cleat on the upper part of the boat, thus preventing the forward end of the boat moving further outboard. The aft end continued outboard, until it came to rest at an angle of approximately 45° longitudinally. The boat came to rest lying on the embarkation gate and handrails. The forward davit arm had only moved a short distance along the track way, while the aft davit arm traversed the full distance. With the boat lying at 45°, it effectively wedged the davit arms in position.

The launching crew were cleared from the area, and the fall wires were secured to prevent further movement. A full risk assessment was carried out on how to recover the boat.

Recovery of the lifeboat was achieved by the vessel moving berth, and using two shore cranes to lift the boat onto a low loader.

No-one involved in the lowering operation was injured.

Once the brake mechanism was dismantled for inspection, the immediate reason for the boat's uncontrolled lowering became apparent. The brake pad had become detached from the brake shoe. It was found that during the recent overhaul, the pad had been secured to the shoe with glue and <u>two</u> rivets, contrary to the manufacturer's instructions and guidance. The pads should have been secured by <u>six</u> rivets.

Photograph showing the lifeboat at its position of rest, with the forward gripe trapped and the aft davit arm moved to the lower position. The twisting action wedged the boat as shown

Securing of the pad had been carried out by the use of adhesive over the full face and two rivets at one end

This picture shows the pad and shoe – note the misalignment of the rivet holes

The contractor carrying out the work was certified ISO 9001 compliant, and had issued both a test certificate and inspection test report on the work undertaken. A ship representative had signed the test report indicating that the lifeboat davits had been surveyed and overhauled to his satisfaction. A dynamic test and examination of the davit winch and brake assembly were made in the presence of the class surveyor, ship representative and contractor representative.

The ship's crew believed that the work had been undertaken to ISO standards and was safe, so operated the equipment based on that belief.

The Lessons

1. The fact that the contractor was ISO 9001 compliant should have instilled confidence in the crew that the work was being undertaken in a manner commensurate with that accreditation. But it is still the responsibility of ship's staff to be assured that correct spare parts are being used, and that they are fitted in accordance with manufacturer's instructions and guidance.

2. This particular incident highlights that quality assurance procedures are not infallible. If a contractor cannot undertake the work to the specifications laid down by the manufacturer of the equipment, he must raise a non-compliance. The non-compliance serves to alert the ship to a potential procedural change, and the possibility of a deviation from specified standards.

3. There was a known history of difficulty in obtaining spare parts for the davit. Consequently, the brake shoes that were supplied to the vessel had to be modified to fit. It is all too easy to adapt incorrectly specified spare parts to fit the job in hand, and to assume that it is safe to do so. Only when an accident such as this occurs, do crew begin to realise their folly and complacency of working with unauthorised spare parts.

4. Complacency is a characteristic that can undermine any safety management scheme.

Oil Stowed in Hot Uptake Area Leads to Fire, and Open Doors and Hatches Leads to Loss of Vessel

Narrative

A standby vessel with a crew of 12 was alongside its home port for routine crew change and minor repairs. This included work on the fire alarm system, although none of the crew was involved in testing it. While alongside, 28 drums of 25 litres of oil were delivered, and these were initially stowed on the working deck because of the lack of dedicated stowage.

The vessel sailed at 1300 for standby duties. None of the vessel's new crew had undergone any safety induction routines, despite this being required by company procedures.

Soon after sailing, the chief engineer and chief officer decided to stow half the oil drums in the main hydraulic pump space, through which the main engine and port generator hot exhausts passed. The drums were stacked and loosely secured by a sheet of plywood jammed against them to inhibit movement.

The engine room escape hatch was also situated in the deck of the hydraulic pump space; it was accepted practice to leave hatches and doors open throughout the vessel in an attempt to improve ventilation.

During the afternoon, the weather deteriorated, with rough seas and a force 6–7 wind. There was a 3.5 metre swell running. At about 1545, the OOW heard a muted buzzer from the fire alarm panel on the bridge, and sent the on-watch AB to investigate. At the same time, the third engineer noticed thick smoke in the "Survivors" area of the main deck. It was initially assumed that it was coming from the open engine room door. Despite this, no attempt was made to close down the engine room, or isolate the ventilation or fuel supplies.

The second and third engineers immediately entered the engine room and rigged a fire hose. But there was no fire-fighting water supply because none of the pumps had been started. Fortunately, the space was found to be clear of fire and smoke. As the engineers advanced around the engine room, they saw what was described as "fiery liquid" coming from the main engine exhaust deck head opening. They evacuated the space, but did not start the engine room fire pump.

Meanwhile, the captain and chief engineer were alerted, but the emergency muster was not conducted and the general alarm was not used. The captain contacted the coastguard via Digital Selective Calling who alerted the rescue helicopter and two lifeboat stations. It was clear from the blistering of the deck paint that the fire was in the main hydraulic pump space.

By that time, a fire pump had been started, and two ABs wearing breathing apparatus headed back to the engine room in an attempt to establish boundary cooling.

In the meantime, the chief officer fought the fire through the auxiliary hydraulic pump space hatch that gave access to the main hydraulic pump space below. Believing the fire to be extinguished, he reported this to the master on the bridge. At the same time, the two ABs ran out of air and evacuated the engine room, leaving the fire hose turned on. As they made their way to the upper deck, one of the ABs suffered from smoke inhalation; the thick black smoke had spread throughout the after end of the vessel via the open doors and hatches.

Realising that the fire had re-ignited, the second engineer attempted to fight it, but he, too, was overcome by smoke. At that point, the chief engineer started isolating the engine room ventilation and fuel supplies.

It was becoming clear to the master that the crew were unable to contain the fire, so he decided to abandon the vessel as soon as the rescue helicopter arrived. Although three of the crew suffered from smoke inhalation, everyone was lifted to safety at 1720. However, as the crew were evacuating, the vessel began to flood because the fire hoses were left running. The vessel was eventually taken under tow, but she sank some 36 hours later.

Although evidence was lost to indicate the cause of the fire, it probably resulted from poorly secured oil drums shifting in the heavy seaway. This would have caused a leakage of oil that was then ignited by the hot main engine exhaust. The fire was then fed by oil from the other drums and from the hydraulic oil storage tank. Fire and smoke spread throughout the vessel via the numerous open doors and hatches. Three fire hoses continued to pour water into the vessel until the fire pump ran out of fuel. As the fire spread, it is possible that flexible pipes in the engine room failed, thus allowing more water into the vessel. It is known that the funnel ventilators became awash and, shortly afterwards, the vessel plunged by the stern.

The Lessons

There is no doubt that, had doors and hatches been closed, the spread of smoke would have been considerably reduced, enabling the seat of the fire to be quickly determined. The fire could then have been tackled in a co-ordinated and controlled manner, vastly improving the chances of success.

The lessons identified from this accident are:

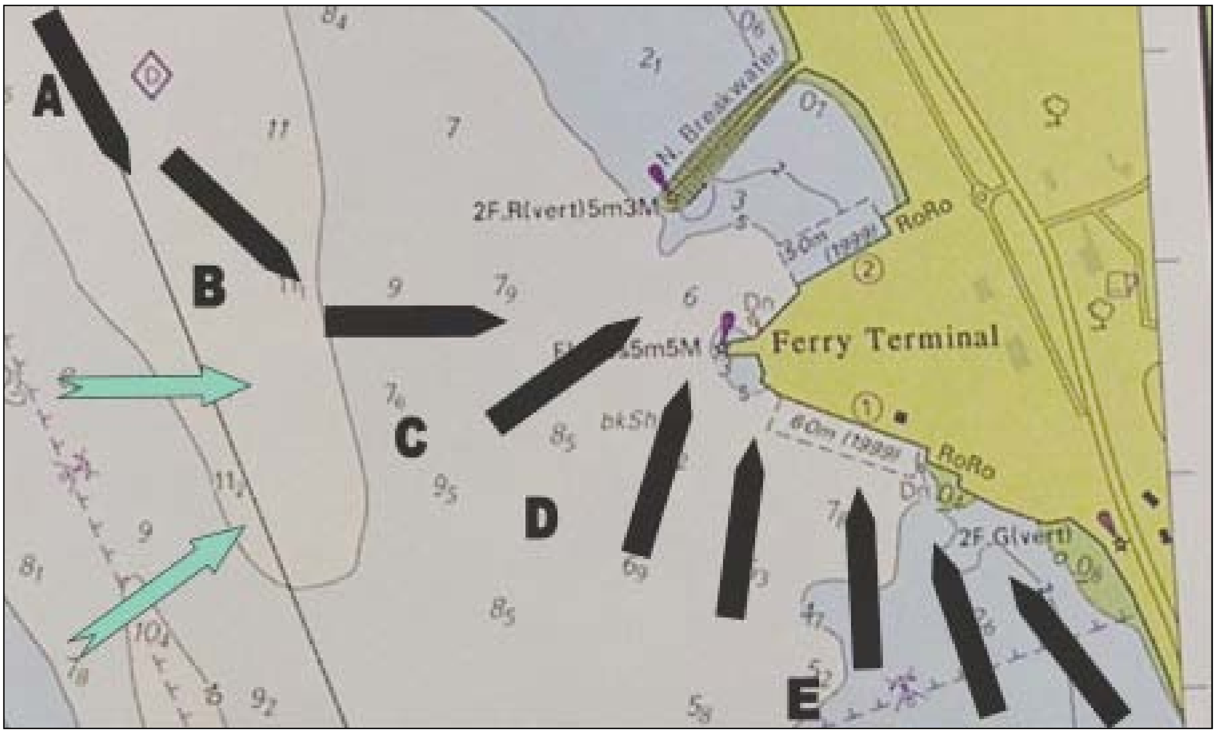
1. **Flammables should be stowed in a dedicated stowage, well away from any heat source that could cause ignition. This is especially relevant in funnel uptake spaces. Where there is doubt about the suitability of stowages, a risk assessment should be conducted.**
2. **Doors and hatches must be kept closed to prevent the spread of fire, smoke and flood water.**
3. **The general alarm must be used automatically in emergency situations to ensure that crew are quickly mustered and accounted for, and to ensure that they undertake the roles for which they have been trained.**
4. **Engine rooms should be closed down promptly, and ventilation and fuel systems isolated if an engine room fire is suspected or confirmed.**
5. **Soon after joining a vessel, new members of crew must undertake safety induction procedures and should familiarise themselves with their muster stations and roles in an emergency.**

Grounding of Ro-Ro Ferry in Strong Winds

Narrative

A 21,000grt passenger ferry grounded while attempting to berth during a storm. The vessel sustained only superficial damage to her hull coating. However, passengers and freight were stranded on board for 28 hours, before she could be safely re-floated and berthed alongside.

The vessel arrived in the bay with a 40–45 knot wind blowing from the south-west. The master elected to berth the vessel using a method developed by other masters in the fleet, which he had practised just once before, and in only a moderate wind. The manoeuvre was designed to make best use of a strong south-westerly wind. However, as the vessel proceeded down the loch, a weather front began to pass through the area and the wind direction veered. The change in wind direction was not noticed by the bridge team.



Sequence of Events

A – The master began swinging the vessel to port, unaware that the wind had veered from the south-west to the west.

B – The master continued swinging the vessel to port.

C – Still assuming the wind was from the south-west, the master positioned the vessel to land the bow gently onto the dolphin, and then allow the wind to assist the stern to starboard. However, the wind increased to 50-55 knots and the vessel began being blown rapidly downwind towards the dolphin and the berth. A southerly flowing tidal stream compounded the problem.

D – The master realised the vessel was setting down on the dolphin too fast, so he put full astern pitch on both propellers to abort the manoeuvre. He then continued manoeuvring astern to ensure the vessel's bow did not damage the berth or link span. The vessel was moving bodily to starboard at a speed of about 3 knots at this time.

The vessel aground close to her berth

E – The master realised the vessel was in shallow water, and prudently decided to stop the engines and allow the vessel to ground, rather than run the risk of sustaining damage to the propellers and engine.

Once aground, the passengers were kept well informed of the situation, and the officers and crew began taking action in accordance with their company emergency procedures plan.

It was a little after low water and tugs were not immediately available. Therefore, after checking the nature of the bottom using a hand lead line, and confirming that it appeared to be sandy, the vessel was ballasted down to ensure that she did not go further aground as the tide rose.

Tugs arrived the following morning, and the vessel was successfully re-floated and manoeuvred alongside.

The Lessons

1. Berthing a vessel at an unfamiliar port is difficult at the best of times. Strong winds will present further challenges. Masters should ensure they have planned their manoeuvre robustly, and should pay particular heed to how a possible change in wind direction could affect a planned approach.

2. Abort positions should have been included in the passage planning for entry into the bay and approach to the berth.

3. The master should have waited for the wind direction and speed to settle down after the front passed before deciding on the most appropriate approach.

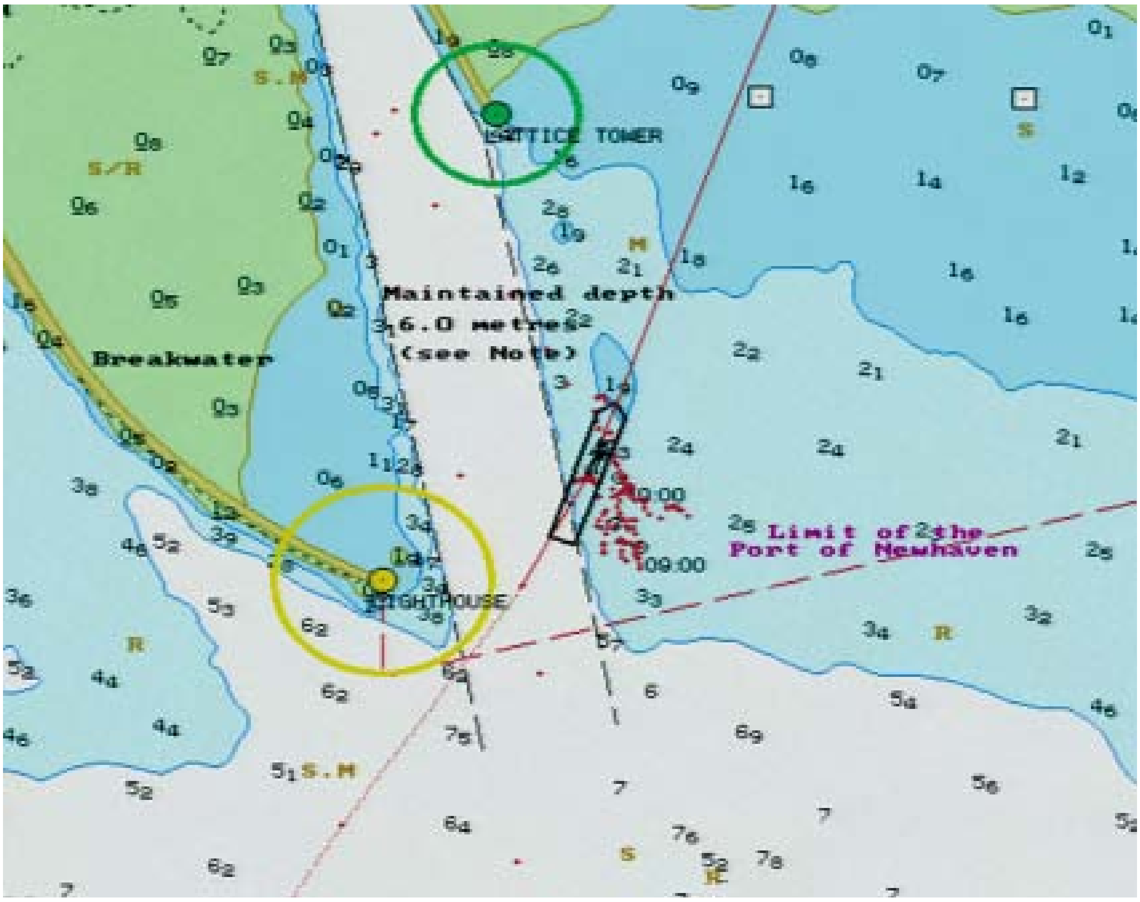
Port Not Starboard

Narrative

A ferry was approaching a port in the UK. The approach required a 40° alteration of course to round the breakwater and enter the port. The master had the con, and was seated a little to starboard of the centreline. In front of him was the navigation console which included displays for radar, ECDIS and the rudder angle indicator, as well as the controls for the engines and bow thruster unit. The helm was in hand steering, and the AB on the wheel was making his first approach to the port. The bridge team was completed by two second officers. The first was acting as the OOW and was sitting next to the master, monitoring the vessel's progress on ECDIS and radar. The second was required to position himself on the opposite side of the bridge to the master to call out clearances as the vessel made her way up the approach channel.

As the bridge of the ship came abeam of the end of the breakwater, the master ordered "port 20". The helmsman replied "port 20" but put the wheel to starboard. This error was not noticed, and when the ship failed to start swinging to port, the master ordered "hard-to-port". Again, the helmsman repeated the order, but put the wheel "hard-to starboard". With the ship still not swinging to port, the bow thruster was used at full power to attempt to bring the bow to port. These efforts had no effect, and the ship maintained her heading.

As the ship passed the limits of the opposite side of the channel, it was finally noted that the rudder was to starboard, and not to port, and the order was given to reverse the direction of the rudder. Shortly afterwards, the engines were put to full astern to minimise the impact of the – now inevitable – grounding.



Screenshot from ship's ECDIS replay

The ship ran aground at slow speed, on a gently shelving sandy bottom. She had sustained some minor damage to a ballast tank, but there was no pollution and nobody was injured. She floated free with the rising tide and finally docked about 3 hours late.

The Lessons

1. **Good bridge teamwork requires that the actions by one person are cross-checked by another member of the team. In this case, no member of the bridge team was monitoring the actions of the helmsman, even though it was his first visit to the port and only his second time steering the ship. It is common good practice always to monitor that wheel orders have been applied correctly.**

2. **The master, as the PEC holder for the port, held the passage plan in his head. There was nothing written down, or drawn onto the chart. This left the rest of the team with no plan against which to monitor the ship's progress.**

3. **As a result of this accident, the company introduced Bridge Team Management training for its officers.**

CASE 13

A Near Miss – at High Speed – in Fog

Narrative

A small passenger hovercraft departed its pad on a routine crossing with 14 passengers on board. Visibility was 8 cables, but was expected to reduce during the crossing, so the hovercraft was operating a fog routine with an additional navigating officer closed-up on the bridge operating the radar.

The hovercraft set off at 40 knots. Only a mile into the crossing, visibility decreased to less than a cable, so the master reduced speed to around 20 knots. As they entered the fog, the navigating officer identified on radar a fast moving contact fine on the port bow, on a steady bearing. He requested the master alter course to starboard. After a 25° alternation, the contact still appeared to be on a steady bearing, so the navigating officer requested a further alteration of course to starboard. Following a second alteration, this time of around 20°, the contact was still on a steady bearing. The navigating officer instructed the master to stop the vessel.

The master conducted a crash stop and turned on the vessel's deck lights. As he did so, a pilot vessel travelling at 23 knots emerged from the fog, swerved round the hovercraft's bow, and passed 10 metres down its starboard side before re-entering the fog.

The Lessons

1. Both vessels were easily capable of stopping within 2-3 ships' lengths, so their skippers were comfortable travelling at relatively high speed in reduced visibility. However, while the hovercraft had a satisfactory fog routine, and suitable equipment to identify other craft and take appropriate avoiding action, the pilot boat did not. The skipper of the pilot boat thought he had seen another contact on radar, and was trying to clarify this with VTS. He did not, however, reduce his speed until after a near-collision occurred.

   The workload of bridge crews is considerably higher in reduced visibility, and small vessels, especially high speed ones, can be very difficult to identify and track on radar. Always reduce speed in reduced visibility, and, if unsure of the situation, reduce speed further until the picture clarifies.

2. In this case, the VTS operator, skipper of the pilot boat, and the master of the hovercraft made VHF errors by missing information, passing incorrect or incomplete information, or failing to correct erroneous information. VHF traffic provides vital amplifying information to supplement the visual or radar picture, especially in restricted visibility, and it must be used and monitored carefully.

3. All radars, including those with automatic tracking systems and ARPA, have difficulty maintaining track on small, high speed vessels. If you operate such a vessel: be seen – fit a radar reflector.

Cast Adrift

Narrative

On a blustery morning, a floating bridge ferry was making one of its regular 4 minute crossings of a river with 35 passengers and 15 cars on board. The ferry was guided by two cables running through rollers on either side of the deck, and propelled itself across the river. The cables were attached ashore to chains using a number of bulldog grips [see figure 1]; each chain was then led to a large weight suspended in a pit. This system allowed the tension to be maintained in the wires as the tide rose and fell.

By late morning, the tide was ebbing at close to its maximum strength, and the wind was blowing in the same direction at about force 7. During one crossing, as the ferry reached mid channel, a stronger gust of wind hit her side, increasing the tension in the cables as she was pushed downstream by the wind and tide.

Both guide cables were pulled from their securing arrangements on one side of the river, and the cables were quickly pulled through the rollers. This left the ferry adrift.

The ferry had no steering, and the propulsion system could not steer her effectively. However, the very experienced ferry operator used forward and reverse power to try to keep her midstream, avoiding other vessels in the area. He telephoned for assistance. Meanwhile, the other crew member attempted to let go the emergency anchors, which were mounted on the outboard side of the deck shelter. A lug on the anchor shaft poked through the bulkhead, and a pin through the lug held the anchor in place. This securing pin was locked off with a split pin. The arrangement was designed to prevent passengers from inadvertently releasing the anchors. Not having the correct tools to hand, letting go the anchor took some time.

Downstream of the ferry were many yacht moorings. The ferry made contact with some of the yachts, before being brought to a standstill by its own anchors.

The passengers were taken ashore by the local lifeboat and other craft on the river. The 15 cars were left on board overnight until the ferry could be recovered to the slipway for disembarkation the following day.

Figure 1 – Before the incident the wire was attached to chain using bulldog clips

Figure 2 – Wire now attached to chain using carpenter's stopper

The Lessons

1. Examination of the securing arrangements showed that the method in use to join the cables to the chain was incorrect and, although it had worked satisfactorily for a number of years, the failure was inevitable under heavy load. Alternative rigging arrangements have now been made, using carpenters' stoppers and bulldog grips [figure 2].

2. The unusual securing arrangements for the anchor, which required the use of tools to release, were far from ideal. These arrangements have been reviewed by the operating company, and a weekly test and maintenance routine established.

3. The already comprehensive operating procedures have been updated to include these changes. They also now include a requirement to release the anchors annually during the maintenance period.

Part 2 – Fishing Vessels

Despite the fact that more training and risk assessment takes place than ever before in the marine industry, accidents still happen, and sadly all too often. It is very easy to simply conclude that the fishing industry is a dangerous one, and there's not much we can do about it, but I for one would rather believe that any accident gives us the opportunity to discover what can be done to prevent a recurrence in the future.

For a hardy fisherman standing at the rail, gutting in poor weather, no amount of training can prevent a strong wave lapping over the rail and washing him overboard. But one skipper back in 1974 decided he would take action. David Smith was the well-known and successful captain of *Argonaut KY,* who decided to put a barrier between the waves and his crew. He achieved this by erecting a simple deck shelter (hoosie) to protect them. This common-sense device became the single most important safety feature that has been added to a fishing vessel in my time at sea; all modern vessels adopt this simple but effective approach to safety.

His ingenious idea inspired me to go further, and cover the working deck and guide the wires and ropes clear of the crew, through fixed or pendulum rollers placed on top of a gantry. These modifications, along with an opening hatch on the side of the shelter to receive the cod end, were implemented between 1974 and 1981, and forever removed five or six areas where fatal accidents were risked. Such is the nature of safety improvements: they build on previous innovations and therefore continually help to save lives.

It is quite likely that there are common denominators in today's accidents. Perhaps it is time to take a fresh look at hazardous areas on fishing vessels — places where accidents regularly occur — and see where changes can be made. An MAIB article in August 2005 by the Chief Inspector of Marine Accidents suggested something similar; and of course, the *Safety Digest* always helps to retain the level of prominence safety issues require.

We know all too well from past experience that people will always make mistakes, but if those involved in Safety Training can put measures in place to minimise the consequences of those mistakes, then real progress will be made. As an example, as skipper on my own boat, I had a simple rule that, once the winch was engaged, *nobody* was allowed forward of the fish hatch without my knowledge. This rule was elementary, but it was effective. There are doubtless many such simple common-sense rules that we could follow, which collectively would make a huge reduction in the accident rates on board ship. And surely, that is to the benefit of us all.

Rob Reid

Rob Reid

Rob's greatest desire was always to become a fisherman, but he didn't accomplish this dream until the age of 23 years. After gaining his skipper's ticket, he owned three second-hand boats and built two. These ranged between 40ft and 75ft in length, the last one being Fruitful Harvest 111 PD 247. Rob has always taken a keen interest in safety measures, and worked closely with the White Fish Authority and then spent over 30 years working for the Sea Fish Industry Authority as a member of the Industrial Development Unit.

CASE 15

Lulled Into a False Sense of Security

Narrative

A fishing vessel left her home port at 0400 to haul her catch of lobster and crab. Around lunch time, she then headed for her landing port for the next morning's market. The weather was good and each crewman took a watch during the night, shaking the next man when they became tired. They unloaded the catch early next morning and headed ashore. They visited a local shop and headed back to a café/bar on the harbour front for a drink or two.

They cast off around midday with the skipper in the wheelhouse while the crew, on deck, readied the vessel for sea. The weather was fair with a 10 knot breeze and good visibility. The skipper steered his vessel manually out of the narrow channel from the harbour. Although a difficult channel to navigate, the skipper was very familiar with it, and had been in and out of the harbour numerous times in all weathers.

As the channel widened to starboard, he engaged the autopilot and then tended to his navigation equipment, setting it up for the voyage. After a minute or so, the skipper looked up and noticed his vessel veering to port. He put the vessel astern, but it was too late and they hit the rocks on the port side of the channel. The skipper continued astern back into the main channel before heading back towards the harbour. The skipper called to a crewman to check the forward hold. No flooding was found. The crewman then checked the engine room and found water almost up to the top of the engine. The skipper shouted to his crew to launch the liferaft.

The crew experienced some difficulty trying to release the liferaft, and resorted to cutting the retaining strap to free the liferaft canister. The crew threw the liferaft over the side and then clambered into it. The skipper joined them shortly after. Their fishing vessel sank 2-3 minutes later in the main channel. They were close to the harbour and were soon rescued by a local boat.

The reason for the fishing vessel veering to port was thought to have been the failure to turn on the electrically-driven hydraulic steering pump when the autopilot was engaged. This was a mistake that had been made before, but not while in the confines of a narrow channel.

Harbour entrance channel at low water

The Lessons

1. Do not underestimate the effect of fatigue. The skipper probably had less than 4 hours sleep in the previous 24 hours. As the weather was relatively calm, the skipper was lulled into the decision to engage the autopilot 2-3 minutes before the vessel was clear of all danger, and then busied himself with a more minor task.

2. Drinking alcohol, especially in combination with being tired, will reduce alertness and will affect judgment and perception. Although alcohol may initially feel like a stimulant, it will very quickly have the opposite effect.

3. The autopilot was not fitted when the vessel was built, but was added sometime later. Every effort should be made to consider the user-friendliness of fitting new equipment, especially in the wheelhouse. For example, it might have been possible to wire the pump directly into the autopilot switch. Alternatively, an indication light might have been all that was needed to highlight the error to the skipper.

4. Make sure your liferaft quick release clip works. In an emergency, scrambling for a knife or hammer is not ideal. A simple test is all that is needed to see if the senhouse/pelican slip will release. If it doesn't, change the slip or modify the arrangement in consultation with your liferaft service agent and MCA surveyor.

CASE 16

All Action and No Talk

Narrative

A 10m boat was at anchor 2 miles offshore with a group of anglers on board. It was a fine day and visibility was good. The boat was displaying an anchor ball 3m above deck level, and also had a bright orange mizzen sail hoisted to keep her lying into the wind.

The skipper of the angling boat saw a small general cargo coaster at a range of 3 miles heading towards him. He continued to monitor the approach of this vessel, and when it became evident that the coaster was not altering course, the skipper cut his anchor rope and drove clear in order to avoid a collision. The vessels passed at a distance of about 30m.

The coaster was on a westerly course and was steaming towards the bright evening sun at a speed of 8.5 knots. The sun made it very difficult to see ahead, but her master had detected the angling boat by radar when at a range of 4 miles, and expected her to keep clear. However, he did not realise that she was at anchor until he saw her cut her anchor rope and move clear.

The Lessons

1. **The prompt action by the skipper of the angling boat saved not only his boat, but also possibly the lives of the anglers on board. Any delay in taking this action, such as by trying to contact the coaster via VHF radio, would probably have resulted in a less positive outcome. It pays to take action and to argue the detail after the event.**

2. **Radar is a great aid to collision avoidance, but is more useful when used in conjunction with visual information. When a target is stationary, it is impossible to know that she is at anchor unless the relevant shapes, lights, or cable are sighted. These indications are frequently difficult to see because of a vessel's aspect, size or distance. More often than not, they are not seen unless binoculars are used.**

3. **Sunglasses are a simple but effective aid when looking towards a setting or rising sun.**

Vessel Saved by a Plastic Bag?

Area of damage

Narrative

Two steel fishing vessels were in the process of pair trawling, having been at sea for 5 days. The sea was rough and a force 7–8 wind was blowing. One of the vessels was trailing her net with the wind on her starboard bow to enable the other vessel to collect the port end of the net. This process was initiated by positioning the sterns of the two vessels close together to allow a heaving line to be thrown across from the receiving vessel.

During the manoeuvre, the vessels came too close, and in the rough seas the vessel trailing the net came down on the starboard corner of the receiving vessel's transom. This dented and punctured the hull plating below the waterline of the vessel trailing the net. The accommodation space started to flood, but instead of investigating the source of the flooding further, the skipper instructed the crew to retrieve the nets. This took about 10 minutes. Having no means of pumping water out of the accommodation space, the skipper then called the coastguard to request portable pumps. He also headed towards the nearest offshore platform.

The pumps arrived by helicopter over an hour later, and were started with the assistance of the helicopter winch man. But they quickly became blocked and stopped pumping. The skipper recalled that there was a drainage pipe situated between the accommodation and the engine room, but this appeared to be blocked because no water was flowing into the engine room. In an effort to allow the flood water to pass through, the skipper instructed the engineer to burn a small hole in the bulkhead between the cabin and the engine room. This then allowed the two bilge pumps in the engine room to get rid of the flood water.

Concerned about the increasing stern trim of his vessel, the skipper shot away his net and transferred it to the partner vessel, thereby removing 3–4 tonnes from the vessel's stern. But to no avail; the water level continued to rise in the cabin and eventually reached the steering gear, causing it to fail.

With no steerage, the skipper had little choice but to abandon ship. But before doing so, he managed to arrange a tow from an offshore support vessel. The towline was secured and the bilge pumps were left running. The engine room and fish room hatches were closed – but the watertight doors into the superstructure were left open.

The crew were all transferred by helicopter to the offshore support vessel, and the stricken vessel was towed into port a day later. On arrival in port, the fishing vessel's pumps were found still running, and a plastic bag was found blocking the hole that had been cut in the bulkhead. The vessel was slipped and repaired, and re-entered service just over a month later.

The Lessons

The vessel and crew had a good helping of luck during this accident, and fortunately it resulted in a happy ending. However, there are several lessons to be learned:

1. When standard procedures become so routine that the thought required to put them into practice is neglected, familiarity and over confidence can lead to careless – and sometimes dangerous – mistakes. Ensure your risk assessment has considered the consequences of conducting operations in all conditions, including during severe weather. The crew involved in this case expected their vessels to receive the odd bump here and there, but had not considered the possible consequences in rough weather. They also learned that the tried, trusted and possibly the quickest method of passing lines between the two vessels is not necessarily the safest.

2. If you find that your vessel is taking in water, you will be in a frantic race against time; precious time should never be wasted retrieving your nets. Instead, treat all flooding incidents as life-threatening, and remember that your main priorities are to save yourself and your vessel – after all, your vessel is your best liferaft. Investigate the source of the flooding and then close it off or patch it as best you can; any delay could hamper your efforts of finding the flooding source. If the flood water can be reduced, or preferably stopped, this will considerably increase the chances of your bilge pumps being effective. Above all, don't rely on your fixed bilge pumps alone to cope with major flooding.

3. Carry additional means of pumping out your vessel. A portable salvage or submersible pump will ensure you can pump out compartments not served by the fixed bilge pumping system. Having to wait for a pump to be supplied by rescue services is time that could be usefully spent saving your vessel *(see MGN 165 for further advice)*.

4. Keep your vessel watertight. Cutting a hole in the watertight bulkhead could have lost this vessel if a plastic bag had not been blocking it. *Close watertight doors*, especially external doors. This will maintain maximum buoyancy and will increase the likelihood of your vessel remaining afloat.

5. Emergency situations require immediate action. Survival suits and lifejackets should be donned without delay or, at the very least, should be ready for immediate use. Such vital equipment can be rendered useless if it is left in a compartment that is taking in water. This will dramatically reduce your chances of survival if you end up in the water.

6. Consider deploying your liferaft manually so that you have a ready means of escape if your fishing vessel suddenly capsizes or sinks.

CASE 18

Don't Ride the Fish Lifting Gear

Narrative

In the late afternoon of a fine autumn day, a 1 year old 34m trawler had completed landing her catch. Two crewmen were being hauled from the fish hold when they slipped and fell approximately 4.5m to the bottom of it. Both were taken to hospital, where they stayed for 4 days.

To land the catch, the vessel used a single line through a block rigged from a span wire over the main deck, and the hydraulic crane directly over a lorry on the dock side. Because the hydraulic crane was slow to move, the two parts were rigged together to speed up the landing operation. Landing the catch took about 2½ hours, and involved all 10 of the crew under the direction of the skipper.

With the hold empty, the four men who had been working there were climbing out. The vessel had a portable ladder for access to the hold stored in the catch processing space above. However, the crew found this cumbersome, so rarely used it. Instead, they usually climbed out using the spar ceiling in the hold.

On this occasion, the last two men decided to use the lifting gear to haul themselves out. They clipped the lifting hooks together to form a stirrup; each put one foot into it and they then shouted up to the deck to hoist them up.

When the men were level with the main deck, they slipped and both fell back into the hold. One of the men broke his fall when he hit the fish hold coaming on his way down, and was able to walk unaided out of the hold. The other man plummeted straight to the bottom of the hold, and was found unconscious. He was carried to the main deck and laid on a mattress to await an ambulance.

The Lessons

Although the cause of the accident can be attributed to the misuse of the lifting gear, a number of other issues were noted which displayed a cavalier attitude towards safety. Although they don't necessarily all relate to this accident, they are, nonetheless worth highlighting. They include:

- The portable ladder was not normally used to access the hold.
- At the time of the accident the main deck hatch opening was not roped off.
- A number of watertight doors were seized and could not be closed.
- The equipment in the safety boat was still packaged for delivery.
- The engine for the safety boat had never been rigged.

These all indicated that personal safety and the safety of the vessel took second place to fishing. The 3 day delay in port, as a consequence of this accident, could have been avoided had a suitable safety regime been in operation.

The use of lifting gear for landing a catch is governed by the Fishing Vessel (Safety Provisions) Rules 1975. Some time in the future, the Merchant Vessel and Fishing Vessel (Lifting Operations and Lifting Equipment) Regulations, known as LOLER, will come into force. These will require lifting gear to be marked with Safe Working Loads, and will prohibit the use of lifting gear for hoisting personnel.

CASE 19

Net Hauled, Only to Sink with the Vessel

Narrative

A 30 year old 20m wooden fishing vessel was trawling for white fish out of a UK fishing port. The vessel was in good condition, had been certified by the MCA 6 weeks earlier, and was manned by an experienced skipper and two crew.

They completed five good hauls, but during the sixth haul, just as the three fishermen finished their evening meal, the engine room bilge alarm sounded. The skipper immediately went below into the engine room and engaged the main engine-driven bilge pump. He first pumped out the engine room and then left the pump running in the fish room, from where he believed melt water to be running aft.

About 15 minutes later, the bilge alarm sounded again and the skipper repeated his earlier actions. However, on this occasion, he inspected the fish room but found nothing wrong.

The bilge alarm sounded again about 20 minutes later. This time, the skipper became concerned. He alerted the crew, asking them to don lifejackets and prepare to haul the net. He then hurried to the engine room where he engaged the main engine bilge pump, as before, and the auxiliary bilge pump. He then returned to the main deck to haul the net. He did not investigate the source of the flooding, nor did he shut the sea cocks because he needed the main engine to be running in order to haul the nets.

Once the net was alongside, the skipper returned to the engine room and found the water was now above the floor plates. He could no longer access the sea cocks or locate the source of the flooding, so went to the wheelhouse and called other fishing vessels in the area for assistance using the VHF radio. The two crewmen transferred to a nearby vessel; the skipper remained on board. One hour after calling other fishing vessels for help, and only after the main engine started to falter, the skipper eventually contacted the coastguard. The water had reached the main engine heads. The skipper transferred to the other fishing vessel after a further hour, when the main engine finally stopped.

Two rescue vessels, both equipped with salvage pumps, arrived on scene as the vessel rolled onto its port side and sank, 30 minutes later.

The Lessons

1. **The skipper did not follow the excellent guidance given in MGN 165(F), which states that it is essential that the source of flooding is located first, and before any attempt is made to haul the fishing gear. *There is no point in recovering your gear, only to lose it, along with the vessel and possibly your life.***

   It is likely that, in this case, the failure of some flexible hosing, inserted in the main engine cooling system 5 years earlier, caused the flooding. A quick check under the plates at an early stage would have found this, and it could then have been repaired easily.

2. **Always call the coastguard at the first sign of any flooding. Had the skipper called the coastguard and the other fishing vessels simultaneously, assistance would have been on scene an hour before the vessel sank. It is likely that she could then have been saved with the use of the salvage pumps.**

CASE 20

Family Tragedy Averted

Narrative

The families of three crew members were very nearly left grieving when a small fishing vessel (less than 10m registered length) took a glancing blow from a 248m tanker. Fortunately, on this occasion, the outcome was relatively minor and the three men survived.

The trawler was returning to her home port, in fair weather and good visibility, but it was dark. Having ensured that no other vessels were in the immediate vicinity, the skipper went to the after deck to help the two deckhands process the catch. His view outside from the sheltered processing area was limited to directly astern. He returned to the wheelhouse every 12-15 minutes to check for traffic, but saw none.

The tanker, meanwhile, was heading nearly due south at about 13 knots. Her bridge team consisted of the chief officer and a lookout. The chief officer saw the lights of a vessel at between 30° and 40° on the port bow, and the radar indicated that she was at a distance of about 5.5 miles and on a collision course. As they approached, he could see through his binoculars that the other vessel was a fishing vessel on passage. Under the collision regulations, his was the stand-on vessel, so he expected the trawler to alter course and give way. It did not.

View from bridge of tanker

Aware that fishing vessels often delay taking avoiding action until relatively close, the chief officer initially just monitored the situation. However, it soon became evident that the fishing vessel was taking no avoiding action, so the chief officer went to the bridge wing and flashed his Aldis lamp at her. He then sounded one long blast on the ship's whistle. Still the trawler took no action. As the distance between the two vessels closed, and when about 1.2 miles apart, the chief officer ordered his own vessel hard-to-starboard. But by this time it was too late.

The fishing vessel received a glancing blow to her starboard shoulder as the tanker turned rapidly. The impact caused her to heel over violently, and seas poured in over her port quarter. Although her three crew members were jolted suddenly, none were injured and the vessel suffered only relatively minor damage.

The Lessons

1. Balancing the need of meeting demanding fishing quotas, while at the same time facing restrictions in the number of days they are permitted to fish, places skippers/owners under intense pressure. But commercial pressure should never take precedence over safety.

2. It is essential that those entrusted with lookout duties perform them properly. Not doing so can have fatal consequences.

3. When an OOW is faced with a fishing vessel on passage, on the port bow, and on a collision course with his/her merchant ship, a dilemma arises. Will the fishing vessel alter course or not and, if it does, will it alter at the last moment because it is very manoeuvrable? The OOW must decide when to alter course to avoid a collision if the fishing vessel is not apparently taking action. Collisions have occurred in these circumstances because the OOW has delayed altering course, having expected the fishing vessel to alter course at the last moment.

   If you are the give way fishing vessel for other crossing vessels, alter early and substantially so that the OOW of the other vessels can see clearly that action has been taken.

CASE 21

Alcohol and Lack of Sleep – a Lethal Cocktail

Location of grounding

Narrative

After an evening spent ashore enjoying beer and spirits until about 1 o'clock in the morning, two deckhands returned to their wooden-hulled prawn trawler. The skipper chose, instead, to go home for the evening.

Early the following morning, the skipper returned to the vessel and started the engine. It was still dark. Awoken by the sound of the engines, one of the deckhands got up and went on deck to cast the lines off. The other remained asleep. Sitting in the port chair, rolling a cigarette, the deckhand observed that the skipper was not manually steering the vessel, but was programming the chart plotter, probably setting course for the fishing grounds.

Very shortly afterwards, and completely without warning, the vessel stopped with such violence that the deckhand was pitched out of the chair and into the console in front of him. Realising the vessel had gone aground, the skipper immediately put the engine astern. But this had no effect, so he instructed the deckhand to check the fish hold. The hold and the cabin below it were both rapidly filling with water.

The other deckhand was roused, while the skipper made a distress call to the coastguard. The two deckhands donned their lifejackets and quickly evacuated, managing to swim ashore and scramble onto some nearby rocks. However, the lifeboat crew found the skipper laying face-down in the water. He was taken to hospital, but died later that day.

Usually, when the vessel made its way out to sea, the skipper would engage the automatic helm at the entrance to the harbour. Perhaps on this occasion, he believed he had set the course on the automatic helm, and had engaged it, but had not actually done so. He might then have become distracted with the chart plotter. It is possible that with no steering, the left-handed propeller then caused the vessel to turn to starboard and towards the shore.

The Lessons

1. If the skipper and the deckhand had been more alert and had maintained a good lookout, they would have noticed the vessel was not following her intended course and would have taken action to rectify it. However, the skipper had allowed himself to become preoccupied in other work, and the deckhand had not been in the wheelhouse long enough to become fully acquainted with the surroundings.

2. When charged with keeping a lookout, crew should never allow themselves to become distracted by other tasks.

3. The skipper and crew had enjoyed a 'few pints' ashore the previous evening, which then took their tragic toll the following day. All too often, chronic fatigue, resulting from too little sleep and consuming alcohol, has fatal consequences. It is a lethal cocktail.

4. The *Rail and Transport Safety Act 1993* lays down legislation which makes it an offence for professional masters, pilots and seamen to be impaired in carrying out their duties by drink and drugs. The prescribed limit of drink for seafarers is the same as for car drivers.

Part 3 – Leisure Craft

The sea is a wonderful environment in which to enjoy our leisure time. It offers a huge range of activities to suit every taste and budget. But it is also an unforgiving environment that catches out the unprepared or the unwary.

As I write this, of the 9 deaths the MAIB is currently investigating, 8 are from leisure craft. In August alone, the Coastguard logged some 800 leisure craft incidents and accidents around the coast of the UK.

What are the golden rules?

Training. Proper training will allow you to get the most from your sport/leisure, and will help ensure your safety. The RYA runs a full range of excellent – and fun – training courses.

Preparation. Is your boat properly maintained and properly equipped for what you intend to do? Lack of maintenance ruins many a fun day and, in extremis, costs lives.

A good-news story at Case 24 – a cheap smoke alarm prevented a catastrophe. Do you have the appropriate equipment fitted and/or carried?

Planning. Is the weather forecast favourable for what you are planning? Have you got the right charts and equipment? Have you planned fully, and informed someone of your intentions? Have you thought how you would deal with emergencies?

Alcohol. At least 4 leisure craft users have died in the UK this summer because of boats being driven by someone under the influence of alcohol. Some seem to think that because there is not a national drink/drive limit on the water in the UK, it is okay to drink and drive. It is not. Nowadays, we are used to nominating a driver when going by car to a pub or out to dinner; it is totally irresponsible to do any different on the water.

Think safety and enjoy your leisure time on the water.

CASE 22

Anything But Plain Sailing!

Narrative

A lone sailor set off early in the morning in his 22ft yacht, which he had caringly restored and had sailed during the summer months over the previous 4 years. This was his first trip of the season in the boat. The intended passage to a nearby yacht haven about 15 miles away required him to cross a narrow channel frequently used by large ships. The sailor wore a lifejacket, but did not carry either flares or a VHF radio.

As the yacht approached the narrow channel, her skipper saw a large ship leaving the port about 2 miles away. The wind was north-west at 20 knots, and the yacht was on a close haul, heading in a westerly direction. The skipper was aware that local regulations required him to keep out of the way of the outbound ship. To comply, he adjusted course to the south-west, which brought the yacht onto a beam reach and increased her speed to about 6 knots.

By this time, the yacht had been spotted by the pilot of the outbound ship, which was constrained by her draught. He was content that the yacht would remain clear of the ship providing the yacht's heading was maintained. However, as a precaution he asked the escorting harbour launch to proceed to the yacht and advise her skipper to keep going towards the south-west. This message was passed by the harbour launch by a loud hailer. The skipper heard the loud hailer but, although the launch was very close, he did not

CO_2 bottle missing

understand the message. Nevertheless, he assumed that the launch would only contact him if it wasn't content with the avoiding action he was taking. Consequently, he decided to tack, and head to the north of the channel. As he did this, he stalled into wind, and lost all headway.

The pilot of the outbound ship, which was now halfway through a 135° to port turn towards the yacht, saw what had happened, and increased the ship's rate of turn to try and avoid her.

The two vessels were now extremely close and the pilot lost sight of the yacht under the bow. The yachtsman decided that collision was imminent, and dived off the yacht. He passed down the port side of the ship and was then recovered by the harbour launch. The yacht passed down the ship's starboard side before being swamped by her wash and foundering. The yachtsman's lifejacket did not inflate because it was not fitted with a CO_2 bottle (Figure).

The Lessons

1. Sailing or motor cruising close to large ships cannot be avoided within the confines of many harbours and their approaches. However, the general rule that smaller vessels must keep clear of vessels navigating a narrow channel or fairway, is frequently easier said than done. The visual perspective of a large ship from a small craft can be very deceiving, and it is often very hard to accurately determine how close a large ship will pass, particularly when the large ship is manoeuvring. Also, a planned passing distance can be unexpectedly reduced for sailing vessels by a sudden wind shift or lull, and for motor cruisers by a mechanical failure. Therefore, stay clear of narrow channels whenever possible, particularly when they are being navigated by large ships. On the occasions when this is not possible, remember that a large container ship will probably not be able to see a small craft within 500m of her bow, and she will possibly need up to twice that distance to stand a chance of manoeuvring successfully to avoid a collision with a small craft ahead.

2. The first trip of the season is something to look forward to. Consequently, there is usually a natural wish to get onto the water and get going as soon as possible. However, a few minutes of re-familiarisation of the rigging, and practising of key manoeuvres is time well spent before venturing into a busy shipping area. Otherwise, the first tack of the season might also be the last!

3. A lifejacket that does not inflate is potentially a death jacket. Regular checks are not just recommended, they are essential. If in doubt, consult an approved service agent.

4. Although a VHF radio is a very useful means of raising an alarm, it is not practical for many yachts to carry one. However, flares are very easy to carry, and can be just as effective in summoning assistance in coastal areas. When neither are carried, there is a reliance on other mariners being in very close proximity. There is always a risk that none will be.

5. There are numerous reasons why a harbour launch or a safety boat might try and communicate with small craft on the water. For various reasons, it is sometimes difficult to understand the message being passed. On these occasions, it pays to ensure that you fully understand the message before taking any action.

Poor Decision-Making Leads to the Death of a Skipper

Narrative

An 11.2m yacht, drawing 1.5m was being professionally delivered from south-eastern Spain to the East Coast of the UK. There was a crew of three, including the skipper who had a Yachtmaster Offshore qualification with a commercial endorsement.

The voyage took longer than planned due to persistent, often light, headwinds and poor performance under power. They were unable to motor at more than about 3 knots.

They began the final leg of their journey in poor visibility, having had a tiring voyage up-Channel. All three were awake in the early hours of the morning, one on the helm, another keeping a lookout, and a third monitoring the radar. They were crossing a major river estuary on the East Coast, notorious for shallows and shifting banks, and were doing so on a falling tide. There was no wind, the sea was smooth, and with the tide in their favour they were making about 4 knots over the ground.

The skipper was navigating using a chart with a scale of 1:250,000, and a small portable GPS chartplotter temporarily fixed just forward of the wheel. They were following a route on the chartplotter to a waypoint several miles distant that would take them into very shallow water. They ran aground with about 1½ hours of tide still to fall, which would have amounted to about 60cm.

Attempts were made to refloat using the engine, and by heeling the yacht by putting the boom to port and adding weight to the end. When this failed, the skipper elected to strip to his underclothes and go over the side with a line tied around his waist, attached to the starboard quarter. This was with the intention of finding deeper water and laying a kedge anchor with which they might winch themselves off.

Folding prop with entangled rope

Later, when in the water, the skipper was speaking to the crew who was on the helm, and had instructed him to leave the engine running astern. Suddenly the line that was round his waist became caught around the propeller and shaft. The skipper was dragged underneath the yacht, where he was trapped below the water with the line tight around him.

The other crew, who had been working with the anchor, quickly went over the side, carrying a knife. He dived underneath, but found it very difficult to free the skipper. Despite the crew himself becoming very tired in the water, on the fourth attempt he managed to free the skipper and bring him to the surface. He was able to be brought back into the cockpit but, despite attempts at resuscitation, he showed no sign of life. It is probable that he had been underwater for 10 minutes.

A "Mayday" call had been put out as soon as the skipper became trapped and, in due course, two lifeboats and a helicopter arrived. The skipper was flown to hospital where it was confirmed that he had died. The two surviving crew were taken aboard one lifeboat while the other took the yacht in tow.

After the yacht had been lifted out of the water, to remove the rope that had been around the skipper, a further line was found tangled in the folding propeller that was preventing it from properly deploying. The line showed signs of having been there some time, and was probably the cause of their reduced speed under engine power.

The Lessons

1. The danger of being in the water, attached to a rope, close to a turning propeller cannot be overestimated. To reduce the hazard, the engine should have been disengaged. Better still, it should have been switched off altogether while someone was over the side.

2. Thorough passage planning is important at all times; in shallow tidal waters it is essential. The track of the yacht and the waypoints being used were stored in the GPS/chartplotter, and were analysed by the MAIB. The route being followed took the yacht straight over an area of shallow water with charted depths of less than 1 metre, and at one point, a drying area.

3. Charts must be of the correct scale. The 1:250,000 chart showed no soundings for the area being transited, and was better suited to longer range route planning. The chartplotter vector charting contained sufficient detail so long as the chart display was set to the correct scale. This was the prime means of navigation being used, but had a screen size of just 7.5cm x 5.7cm, making it very difficult to see the wider picture.

4. Fatigue was an important factor. The skipper had intended to carry out the voyage with four people on board, but had decided to go with three when one dropped out. Although it is not unusual for a yacht to be navigated shorthanded over long distances, proper rest is essential. It seems very likely that the skipper's decision-making was affected by fatigue.

5. Whenever any type of vessel grounds, it is vital to carry out a quick but rational risk assessment. The action taken will be different if you are being blown onto a dangerous lee shore, compared with gently running onto a bank in calm conditions with no swell, and the prospect of the height of tide and the direction of stream being able to float you off in a couple of hours. The decision by the skipper, to go over the side in the way that he did, was ill thought through.

6. It is important to recognise the differences between navigating in largely non-tidal waters such as the Mediterranean, and the shallow tidal waters that characterise the East Coast of England. It is possible to gain commercially acceptable sailing qualifications without having practical experience of shallow estuaries and shifting banks. There are different challenges presented by the variety of types of waters found throughout the world, but if they are unfamiliar to you, as skipper, extra care must be taken at the passage planning stage.

N.B. The portable GPS/chartplotter being used on board this yacht was found to have an unusual characteristic within its chart display. As with most units of this type, it was possible to change the units through which speeds, depths, and heights were displayed. As a result of this, the unit was set to display soundings in metres, but *drying heights* in *feet* on the same chart. This almost certainly had no bearing on the circumstances of the accident, but in other situations could easily cause confusion.

Units of this type are sold as an aid to navigation, with strong advice to use them in conjunction with paper charts. It is important to be aware of the multitude of functions and options available so that it is an aid rather than a hindrance.

A Cheap but Priceless Early Warning

Narrative

A new, 14m sailing yacht was being manoeuvred from her berth at the beginning of a weekend's sailing. The skipper used the engine and, for just a few seconds, her 12 volt, motor-driven bow thruster, installed in a compartment beneath the double bunk in the forward cabin. She had just cleared her berth when the smoke alarm sounded in the empty forward cabin.

The crew found smoke coming from the space beneath the bunk. They lifted the bedding clear, removed the compartment's covers and pulled out the spare sails and other gear. Using a dry powder extinguisher, they extinguished burning and smouldering material.

Meanwhile, the skipper requested assistance and manoeuvred back to the berth, where shore firefighters assisted in making the vessel safe. Negligible damage was caused to the boat, but most of the bedding and spare kit was affected by fire, heat or smoke.

A closer examination found that a metal cover to the brush gear of the bow thruster's motor had been displaced. The cover had then made contact with a terminal on one of the motor's power cables, causing arcing (Figure 1). This sparking had ignited a sail bag.

Figure 1: Bow thruster showing exposed power cables and fire damage

Figure 2: Machinery space with no visible warnings can be easily mistaken for a storage locker

The Lessons

1. The owner had fitted a smoke alarm in the forward cabin as a sensible precaution. By alerting the crew early, its value was clearly shown and its purchase price of a few pounds showed a handsome return.

2. Kit had been so tightly packed into the space that it enveloped the bow thruster's motor. The resultant loss of cooling air circulating around the motor had the potential to cause overheating, which would normally show when the motor's thermal cut-out tripped, possibly after just a few minutes of operation. This could cause the loss of the bow thruster at an awkward stage of events.

3. The vigour with which gear had been packed around the bow thruster moved the protective cover of the motor's brush gear. Apart from exposing moving parts of the motor, itself potentially dangerous, it generated a short circuit and a source of ignition as soon as power came on the main cable when the thruster was used.

4. The manufacturer's instructions for the bow thruster were on board the vessel. They quite clearly stated that nothing should be stored close to the motor. When a new boat is taken over, it may not always be possible to read and understand the significance of every detailed instruction, in every instruction book, for all the equipment found on a modern vessel. However, the principle that nothing should be stowed close to machinery is universal.

5. Spaces having every appearance of being stowage lockers, as in this case (Figure 2), almost invite gear to be crammed in them, and it is certainly very tempting to do so. Without clear warnings that the space contains machinery, the potential hazards may not be obvious or recognised. This could be overcome by labels on the doors or covers, of spaces that may not have been seen as obviously containing machinery, designating the space as a machinery space and not for storage purposes.

6. Bow thrusters are being fitted into many existing yacht designs. Such retrofits or design modifications are not always as well considered as they could be. If you have, or are buying, a yacht with a bow thruster (or any other additional mechanical or electrical device) ensure that they are properly protected from accidental contact.

Preliminary examinations started in the period 01/07/05 – 31/10/05

A preliminary examination identifies the causes and circumstances of an accident to see if it meets the criteria required to warrant an investigation, which will culminate in a publicly available report.

Date of Accident	Name of Vessel	Type of Vessel	Flag	Size (grt)	Type of Accident
02/07/05	*Orion*	Fishing vessel	UK	46	Capsize
	Mollyanna	Sailing dinghy	UK	Unknown	Capsize
	Starida II	Angling vessel	UK	Unknown	Capsize
	Sarah Jane Too	Angling vessel	UK	Unknown	Capsize
13/07/05	*Arklow Racer*	General cargo	Irish	2999	Grounding
19/07/05	*Scath Ros* *Immanuel V*	Fishing vessel Fishing vessel	UK UK	8.59 9.06	Collision
04/08/05	*Bramble Bush Bay*	Chain ferry	UK	525	Accident to person
07/08/05	*Un-named speedboat*	Yacht (pleasure)	UK	Unknown	Accident to person
09/08/05	*Lands End*	Mega yacht	UK	364	Grounding
13/08/05	*Sovereign II*	Dive support vessel	UK	Unknown	Accident to person
24/08/05	*Balmoral*	Passenger vessel	UK	735	Grounding
28/08/05	*Fertile II* *Aquarius*	Fishing vessel Fishing vessel	UK UK	251 189	Collision
08/09/05	*Blue Sinata*	Fishing vessel	UK	5.60	Flooding/foundering
10/09/05	*Hatsu Prima* *Gertrude*	Container vessel Oil/chemical tanker	UK Panama	17887 4412	Collision
14/09/05	*Belo Horizonte*	Bulk carrier	Hong Kong	40300	Fire
28/09/05	*Hohebank*	General cargo	UK	1687	Grounding
11/10/05	*Lerrix*	General cargo	UK	1992	Grounding

Investigations started in the period 01/07/05 – 31/10/05

Date of Accident	Name of Vessel	Type of Vessel	Flag	Size (grt)	Type of Accident
10/07/05	*Sea Snake*	Motor (pleasure)	UK	9	Fatal accident to person
16/07/05	*Carrie Kate* *Kets*	Motor (pleasure) Motor (pleasure)	UK UK	Unknown Unknown	Collision
19/07/05	*Savannah Express*	Container vessel	Germany	94483	Contact
26/08/05	*Big Yellow*	Passenger craft	UK	Unknown	Hull failure
28/08/05	*Harvest Hope*	Fishing vessel	UK	356	Flooding/foundering
03/09/05	*Anglian Sovereign*	Emergency Towing vessel	UK	2270	Grounding

APPENDIX B

Reports issued in 2005

Albatros – accident on board the commercial sailing vessel, Thames Estuary on 22 August 2004 resulting in one fatality
Published 8 April 2005

Attilio Ievoli – grounding of the Italian registered chemical tanker on Lymington Banks in the west Solent, south coast of England on 3 June 2004
Published 7 February 2005

Balmoral – grounding of passenger vessel, Dagger Reef, Gower Peninsula on 18 October 2004
Published 29 July 2005

Brenda Prior/Beatrice – collision, Lambeth Pier, River Thames on 17 December 2004
Published 11 August 2005

Cepheus J and Ileksa – collision in the Kattegat on 22 November 2004
Published 20 July 2005

Coral Acropora – escape of vinyl chloride monomer, Runcorn, Manchester Ship Canal on 10 August 2004
Published 8 March 2005

Daggri – contact made by the UK registered ro-ro ferry with the breakwater at Ulsta, Shetland Islands on 30 July 2004
Published 5 April 2005

(trilogy)
- ***Emerald Dawn*** – capsize and foundering, with the loss of one life on 10 November 2004
  Published 5 August 2005
- ***Jann Denise II*** – foundering 5 miles SSE of the River Tyne on 17 November 2004 with the loss of two crew
  Published 5 August 2005
- ***Kathryn Jane*** – foundering 4.6nm west of Skye on, or about, 28 July 2004 with the loss of the skipper and one possible crew member
  Published 5 August 2005

Hyundai Dominion/Sky Hope – collision in the East China Sea on 21 June 2004
Published 30 August 2005

Isle of Mull – contact between two vessels, and the subsequent contact with Oban Railway Pier, Oban Bay on 29 December 2004
Published 22 July 2005

Jackie Moon – grounding, Dunoon Breakwater, Firth of Clyde, Scotland on 1 September 2004
Published 23 March 2005

Nordstrand – fatal accident at Agencia Maritima Portillo, Seville, Spain on 20 September 2004
Published 15 April 2005

RFA Fort Victoria – investigation of the lifeboat release gear test, which caused injuries to two people at Falmouth ship repair yard on 10 September 2004
Published 18 May 2005

Sardinia Vera – grounding of the passenger ro-ro ferry, off Newhaven on 11 January 2005
Published 21 September 2005

Scot Explorer and Dorthe Dalsoe – collision, Route 'T' in the Kattegat, Scandinavia on 2 November 2004
Published 10 June 2005

Star Clipper – failure of a mooring bollard from the Class V passenger vessel, resulting in a fatal accident at St Katharine's Pier, River Thames, London on 2 May 2005
Published 18 February 2005

Stolt Tern – grounding, Holyhead, Wales on 1 December 2004
Published 9 September 2005

Swan – capsize of the passenger launch on the River Avon, Bath on 14 October 2004
Published 15 July 2005

Waverley – grounding of the passenger vessel, south of Sanda Island, west coast of Scotland on 20 June 2004
Published 1 February 2005

Recommendations Annual Report 2004
Published July 2005

Annual Report 2004 Published May 2005

Safety Digest 1/2005 Published April 2005

Safety Digest 2/2005 Published August 2005

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