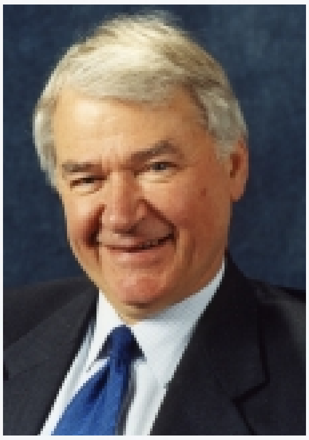
Part 1 – Merchant Vessels



It is a great pleasure to be invited to write this Introduction to the Merchant Vessels Section of the MAIB's Safety Digest 1/2008, and it has a certain resonance for me as I am an avid reader of the MAIB Accident Reports. In my opinion, the publishing of these Reports is a vital service to the shipping industry and there are lessons to be learned from each and every incident.

It is said that 'experience is the best teacher' but that 'the wisest learn from the experience of others'. That is what the MAIB reporting scheme is all about – to make us all wiser.

Anyone who regularly reads the MAIB Accident Reports will know that the same type of accidents occur on a regular basis. The Reports cover merchant vessels of all sizes and types undertaking short sea as well as ocean passages. It is quite clear that many of the accidents reported could equally apply to any vessel and that, therefore, lessons can be learned irrespective of the trading pattern and vessel size and type.

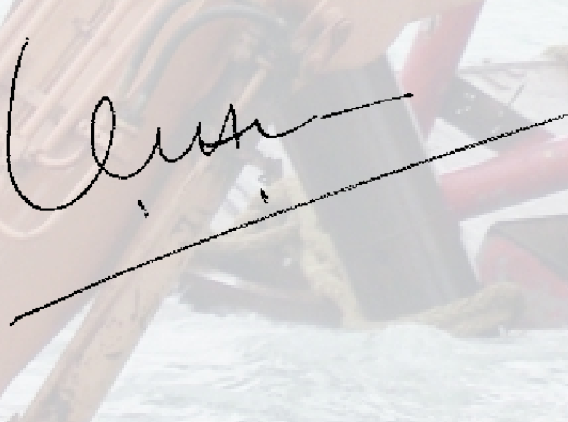
I would very much like to see the development of the MAIB accident reporting model in a wider international context so that more can be learned from the incidents which occur constantly around the world, but I have no expectation that this will happen in the near future.

In this Digest, we have some important recurring themes which relate to groundings, collisions and mooring accidents. All of these could have been averted through proper implementation of team management and briefing/planning prior to the event. In most cases the adoption of an effective monitoring process would have prevented the accident from occurring. The industry has effective tried and tested methods of ensuring safe operations, but it is the implementation of these methods which seems to fail.

It should be noted that the articles chosen for this Digest are just a few of the reported accidents which have occurred during the period, but each one is interesting and of relevance because of the specific lessons which can be learned.

The international association of dry cargo ship owners, INTERCARGO, continues to promote the goal of quality across the dry bulk sector and is placing a greater emphasis on the role of the human element through the recent creation of a joint committee with INTERTANKO to provide a focus for the adoption of industry best practices. The publication of the MAIB's Safety Digest is a useful tool in our efforts to achieve this goal.

As I have done in the past, I congratulate the MAIB for the standard of reporting that it continues to produce and I hope that seafarers in conjunction with their managers and owning companies can be made more aware of the experience of others and thereby become wiser and less liable to repeat the same mistakes, with the inevitable tragic consequences.



Roger Holt

Roger Holt began his career in the maritime industry as a Deck Officer with P&O in 1964 and came ashore in 1971 having graduated with a BSc in Nautical Science from Southampton University.

He was retained by the commercial department of P&O Bulk Shipping, and in 1980 he joined Burbank Marine in London and operated as a dry cargo broker on the Baltic Exchange until 1985. He then joined Mundogas in London as Chartering Manager. Mundogas was sold to Enron in 1988 and he was employed by the new ship owner to run its commercial office in London.

He was appointed Managing Director of Universal Bulk Carriers in 1992 until 1995. During this period, he was also involved with developing Aurora Tankers as a J/V between IMC and OMI.

He was then appointed Managing Director of UB Shipping until 1997 when UB Liner Services was sold and the reefer operation repatriated to Norway. In 1998 he established Holt Maritime Ltd as an independent consultancy and project brokerage company.

He was appointed Secretary-General of **INTERCARGO** in June 1999.

Caution – Seabed Last Surveyed by Leadline in Mid 19th Century

Figure 1: Jack-up barge in position

Figure 2: The tug used to escort the jack-up barge

Narrative

A jack-up barge, towed by a 32m tug and escorted by a second tug, was being moved as part of a project to install a coastal renewable energy installation. The visibility was good, with light, variable winds; perfect for transferring the barge. Although it was the day before spring tides, the barge had been transferred the previous day, within the same area, without concern. The tug skipper used paper charts for planning and navigation together with a chart plotter for monitoring the passage.

The least expected depth for the passage was greater than 20m. Once clear of the port approaches, the barge master and tug skipper agreed to lower the barge legs to a depth of 9m to improve the barge's stability for the anticipated swell.

The tow's progress through the water was slightly reduced as the barge trimmed forward now that the legs had been extended. As the tug and tow approached the halfway point in the voyage the following spring ebb tide, flowing at about 6 knots, set the tug and barge closer to the coast than expected.

The tug skipper discussed the situation with the tow master, and they agreed to change their route to a channel used less frequently by deep draught vessels, but one the skipper had used many times before. This route also had a minimum expected depth of water in excess of 20m. As the tug and tow altered course to run with the ebb tide, their speed increased to around 9 knots.

Following the decision to change the route, the tow master and tug skipper agreed to lower the barge legs further, to 13m, to reduce the expected rolling when they crossed the tidal flow later, and to have the legs at the correct depth for positioning the barge on the seabed.

Shortly after altering course, and half an hour after low water, the barge grounded on the forward two, of her four, legs. The force of the grounding caused some of the barge personnel to fall; however, no one was injured.

The charted depth at the position of the grounding was shown to be greater than 20m, with the closest sounding on the chart showing a depth of 26m.

The tug skipper reacted quickly to the grounding by simultaneously applying astern propulsion and paying out the towing cable. The escort tug promptly connected a tow to the stern of the barge to relieve the strain on the barge legs, and held her in position to wait for the rising tide and a reduction in the tidal flow.

The jack-up barge refloated 40 minutes after the grounding and was returned to harbour. All four legs were found to be damaged, with the damage to the barge costing an estimated £1m to repair. The delay in returning the barge to her destination also resulted in extensive delays to the project when the seabed frame, constructed during the previous installation stage, collapsed in the strong tides.

The tug's echo sounder was running throughout the voyage, although the depth trace prior to the grounding was illegible; possibly due to the turbulence caused by the fast flowing tidal streams in the area.

Following the grounding, the national hydrographic office initiated NAVTEX warnings of the danger. A week after the grounding, the local pilot boat carried out a survey of the area, which confirmed the presence of an uncharted bank with a minimum depth of less than 8m covering an area of approximately 2.5 x 2.5 cables. The published chart correction revised the charted depth of the bank to be 7.1m.

The source diagram for the chart showed the area to have been surveyed by leadline between 1839 and 1848. The original survey record showed that the survey of the grounding area was carried out in 1844, and the findings were correctly transferred to the chart. The 7.1m bank had been missed due to the sampling nature of the leadline surveys.

The Lessons

1. **Ever larger and deeper draught vessels, including passenger ships, are navigating more frequently in remote and infrequently visited areas of the world. This grounding should alert masters and marine managers to the risks of routing their vessels in these areas.**

2. **The tug skipper and the tow master had not appreciated the implications of the source data on the chart they were using. 19th Century source data implies leadline surveys which, by their nature, are not as comprehensive as modern surveys. Prudent mariners must check the source data of their charts to assess the risk to their passage plan.**

3. **When using electronic charts, source data can be hard to find or, once found, interpret:**

   - **ECDIS equipment uses Category of Zone of Confidence (CATZOC) instead of the traditional Source Data diagram shown on paper charts. However, CATZOC might be an ECDIS menu option which is not immediately available to the navigator and so easily forgotten during passage planning. A full description of CATZOC is provided in the Mariners Handbook – NP100.**

   - **Electronic chart systems (ECS) and chart plotters might not display CATZOC or survey source data at all, therefore their reliability should be carefully considered by the prudent navigator. If appropriate, reference should be made to updated paper charts.**

4. **Depths that are significantly less than charted may exist wherever your voyage takes you, and the possibility of their existence should not be ignored. Echo sounders should be used in poorly surveyed regions, even when shallows are not expected.**

One Fire is Unfortunate, Two Fires is…

Figure 1: Fire Service attending to the fire (image captured from CCTV)

Narrative

A 2500gt general dry cargo ship had arrived at a UK port following a passage from the eastern Mediterranean during which the ship had encountered particularly severe weather conditions. While manoeuvring in the locks, a fire occurred inside the upper part of the main engine exhaust uptakes, within the funnel area. Flames came out of the main engine exhaust at the funnel and ignited waste oil that was lying on the funnel top. This produced a spectacular ball of flames and much dense black smoke.

The crew discharged a powder extinguisher to the funnel top, then water from the ship's fire hose. Meanwhile, the shore-side fire brigade had been called, and they responded in force. Initially, the funnel door was open and few significant signs of the fire were seen inside the funnel space. The door was then closed and boundary cooling applied to the outside of the funnel. The engine room was evacuated, closed down and the CO_2 flooding system was operated without any problems. The fire was rapidly brought under control and was soon extinguished. There was some minor fire damage to both the internal and external paint finishes of the funnel and the lighting systems inside the funnel space.

The engine room CO_2 cylinders were landed ashore for re-charging and, although alongside, the ship's crew maintained engine room watches due to the increased risk.

During the evening, there was a second, smaller incident. Increasing amounts of smoke were seen coming from the upper part of the funnel, in the area of the main engine silencer/spark arrestor. The local fire brigade was called again, and returned on board and located the seat of the fire. Hot spots remaining inside the main engine exhaust from the first fire had ignited the oily/greasy

Figure 2: The main engine/silencer arrester – the seat of the second fire

vapour residues in the mineral wool insulation that covered the exhaust uptakes. This second fire was extinguished by breaking open the outer metal cladding and applying water directly to the seat of the fire within the insulation itself. A small amount of water was also put down the exhaust uptake, care being taken to allow this to drain off before it reached the main engine.

Although the vessel was built in 1982, the main engine was an older design more commonly seen on larger vessels. Rated at 1490kW, it was a slow speed two-stroke, direct reversing engine with compressed air starting, and used a scavenge pump in a cross scavenge system. The engine was provided with a simple cylinder lubrication system and operated using gas oil as fuel. There was no economiser or exhaust gas boiler.

The engine had been substantially overhauled during a repair period just before this voyage, during which the pistons had been withdrawn and the piston rings and some cylinder liners renewed. Consequently, the rate of cylinder oil lubrication had been increased for the "running-in" period. There was no system to monitor and control the rate of cylinder lube oil injection, so it is likely that the engine cylinders were significantly over-oiled for an extended period.

After the fire, the main engine was examined and was found not to be damaged; all piston rings were intact. Significant quantities of oily carbon were found in both the scavenge and the exhaust trunkings, however the fire had been in the uptakes only. There were large quantities of fully burnt ash at the after end of the exhaust trunking, beneath the main exhaust uptake. Further areas of insulation were stripped away from the outside of the exhaust trunking, and some areas were found to have been contaminated by oil vapours.

The Lessons

1. The voyage was longer than usual, so the crew had no opportunity to examine or to clean the scavenge air or exhaust trunkings. Also, the bad weather meant that the build up of oily residue on the funnel top went unnoticed. Engineers must always be alert to the dangers of fouling of scavenge and exhaust trunkings/uptakes; the result may not always be a scavenge fire!

2. The local emergency response plan went well, the fire & rescue service responded quickly, and in significant numbers. However, its actions in tackling the initial fire were probably less than optimal; while the boundary cooling technique was effective, it is unlikely that the use of the CO_2 flooding system was the best way to tackle this particular fire. This ineffective use of resources was due to a lack of understanding of the construction and layout of the ship and, consequently, the location of the seat of the fire. The second fire was due to inadequate damping down after the first incident, again due to a lack of understanding of ship construction and layout.

   The port authorities, fire & rescue service and the Maritime and Coastguard Agency are working together to enable local firefighters to increase their knowledge of ships and shipping operations. However, owners, masters and crews should always consider helping those who will be there to help them; please respond positively to requests for familiarisation visits and exercises involving the emergency services.

3. The phenomenon of fires within oil contaminated lagging is well known, and is commonly labelled a *"lagging fire"*. In this case, although covered with thin metal sheathing for mechanical protection, the mineral wool insulation was not vapour-sealed. The oil contamination was probably due to oily vapours inside the funnel space condensing on the outside of the exhaust trunking as it cooled. These owners now have a planned programme of inspection and renewal of contaminated lagging. Do you know what is inside your lagging?

Left a Bit More

Narrative

A chemical tanker had discharged parcels of cargo at a port in the Middle East and was outbound through a narrow channel to sea. With the pilot on board and an escorting tug alongside, all was going well. In good weather conditions and an ebbing tide, the pilot decided to disembark at the port's breakwater, about 3 miles short of the official position. This was just before the channel turned through 90 degrees to port and reduced to a width of 1.5 cables. Despite this, the tug was dismissed and the pilot disembarked.

Once past the breakwater, the vessel turned to port and the master ordered the helmsman to maintain a heading along the dredged channel. The tidal stream was predicted to follow the vessel's course at up to 4 knots, so the passage plan allowed for a speed of up to 10 knots to maintain steerage. The local chart also warned of anomalies due to dredging, and the master ordered a small course alteration to port to account for an offset.

At about the same time, the master noticed a small fishing boat ahead, operating near to a marker buoy on the left hand side of the channel. Meanwhile, the helmsman was having difficulty altering course and increased to 10 degrees of port rudder. Shortly afterwards, the vessel began turning rapidly to port and the master noticed that 30 degrees of port rudder had been applied. He ordered 'hard to starboard' and, 30 seconds later recorded that the swing to port had stopped. However, the swing in the vessel's head meant that the fishing boat was now off the vessel's starboard bow, and the master realised that if he allowed his vessel to swing back to starboard, and follow the channel, he would collide with the fishing boat. Consequently, he ordered full astern power and let the port anchor go.

The tanker came to rest with the forward part aground on soft sand/mud, and the fishing boat passed down its starboard side without making contact. Although the fishermen jumped into the water, they were thrown lifebuoys and were recovered unhurt. The tanker was later refloated with the assistance of a tug. With no damage evident from tank soundings, the vessel was allowed to continue on passage.

The Lessons

1. The pilot disembarked significantly ahead of the official boarding position, immediately prior to a difficult manoeuvre in complex tidal conditions and left without giving any further advice.

2. The master allowed his vessel to move to the port side of the channel, despite the requirements of COLREGs and the presence of the small boat ahead on the port side.

3. The master did not monitor the helmsman's response to his orders and was not aware of the large amount of port rudder until it was too late to rectify the situation. The helmsman applied maximum port rudder without further instructions from the master.

4. Although speed had been increased, the following tidal stream significantly reduced the effect of the rudder.

5. Despite members of the bridge team completing resource management training, the lessons learned were not applied on this occasion.

Too Little, Too Late

Figure 1

Narrative

A 1568gt general cargo ship in ballast was on passage through UK territorial waters on a course of 007° in autopilot, and making good a speed of 7 knots. The wind was from the north, force 7, and the sea was rough with a swell of between 2 and 3 metres. Fifteen minutes after taking over the bridge watch from the master, the chief officer saw a beam trawler off his port bow at a range of 2 miles. The fishing vessel had also been seen by the master shortly before handing the watch to the chief officer, but he had not assessed her CPA or notified the chief officer of her presence during the watch handover. The chief officer saw that the vessel was fishing and, by using the EBL on the radar display, assessed that she was on a steady bearing. The radar display in use (see Figure 1) did not have a gyro input and was not equipped with an automatic or semi-automatic plotting facility.

The beam trawler, which had a crew of three, was on a course of 160° at a speed of 6 knots. Her skipper was in the wheelhouse, but was working on the vessel's chart plotter and did not see the approaching cargo ship. When the vessels had closed to a distance of 5 cables, the chief officer on board the cargo ship altered course to 027°. After steadying on the new course, the chief officer assessed that the trawler was still on a steady bearing. He changed to manual steering and put the helm hard to starboard; he also sounded the ship's whistle.

By now, the vessels were only 2 cables apart and the whistle alerted the mate working in the trawler's forward shelter deck. He ran to the wheelhouse and put the trawler's engine astern, but this did not prevent her bow from colliding with the aft end of the cargo ship's port side.

The cargo ship was holed above the waterline (see Figure 2) and diverted to a nearby port for survey and repair, but the trawler sustained only superficial damage and continued fishing.

Although the two vessels established communication on VHF radio and exchanged details following the collision, neither reported the accident to the coastguard.

Figure 2

The Lessons

1. Encountering and keeping clear of fishing vessels is a routine occurrence for most bridge watchkeepers. However, once in a while this can be complicated by unexpected course alterations by the fishing vessels concerned. This occasional erratic behaviour by some fishermen does not justify a vessel delaying avoiding action. This serves only to confuse the situation further, reduce the margin for error, and it usually necessitates a greater alteration to achieve a safe passing distance.

2. The number of ships fitted with the means for an OOW to visually determine a vessel's bearing movement is decreasing. Consequently, there is an increasing reliance on radar to determine passing distances and CPAs, even when vessels are in sight of each other. However, the technical specifications, performance and functions of the differing radar displays available vary considerably, and some are able to provide only coarse approximations. Therefore, the limitations of the equipment available must be taken into account when assessing the risk of collision and deciding on a safe passing distance.

3. When working a 6 hours "on", 6 hours "off" bridge watchkeeping regime opposite the same person, it is easy for a degree of complacency to set in when handing and taking over the bridge watch. If this is not guarded against by both officers, it will only be a matter of time before the 'handover' is reduced to a 'cross-over' and important information is not passed on.

4. Given the limited manoeuvrability of vessels engaged in fishing, it is in their interests to keep a proper lookout, to ensure dangerous situations caused by other vessels not keeping clear are spotted in time to allow successful avoiding action to be taken. This cannot be achieved unless at least one person is looking out of the window and at the radar display.

5. Even where assistance is not immediately required and there has been no pollution following a collision, grounding, or other serious accident, informing the local coastguard as soon as possible has potential benefits should the situation suddenly change. In particular, assistance is likely to be at hand much sooner if the coastguard has already been able to inform the relevant services of a vessel's situation, rather than starting from cold.

Buoy oh Buoy – Planning the Voyage Would Probably Have Prevented This Grounding

Narrative

A small commercial vessel set out to deliver fish food in bulk to a fish farm located in a small inlet of an island. The skipper was familiar with the general area in which the vessel had traded for several years, but had not made regular calls to this particular fish farm.

The weather was fine and clear and the sea was calm. The vessel set off from her overnight berth at first light but without undertaking any form of planning for the passage. The trip proceeded smoothly until the vessel approached the narrow entrance to the inlet.

As the vessel came close to the entrance the skipper, who was on the bridge alone, noticed two small marker buoys close ahead; he altered course to port to avoid the buoys and, as he did so, the vessel grounded on a rock ledge.

The crew sounded the compartments to check for water ingress, which revealed that the vessel, although having suffered some hull damage, remained seaworthy. She was later refloated, and temporary repairs were undertaken in the shelter of the inlet. The vessel then proceeded to a repair facility to effect permanent repairs, which resulted in her being out of service for several weeks.

It transpired that the two marker buoys at the entrance to the inlet, which the skipper had altered course to avoid, had been laid by the local fish farm workers to mark the edge of the rock ledge on which the vessel grounded.

The Lessons

1. **The principles of passage planning are as relevant for small craft as they are for large ocean going vessels.**

2. **The fundamental requirements of planning and executing a safe navigational passage must be clearly understood and implemented by those in charge of all sizes of vessels. SOLAS Chapter V, Regulation 34 applies to all ships which proceed to sea, and the Annex to A893(21) provides guidelines for voyage and passage planning. The key elements of these are: Appraisal, Planning, Executing and Monitoring.**

3. **The skipper should have realised that the entrance to the inlet, being very narrow, was a critical section of the passage and warranted particular attention. He could have considered telephoning the local fish farmers, to whom he was delivering fish food, to seek their advice and guidance on the best approach to take into the inlet. He might well have been told about the marker buoys which they had laid.**

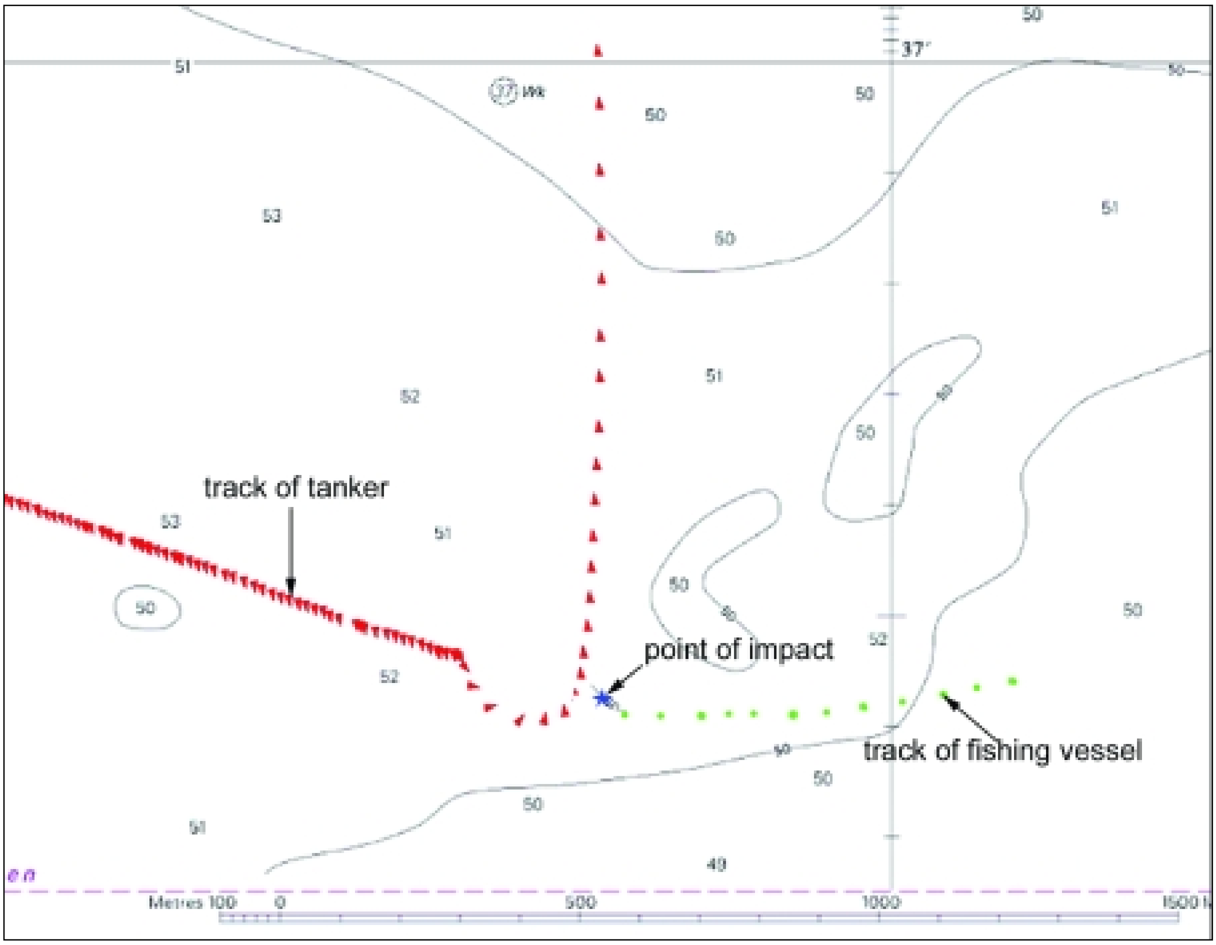
He Was Not Supposed to be There, Guv!

Narrative

A coastal tanker had just picked up her anchor and was proceeding to the pilot boarding area when she was advised by port control to drift off port limits and to wait for the visibility to improve before the pilot could board.

At about the same time, a GRP fishing vessel left the port with the intention of laying her pots in her usual fishing grounds. The restricted visibility was of no concern to her skipper as the vessel was fitted with a multifunction navigational aid, which included a radar. Also, the skipper overheard a broadcast by port control restricting the traffic movements in the port, which he understood to indicate that he would not encounter any traffic within the port limits.

At about 0848 UTC the master of the tanker received a call from the pilot advising him to meet him at a position 2 miles to the north. He plotted his position at 0850 UTC and manoeuvred his vessel to head north with the use of helm and engines, acquiring a speed of about 3 knots in so doing (see Plot). At the time, the bridge was manned by the master and a seaman.



Tracks of the vessels

After laying some of her pots in the eastern approaches to the port, the fishing vessel headed off in a westerly direction at a speed of about 6 knots. The skipper was using a track recorder in conjunction with a separate echo sounder to record the positions of his pots. To monitor the traffic on radar, the skipper had to switch between the echo sounder and radar modes on his multifunction navigational instrument. The range set on the fishing vessel's radar was only 0.125nm which, in effect, gave the skipper 1 minute's worth of view ahead, but he was not fully aware of this fact. He had been switching to monitor the radar occasionally, and was about to do so when the skipper sighted the tanker's hull. By that time it was too late to take effective action to prevent the collision which occurred at 0851 UTC. The precise time and position of the collision are known because the skipper was thrown forwards onto the control console, where he accidentally hit the "save" button on the track plotter keyboard.

The master of the tanker did not notice the fishing vessel on his radar. This is because either the radar was not being monitored, or the auto clutter had masked the target. He did not notice the fishing vessel until the collision occurred. Immediately after the collision, the fishing vessel put her engines astern and backed off into the fog.

Evidence suggests that no fog signals were being sounded by either vessel.

As a result of the collision, the tanker suffered some superficial damage, but the fishing vessel was damaged more substantially and was able only to limp into port with her bilge pumps working (see photograph).

Damage to the fishing vessel

The Lessons

1. All vessels are required to maintain a lookout by sight and by hearing, as well as by using all available means. In this case, both vessels had radars which were not being monitored effectively.

2. The master on the tanker was distracted from his role in collision avoidance and lookout because he was engaged in communications and navigation. He should have called another officer to the bridge to assist with these tasks during the situation that prevailed.

3. This collision reinforces the need to sound the appropriate fog signal. In the absence of an adequate radar lookout, this collision could have been avoided if either of the vessels had been sounding its fog signal.

4. Masters and officers are reminded that after a collision they have a legal obligation to stop and offer assistance to the other vessel. The master of the tanker had no idea whether or not the fishing vessel was safe, especially as it disappeared back into a fog bank soon after the event.

   - Following an accident, it is prudent to alert the authorities at the first opportunity. Once you have confirmed that the situation is under control and no assistance is required, a follow-up call can be made to stand down the alert. By doing this, there will be no delay in providing assistance should you or the other vessel need it. Tragically, when mariners have delayed calling the coastguard, some have left it too late.

Backspring Strikes Leading Hand in the Face

Figure 1: Mooring arrangements at the time of incident

Narrative

In good weather and light winds a ro-ro ship entered a lock. The mooring bollards along the side of the lock were over 100 years old and, unlike more modern designs, did not have 'horns' to prevent ropes from riding up. Therefore, to prevent the eye of a mooring rope from slipping off a bollard it had become an established practice for the lock personnel to hitch the eye when securing high-sided ships such as ro-ro's.

During the locking procedure, the bridge team, which consisted of the master and chief officer, operated the bow and stern thrusters and the variable pitch propeller. The forward mooring party comprised an able seaman and a leading hand; the latter was standing on the stem platform relaying distances to the bridge team as the ship was manoeuvred into the lock at a speed of about 1 knot.

The forward 64mm backspring was passed down to two linesmen. The senior linesman, who was a berthing master and unfamiliar with this specific task, placed the eye of the mooring rope over the allocated bollard, *without* using a hitch. Both linesmen then moved towards the inner gates to operate the machinery controlling the sluices. When the ship was in position, the forward backspring was heaved in to hold the ship. The leading hand took over from the able seaman at the

Figure 2: Position of casualty at controls

winch controls, which were located at the ship's side, next to the fairlead through which the backspring passed. As the ship rose in the lock, the backspring slipped off the bollard, snapped back, and struck the leading hand in the face, causing lacerations and fractures to his cheek bone and nose. He had not been wearing a safety helmet.

The Lessons

1. It is unlikely that the ship's crew could have done anything to prevent the mooring rope from slipping off the bollard. However, careful consideration should always be given to ensuring crews are not placed in positions of danger during mooring operations. Consideration should also be given to locating winch controls so that they are not in the snap back zones[1] of mooring ropes. If the controls cannot be located away from snap back zones then some form of remote operation or guard should be provided to protect the operator.

2. It is essential that all personnel involved in mooring operations are provided with, and wear, personal protective equipment.

3. Complacency is a killer, and it is vital that ships' staff keep alert to the potential risks involved in mooring operations at all times.

1 The Maritime and Coastguard Agency's *Code of Safe Working Practices for Merchant Seamen* includes diagrams of snap back zones

Mooring Failure – Walking a Tightrope

Figure 1: After winch mechanism

Narrative

A ro-ro ferry was allocated a lay-by berth so that stabiliser and main engine defects could be investigated. It was a clear and bright day, and on arrival at 1430 the wind was north-easterly between 30 – 35 knots.

The crew were certainly familiar with routine moorings to load and discharge at linkspans for short periods, as part of their normal routines. However, long term, alongside berthing occurred only 3 or 4 times a year. The mooring arrangements were loosely discussed between the master and the chief officer and were specified as "2, 2 and 2", meaning 2 head/stern lines, 2 breast lines and 2 springs, which was the normal practice. This requirement was passed to the bosun and the deck store petty officer, who were in charge of the forward and after mooring parties respectively.

Both parties used a mix of ropes and wires for the same function, i.e. breast and spring lines. The wires were left on the winch drums with the drum disconnected from the winch drive shaft, the band brakes were on, the control lever in neutral and hydraulic pumps shut down (Figure 1). This procedure was normal and accepted practice.

The forward and after mooring ropes were secured in different ways: the forward mooring party used ropes on bights and left them on the winch warping drum so that rope tension equal to that of the wire could be achieved. The ropes were then backed up on bitts, with figure of eight turns. The after mooring party also used ropes secured on the drum ends, but without using bights. They were backed up with only a couple of turns around a single bitt.

Now that the ship was securely alongside, the

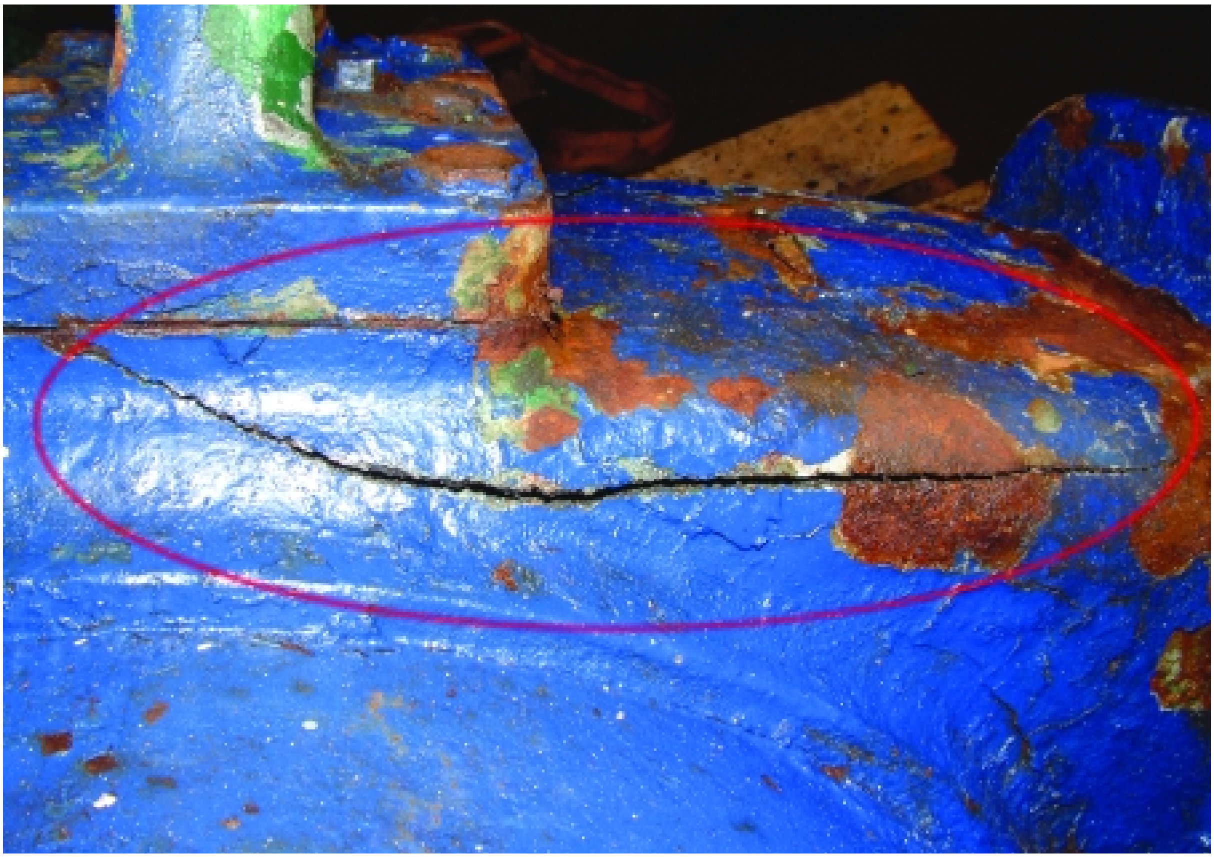


Figure 2: Fractured motor casing

master received reports from the mooring decks that she was “all fast forward” and “all fast aft”. There was no positive reporting on the status of the winches or of the types and number of lines used. Unfortunately the practice of having an officer supervising the moorings had also fallen into abeyance, therefore no deck officer checked the moorings despite the very windy and obviously risky conditions. The master was able to view the forward moorings from the bridge, but the after moorings were obscured. There was an assumption that the after moorings were the same as the satisfactory ones forward.

The mooring watch was set, the quartermaster positioned at the gangway and an OOW on the bridge. The engineers set about their defect investigation and the master settled down to tackle his paperwork. All appeared to be normal. Indeed, it was a quiet afternoon, until 1810, when the bridge received a report that one of the stern line wires had “stranded” and the on-watch deck team intended to replace it. Dealing with stranded wires was not unusual. However, in this case a replacement wire was not sent out before the damaged one was removed. The damaged wire had been removed from the jetty bollard, and work was underway to detach the wire from the winch drum when the chief officer arrived at the after mooring deck. He was happy with the progress and returned to the bridge. Unfortunately the opportunity to check the other moorings, and the suitability of the remaining single stern line to take the load, was not taken.

At about 1835 another ferry entered the port. Shortly afterwards, the inevitable happened. The ship surged about 5 metres up the jetty, the remaining stern line parted and the ship’s stern started to leave the quay. The ship pivoted about the forward port shoulder causing one of the forward breast ropes to part. As she continued to move off the quay, the port after winch brakes rendered and the wires were pulled from the winch wire drums.

As weight came onto the after ropes the loose turns were pulled from around the single bitts, and the winch warping drum rotated which, in turn, rotated the winch hydraulic motor backwards. This huge shock loading pressurised the motor casings and they fractured under the excessive pressure (Figure 2), spraying hydraulic oil across the port after winch deck.

By a stroke of good luck no-one was injured.

The ship adopted an angle of about 45 degrees to the jetty before a nearby tug was raised on VHF and came to the ferry's assistance and pushed her back alongside.

The Lessons

Mooring of ferries undertaking short sea trips can become automatic and, it could be argued, somewhat monotonous. This accident clearly demonstrates that complacency can be dangerous. An effective and safe mooring arrangement is fundamental to the safety of the vessel and her crew, and indeed to other vessels. It is an important aspect of ship operation, requiring careful consideration. This is especially the case when unfamiliar moorings take place.

The following points are reminders for safe and effective moorings:

1. **Moorings should always take due account of the existing and predicted weather conditions.**

2. **Short lengths of line (nips) and mixing of wires and ropes for the same service i.e. for breast, head/stern lines should be avoided.**

3. **Masters should encourage positive reporting from the mooring decks, with a clear description of the moorings and status of winches.**

4. **The tie up should be supervised, where possible, by an officer, as laid out in STCW Chapter 25.**

5. **Ropes should be removed from winch warping drums and secured on bitts using figures of eight, using stoppers as appropriate.**

6. **Do not assume that moorings which cannot be seen are as satisfactory as those which are visible – do check; the effort is worth it.**

CASE 9

To Cross or Not to Cross?

Narrative

In the early hours of the morning, a coastal LPG tanker was north-east bound in the Dover Strait Traffic Separation Scheme enroute to its loading port in Scotland. Its passage plan included crossing the south-west traffic lane in the vicinity of MPC buoy. At the same time, a container vessel was in the south-west lane, bound for the West Indies. The weather was fine with good visibility.

The master of the LPG tanker had only joined the vessel the previous day. In his night orders he had asked to be called as the vessel approached MPC buoy and at any other time "if in doubt". As the vessel approached MPC buoy the OOW called him and told him that there was no "dangerous traffic"; this was enough to persuade him to stay in his bed and leave the navigation through the TSS, including the crossing of the south-west lane, to the watchkeeping officers.

A target was sighted on the port bow of the LPG tanker at 10 nm and acquired on the vessel's ARPA radar. When the vector was settled, the OOW performed a trial manoeuvre check which indicated that if the tanker altered course at the MPC buoy, as planned, they would pass 1 mile ahead of the target vessel.

There was a strong tidal stream running from the north-east, so the vessel was a little later arriving at the MPC buoy than expected. At the MPC buoy the lookout took the wheel and, on instruction, altered course to cross the south-west lane. After steadying on the new course the OOW fixed the position using a visual bearing and radar distance, and plotted it on the chart in the chart room. He recalls seeing the target vessel, a container ship, broad on

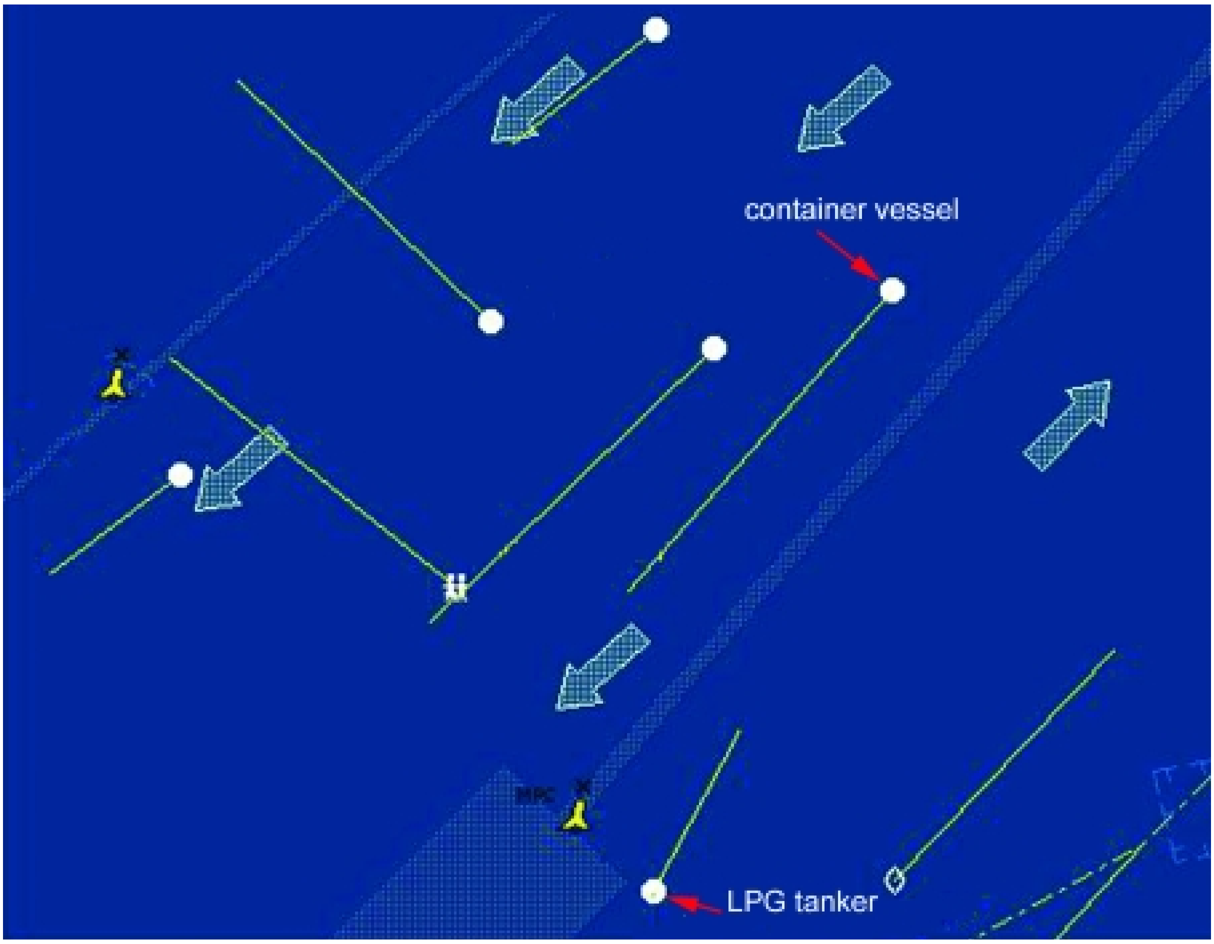


Figure 1: Initial position of vessels

the starboard side, but he did not take any bearings of her or check the new closest point of approach.

He was unaware that his vessel was on a collision course with the container vessel until CNIS called him on the VHF. His first reaction was surprise because he expected to be passing 1 mile ahead of the other vessel. He initially told CNIS that he would alter to starboard, but then he realised he had insufficient sea room, so advised CNIS that he would go to port instead. He asked the name of the other vessel.

Shortly after starting the turn to port he contacted the other vessel to request that they went to port as well; this was declined by the master, who stated that they would alter to starboard.

The combination of these two actions resulted in a collision being narrowly avoided.

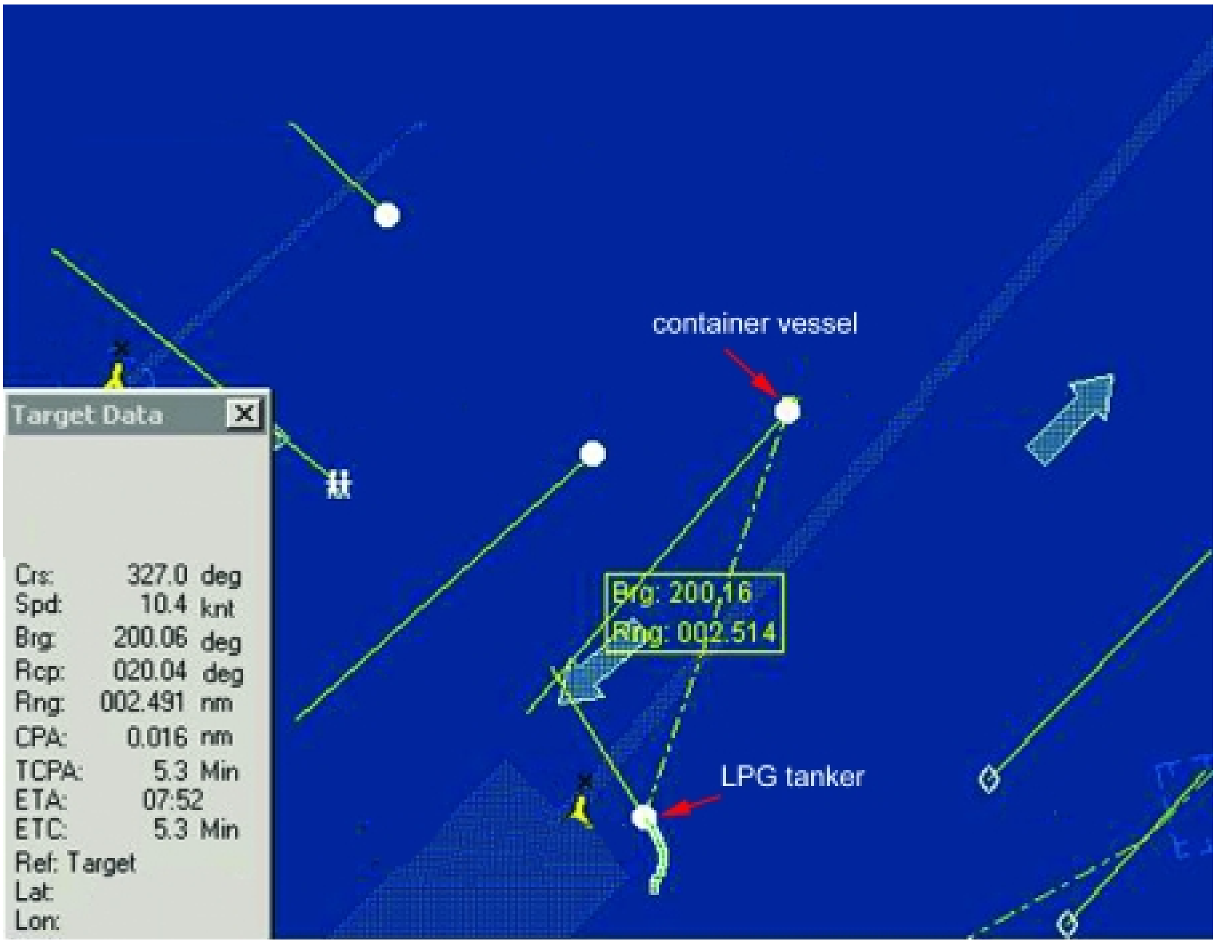


Figure 2: Vessel positions after LPG tanker's change of course

Figure 3: Vessel positions before LPG tanker's turn to port

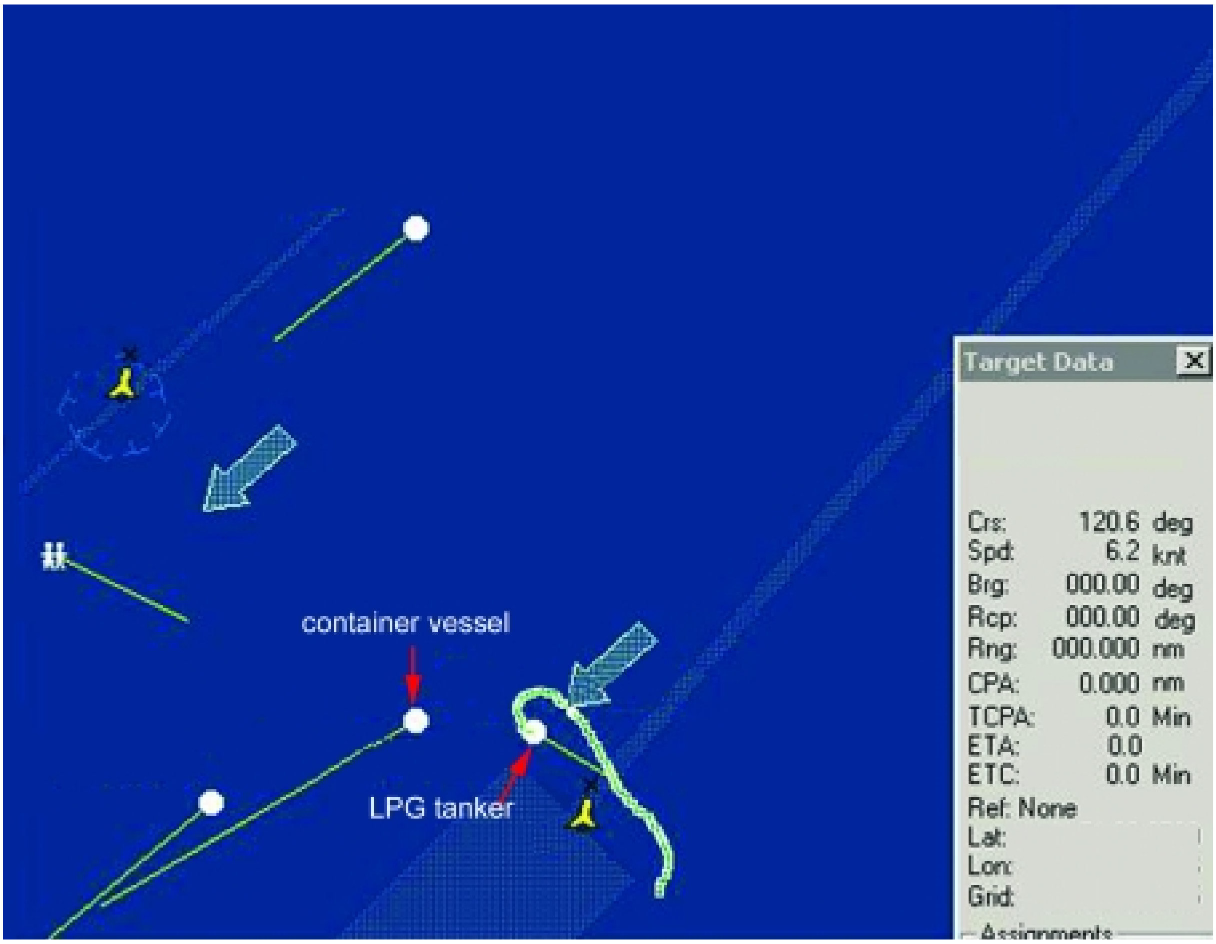


Figure 4: Extent of avoidance action taken by LPG tanker

The Lessons

1. The tanker operated a three watch system which did not include the master. In areas of high traffic density and at times of high risk, like crossing the south-west lane of the Dover Strait Traffic Separation Scheme, the master should have been on the bridge to support the bridge team.

2. For a key period, the tanker had no lookout – the seaman was on the wheel and the officer was in the chart room. This was contrary to the Collision Regulations and good practice.

3. Quite correctly, the radar's trial manoeuvre facility was used to predict what would happen when the alteration of course took place some 9 minutes later. However, the OOW did not appreciate that even a short delay in starting the turn could substantially change the result, especially when two vessels are approaching one another at a closing speed of about 35 knots.

4. After the alteration of course was completed, the OOW should have rechecked the situation to ensure that the CPA was still adequate.

5. When the OOW saw the other vessel broad on his starboard bow he assumed that it would pass astern. This was scanty information; he did not take into account that a fast vessel (this one was making 23 knots) could still be a danger.

6. Good seamanship dictates that crossing ahead of another vessel should be avoided whenever possible. In this case, as there was no traffic immediately following the container ship, it would have been prudent to pass round her stern.

7. The danger of using VHF in collision avoidance is well known. In this case, the master of the container ship was wise to decline the suggested alteration to port.

CASE 10

Don't Try This at Home

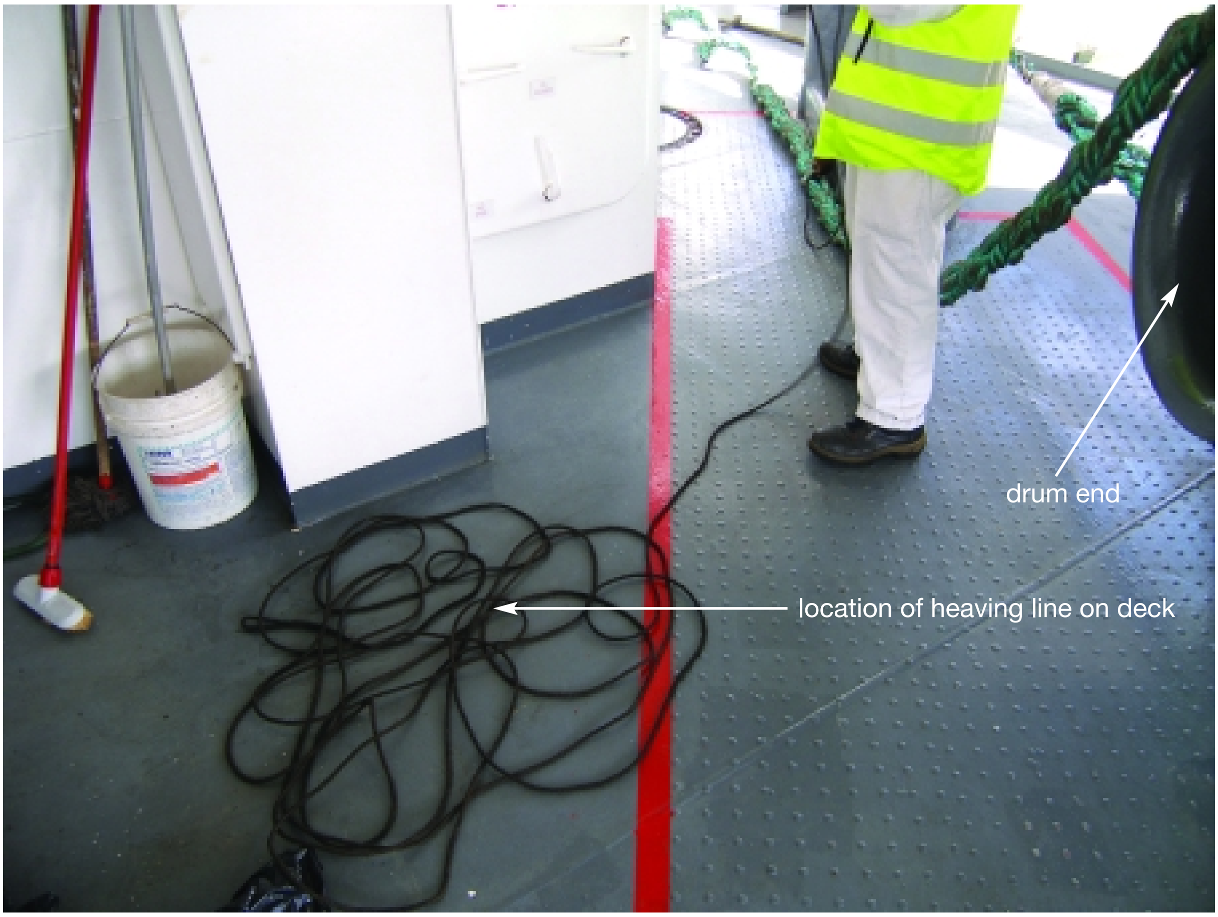


Figure 1: Position of the casualty in relation to the heaving line

Narrative

A container feeder vessel, with a pilot on board, was on its regular weekly visit to a port situated on a river. He took over the ship's controls just off the port. He then held the ship stationary, stemming the 3-4 knot flood tide, with the port's entrance lock on his starboard beam. The weather conditions were good with only a light breeze.

A tug approached stern to stern with the containership ready to make fast a tow line from her aft tow winch, as was normal practice. A heaving line was thrown down from the ship (see Figure 1) to the single crewman on the aft deck of the tug, and the tug's messenger line was attached. The ship's aft mooring deck crew manually heaved the messenger line through the transom panama eye. A seaman then put 4-5 turns of the messenger line onto the drum end of the winch, at which point the officer-in-charge instructed the crewman controlling the winch to start heaving slowly to pull the tug's tow wire on board.

As the tow wire neared the panama eye, the tug unexpectedly started to move off to port and away from the stern of the ship. Although the tug's tow wire was veered by the crewman on the tug's aft deck, and heaving was stopped on the ship's aft deck, the messenger line started to pull off the ship's drum end. The seaman near the drum end saw a riding turn starting to form and he stepped in to clear it, standing on the heaving line which was still attached to the messenger line as he did so. His left ankle became caught in the heaving line and, as the last turns of the messenger slipped off the drum end, he was pulled towards the panama eye.

Figure 2: Position of the casualty before being dragged through the panama eye

The crewman braced himself against the panama eye while his fellow crew members tried to clear the heaving line. Just as the officer-in-charge took two paces to retrieve a knife from the galley, the seaman, concerned at losing his leg, decided to put his feet and legs together and, miraculously, was pulled through the panama eye (see Figure 2).

He landed in the water and managed to swim to the surface and cleared himself from the tangled line. He was very quickly retrieved from the water by the crew of the tug, was taken below and tended to by the tug's crew. The seaman lost the tip of one little finger, and also sustained significant bruising to his leg.

After alerting the port authorities, the tug headed upstream to a landing stage where the injured seaman walked ashore and was taken to hospital.

The Lessons

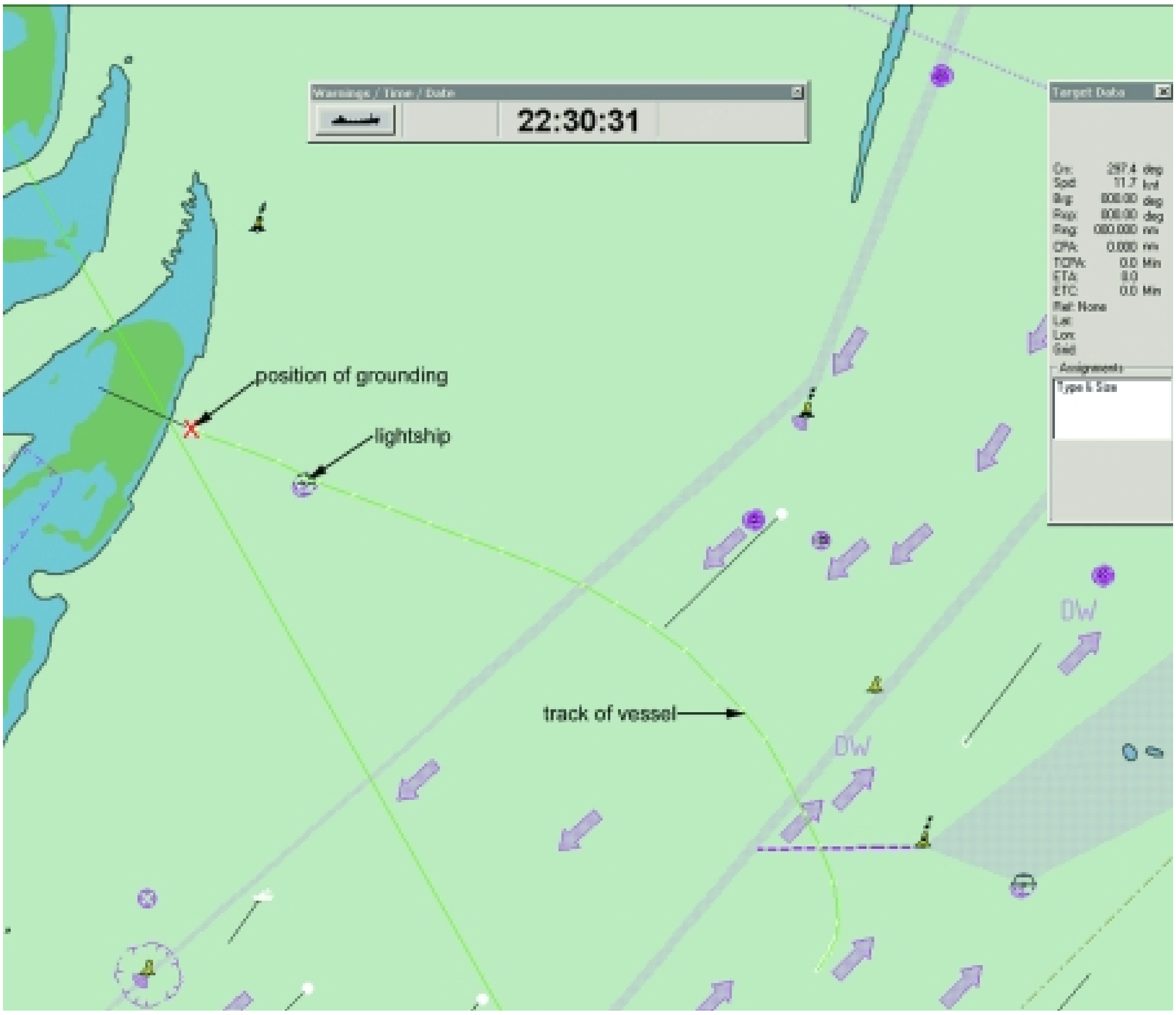
1. The seaman in this incident was lucky to be alive after squeezing through the panama eye and being dragged underwater by the weight of the tow wire! A sharp knife to sever the heaving line would easily have prevented him from being dragged overboard. Make sure that every mooring station has a means of cutting a line in an emergency. Relying on the bosun to carry a knife is not good enough.

2. Making a tug line fast to a ship presents a significant hazard to both ship and tug crews. It is important to remember that tugs, operating in the wash of a ship can, and do, occasionally lose control temporarily, causing them to move off station. Ships' crews must be prepared for this, and must be able to respond quickly and effectively to reduce the risk of serious injury.

3. The single crewman on the aft deck of the tug, who was operating the tow winch, managing the tow wire and, supposedly, in direct communication with the crew on the ship's aft deck, was unable to stay fully aware of the situation. Tug crews' individual responsibilities must be properly defined to ensure they do not become overloaded in a situation such as this Ideally, one crewman should be made responsible for monitoring the safety of the overall operation.

4. Good communication is the key to safe operations between tugs and ships. On this occasion, there was little communication between the tug and the aft deck of the container ship, or between the tug's bridge and aft deck. It is vital that clear visual communications are maintained between tugs and ships, as well as between tug crew members to ensure operations are carried out as safely as possible.

In Command, Inebriated, Incapacitated and in Jail



Vessel track until grounding at 2230

Narrative

A 3000grt combi-freighter was crossing a south west traffic lane at a speed of 11.5 kts. The master was the OOW and he was alone on the bridge. It was dark and the sea was rough. When crossing the traffic lane, the ship passed ahead of two south-west-bound vessels, the closest CPA of which was 6 cables. At 2212, once clear of the TSS, the master went to his cabin for about 30 seconds to fetch some paperwork. When he returned to the bridge, he sat down in a chair and fell asleep. The ship then passed very close to a lightship before grounding at 2230 (see figure).

As the ship took the ground, the chief engineer ran from his cabin to the bridge. The master was standing in the forward starboard corner, looking out of the window, and did not respond when he was told that the ship was grounding. The chief engineer put the ship's engine control lever astern and then went below to change from the shaft to the auxiliary generator. On his way back, he alerted the chief officer, who immediately fixed the ship's position. No VHF call was made to the local coastguard and the ship's general alarm was not sounded. The main engine continued to be manoeuvred astern and, soon after the ship re-floated at 2247, the master left the bridge; he had not said anything following the grounding, his breath smelled of alcohol and he appeared to be drunk.

Once the vessel had been checked for damage and her DP informed, she resumed her passage, with the bridge watchkeeping duties shared between the chief and second officers.

The master continued to drink alcohol during the passage, and when the ship arrived at her destination 3 days later he was found to be over the permissible alcohol limit. He was later imprisoned for 4 months for the grounding of his ship and for 7 months for the drinking related offence.

The Lessons

1. Regardless of a person's ability and experience, alcohol impairs judgment, concentration, awareness, and perception of risk. It therefore considerably increases the risk of accidents occurring. In this case, the accident could just as easily have been a collision with another vessel, or contact with the lightship, both of which had the potential to be far more serious. The adverse effect of alcohol on performance is becoming increasingly recognised by national enforcement authorities and ship owners, with alcohol testing following an accident becoming more widespread. The risk of getting caught is therefore increasing – is it worth it?

2. Although it was dark, and the ship was in a busy TSS, the master was alone on the bridge. Had an additional lookout been on the bridge as required by international regulation, the master's incapacitation and the close pass of the lightship would have been readily apparent. The use of a bridge watch alarm would also have alerted the crew in sufficient time for corrective action to be effective. Every OOW runs the risk of becoming incapacitated at any time of the day, for a variety of reasons, and a second person and/or a watch alarm on the bridge can be the difference between embarrassment and disaster.

3. Following a major accident, such as a collision or grounding, the alerting of the crew by the use of the general alarm, and of the coastguard by radio or DSC, are both important actions intended to minimise the risks to a vessel and those on board. It is therefore safer to ensure these actions are taken as soon as possible rather than to wait and discover that some of the crew are missing or that external assistance is required. It might be too late by then.

Port or Starboard?

Narrative

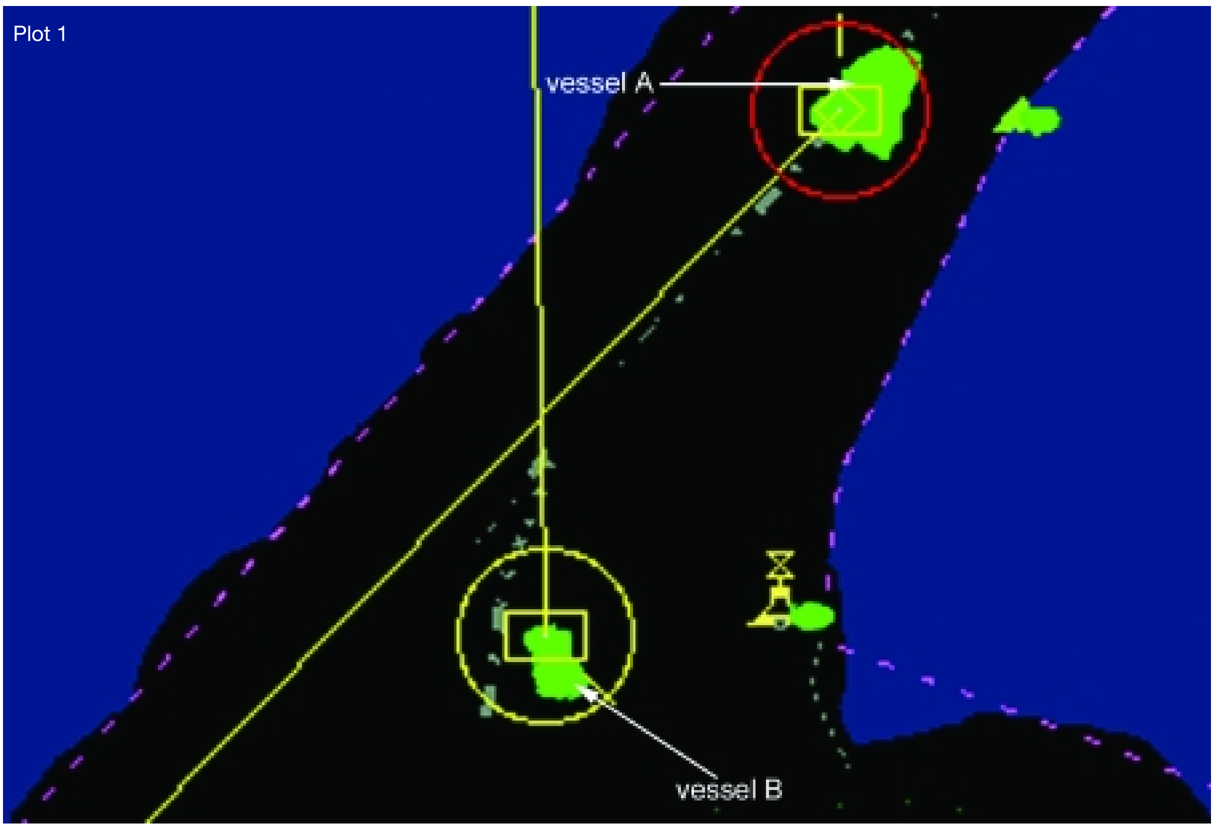
Two vessels collided at the entrance to a channel in a busy shipping area when the visibility was less than 2 cables. The vessels were engaged on routine passages, which their experienced bridge teams executed on a daily basis. Both vessels were being conned by their respective masters, with an AB on the wheel, and were travelling at their normal operating service speeds and sounding fog signals.

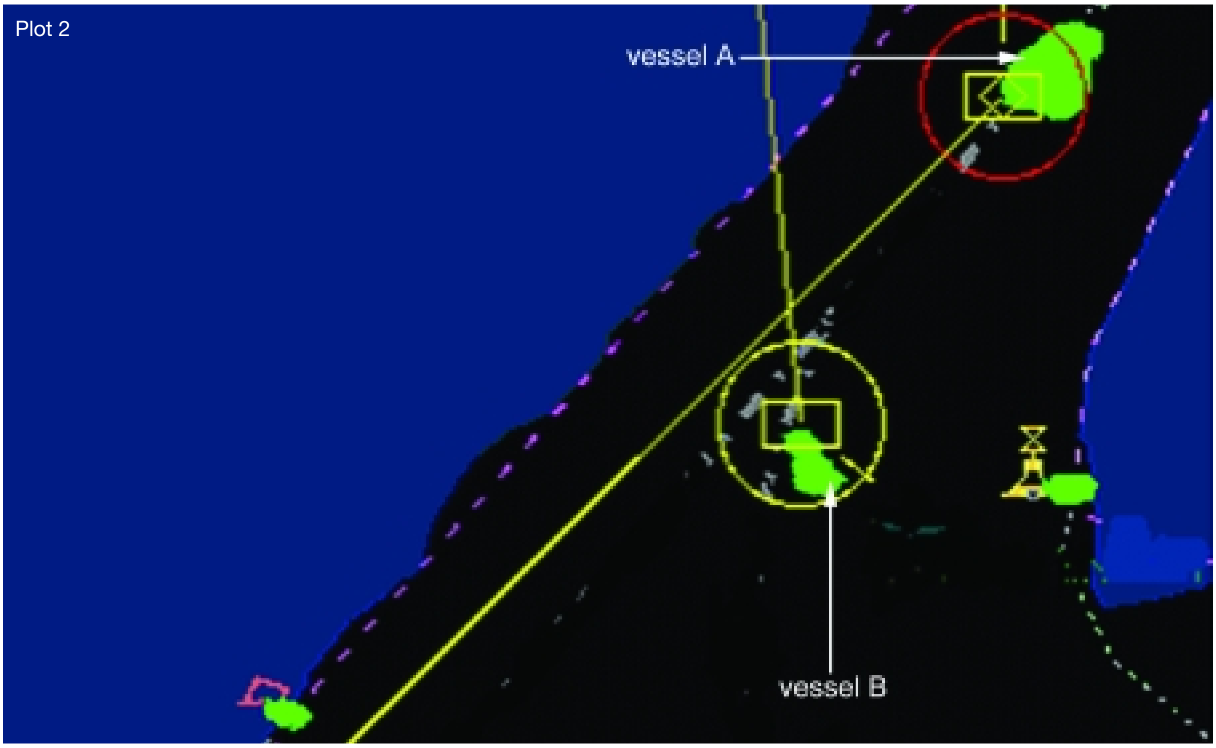
Vessel A was southbound in the channel while Vessel B was approaching the channel entrance on a northerly course. After vessel A informed the local VTS of her position on passing a charted reporting point, she was contacted by Vessel B via VHF radio, and a red to red passing in the channel was agreed. It was intended that Vessel A would keep to the western side of the channel and that Vessel B would alter course to starboard (see plot 1).

Accordingly, the master of Vessel B ordered “Starboard 30”. However, the AB on the helm went to port and, as the master was busy trying to see the other vessel he did not notice the AB’s error. Moments later, the master saw Vessel A as she loomed out of the fog, and ordered ‘hard a starboard’ to increase the rate of turn. At this point, the AB realised that the helm was at “Port 30”. He put the helm hard to starboard but did not inform the master of his earlier mistake.

Unaware of the actions of the AB and, in view of the relative aspects of the two vessels, the master of Vessel B assessed that Vessel A must have altered course to port. Consequently, he grabbed the helm and went hard to port (plot 2).

The master of Vessel A was also surprised to see a starboard aspect of Vessel B, and used his forward speed and his side thrusters to slide his vessel away to cushion the effect of the imminent collision. Vessel A suffered minor damage to her hull above the water line and there was paint damage and slight indentation to the bow of Vessel B. Luckily there were no injuries or pollution.





The Lessons

1. This is not the first time a helmsman has put the helm the wrong way in pilotage waters, and it won't be the last. However, such a mistake need not result in an accident, providing it is spotted immediately. Regardless of the experience of those involved, this can only be achieved by the good seamanship practice of habitually checking the rudder angle repeater after each helm order has been given. It will often be too late to rectify the error if the movement of the ship's head is relied upon, particularly in restricted visibility where there are no visual references.

2. In this case, both vessels were on their normal service speed. Had they reduced to a speed commensurate with the visibility, there would have been more time available to take avoiding action.

3. Both masters were familiar with the area and engaged in a routine passage. In such circumstances, it is easy to be lulled into a false sense of security. Consequently, the consideration of factors such as a safe speed, and the management and monitoring of the bridge team, can lapse. Complacency is not always easy to detect, particularly where it develops over time. Be alert to the symptoms!

That Was Close – Too Close

Narrative

Two vessels approached one another in gale force winds on a winter's night, such that a risk of collision existed. One of the vessels was engaged in fishing with her trawl gear deployed, while the other was a small cargo vessel which was rolling heavily and yawing as she headed into the heavy sea and swell.

The cargo vessel was the give way vessel and recognised that she would have to alter course to avoid a collision with the trawler. When the vessels were 3 miles apart the cargo vessel altered course by 10 degrees to avoid the trawler, which was now hauling her nets.

As the vessels closed one another, the trawler considered that the passing distance was going to be too close, so called the cargo vessel on VHF radio to alert her to the situation and request that she take further avoiding action. The cargo vessel replied that she was aware of the situation and would keep out of the way of the trawler.

The cargo vessel failed to take any further action and, eventually, passed within 100 metres of the trawler and was observed to be yawing significantly as well as rolling heavily as she passed.

The crew of the trawler considered that this was not a safe distance and reported their concerns to the coastguard.

The Lessons

1. **The cargo vessel was undoubtedly the give way vessel, and recognised this fact from a relatively early stage. However, she failed to take early and substantial action to keep well clear as required by the International Regulations for Preventing Collisions at Sea.**

2. **In this case, the weather conditions were very poor and the cargo vessel was rolling and yawing heavily. In such conditions, it should have made a more substantial alteration of course than might have been required in less severe weather conditions. An alteration of course of just 10 degrees, when only 3 miles from the other vessel, was not enough to avoid a close-quarters situation.**

3. **Mariners should ensure that action taken to avoid collision shall be such as to result in passing at a safe distance. Further, the effectiveness of the action must be carefully checked until the other vessel is finally past and clear. In this case, the trawler had started to haul her nets, which resulted in a passing distance closer than was originally anticipated by the cargo vessel.**

CASE 14

Buried Tow Line Nearly Buries Tug's Engineer

Narrative

A harbour tug was tasked to assist in the berthing operations of a 75,000gt bulk carrier and to pass her tow line from her forward towing winch through a panama lead at the ship's starboard shoulder. The tug came alongside the bulk carrier and the tug master manoeuvred his vessel in such a way that the tug's forward fairlead was directly beneath the ship's panama lead. The ship's crew threw a heaving line onto the tug's foredeck and the tug's chief engineer made it fast to the messenger, which was attached to the tow line. As the ship's crew manually heaved in the messenger, it became apparent that the tow line had become jammed under other turns on the winch barrel. The tow line became taut and the mate, who was at the bridge controls, stopped the winch as he could no longer pay out the line.

Knowing that the jammed tow line meant that the ship's crew would not be able to pull the line on board by hand, the mate went to the bridge door and shouted to them to heave the tow line using one of the ship's mooring winches, so that the buried turn could be pulled free from the winch drum. At first, the ship's crew did not heed his instruction. The chief engineer became aware of the problem with the tow line and he moved forward to inspect the jammed turns on the winch, gesticulating to the ship's crew to slack back the tow line. Believing that the tow line would be slackened back from the ship, he then attempted to free the buried turn by kicking it and jarring it by hand. However, the tow line suddenly jumped free and struck the chief engineer, throwing him to the deck and fracturing his left forearm.

The tow line was made fast and the tug master informed the shore staff and the pilot about the accident. The tug made its way to a berth, where the chief engineer was met by an ambulance and taken to hospital. Another tug was substituted to complete the berthing of the bulk carrier.

Notes:

- The crew normally served on a different tug, and were unfamiliar with the radio equipment fitted to the vessel. Accordingly, they did not follow their usual practice of maintaining direct communication with each other by using portable UHF radio. Had they done so, it is possible that the tug's master or mate could have prevented the chief engineer from placing himself in a position of danger.

- The ship's crew changed from manual hauling to using a winch to heave in the tow line. It is likely that this caused the buried turns of the tow line to suddenly jump free.

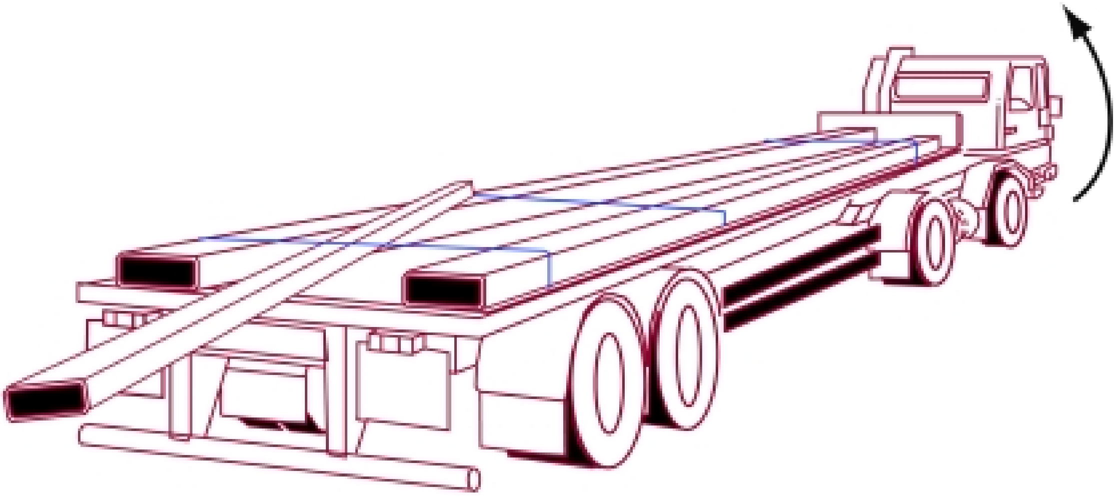
The Lessons

1. **Passing a tow line to or from a ship should be a relatively easy task. However, problems can arise, and it is essential that effective communications are maintained between the tug's crew and ship's staff at all times. The latent energy contained within lines under tension can, when released, cause fatalities and/or major injuries.**

2. **Tug masters should carefully assess the situation before allowing and directing personnel into a high risk area.**

3. **Tug masters should give verbal permission to any personnel entering a high risk area around a winch. It is therefore essential that there are direct communications between the tug's bridge and crew members working on deck.**

Sliding Load



Narrative

An unaccompanied 12.2m HGV flatbed trailer carrying steel box-sections was being unloaded by a tugmaster from a ro-ro vessel. Deck lashings were removed and crew stood by to remove the support trestle at the front of the trailer. The tugmaster connected to the trailer and lifted the front clear of the trestle, tipping up the flatbed slightly.

The crew heard a loud bang and went to see what had happened. Part of the load of steel box-sections had slipped off the rear of the trailer and landed on the deck of the ship. Fortunately, the area immediately behind the trailer was clear, no one was injured and only very minor damage was caused.

The load of steel box-sections was inspected and found to be made up of full and half lengths. It had been secured using several webbing straps across the width of the trailer. Forward movement was prevented by the headboard at the front of the trailer, but there was only the friction from the webbing straps to prevent the steel from sliding rearwards. The sections that slipped off the trailer were half lengths, from the middle of the load where the webbing straps would have had the least effect.

Although there was minimal damage and no injuries, the weight of the steel was significant and the outcome could easily have been far worse if someone had been working nearby.

The Lessons

1. **Crew working on vehicle decks should be aware of the correct lashing methods used to secure common loads to trailers. Advice is freely available from Government Departments and Industry Associations on best practice.**

2. **Trailers should be inspected where possible to ensure that both the load and the trailer are secured when they are loaded on board the vessel.**

3. **Personnel should keep clear of the area around vehicle trailers when they are being lifted or moved, to minimise the hazard should any items fall.**