Consolidated version Others

CARGO SHIFT (III 5)

Very serious marine casualty: Listing of vessel followed by grounding

What happened?

A dry cargo vessel was approaching port, and the vessel developed a severe port list due to cargo shifting and subsequently water entered the engine-room via a weathertight engine-room escape door being left open. This exacerbated the list and the crew abandoned ship. The main engines were left running and this caused the vessel to make circles and make boarding very difficult if not impossible. Eventually this led to the vessel's grounding on a shoal where she became a constructive total loss.

It became evident during the accident investigation that the cargo was not stowed and secured as required by the vessel's cargo securing manual.

What can we learn?

- The importance of following the instructions contained within vessels' cargo securing manuals when securing a cargo prior to proceeding to sea.

- The need to ensure that all weathertight doors are kept closed and properly secured while a vessel is underway.

- It is unwise to abandon ship with the propeller turning.

Who can benefit?

Seafarers, shipowners, insurers

MACHINERY FAILURE (III 4)

Very serious marine casualty: Engine-room fire

What happened?

As a result of a severe engine-room fire, this passenger/ro-ro passenger ship lost all main and auxiliary power. In the resulting blackout, the emergency generator started up and went on line but stopped shortly afterwards.

When the engine was examined after the accident, it showed signs of overheating. The dampers that are meant to ensure that the engine has access to fresh air for cooling and combustion were found in the closed position, and a cooling water hose was found to be broken. The hose showed clear signs of fatigue, with both interior and exterior crack formations.

Why did it happen?

1 The dampers either opened and quickly closed again, or failed to open, and the temperature in the emergency generator room increased as a result of insufficient air cooling. This then caused a rapid increase in the cooling water temperature, so that the cooling water

line was exposed to high temperatures and probably a considerable increase in pressure when the cooling water reached boiling point. The hose probably ruptured under the strain and cut off the last remaining cooling effect for the engine, which then seized.

2 The dampers were arranged to be normally closed and held closed by springs. They were dependent on a supply of compressed air from an accumulator to open them automatically when the generator started. The compressed air is produced by a working air compressor placed in the auxiliary engine-room and powered from the main switchboard. After weaknesses in this system had been identified in connection with the grounding of a sister ship two-years previously, a check valve was installed on the air supply line in the emergency generator room, so as to prevent loss of air pressure in the event that the power supply failed. The maintenance system on board the ship required the periodic testing of the automatic air dampers. This test was carried out about two months prior to the fire and the following comment entered:

> "the check valve does not work as intended – the damper goes in closed position after a while. Working on getting hold of new air cyl. with opposite action. Until then, the dampers are to be set blocked open at black-out". (sic)

> This information was neither shared with the shore-based management or sister ships in the fleet nor were effective temporary measures put in place to ensure the air supply in the event of an emergency situation.

What can we learn?

1 From a design point of view, the means for ensuring the air supply dampers to the emergency generator function should be completely independent of the ship's main power supply.

2 When non-conformities are found on essential systems and spares are not readily available, suitable and effective contingency measures need to be implemented. If the non-conformity affects essential safety equipment – such as the emergency generator – and effective contingency measures cannot be implemented, then the relevant authorities should be advised.

3 Such non-conformities should be shared with shore management, who, in turn, should consider whether the information should be shared with the fleet.

Who may benefit?

Seafarers, shipowners, ship managers.

ENGINE FAILURE (III 2)

Very Serious Marine Casualty: Engine failure and grounding resulting in ship loss

What happened?

Although the chief engineer was concerned about high exhaust gas temperatures, a dry cargo ship departed for a long trans-ocean voyage. After a couple of weeks, the exhaust gas temperature increased and, consequently, the engine speed was reduced. Eventually, the engine was stopped for detailed inspection and investigation. This revealed broken rings on almost all of the pistons and also determined that the fuel injectors did not work properly. The ship was adrift for several days while the engine crew worked on the problem. Many attempts were made to start the engine again, but it would not start.

Meanwhile, there was ongoing correspondence between the ship and the management company. After a few days, the master was informed that tug assistance had been ordered. At about the same time, the ship was approaching the shore and could drop anchor. When the tug arrived, the weather had become worse and attempts to connect the towing gear were unsuccessful. The ship started to drag anchor and later grounded. The crew eventually abandoned the ship by helicopter.

Another tug tried to connect to the ship, and succeeded. However, the ship was not allowed to stay within the exclusive economic zone, and finally sank some 100 miles off the coast in a water depth of 1000 metres.

Why did it happen?

- The investigation did not confirm the exact cause but suggested that the quality of bunkers, together with a permanent shortage of new fuel injectors and other spare parts, had a significant impact.
- The actions of the master were professional and adequate. However, as problems increased, there seems to have been too much time spent on communication with the company and too many parties were involved in decision-making. This caused the master to not fully appreciate the risks of the situation.
- The engine crew had not fully appreciated that the outcome of the situation relied on their completing the work efficiently.

What can we learn?

- Concerns and suspicions should be taken seriously and investigated satisfactorily before departing port.
- An adequate stock of spare parts should be kept on board, especially when concerns have been raised.
- Proper equipment and, in this case, proper quality of bunkers are essential for a safe voyage. If money is saved by using lower quality products, actions should be taken in advance to be able to handle problems that may consequently arise.
- Focus should be kept on the important issues. The master, being at the scene, should be given the support necessary to reflect and validate the situation on site frequently. This validation should then guide how the engine crew should plan their job.
- The importance of internal crew communications.

Who may benefit?

Shipowners, operators and crews.

HEAVY WEATHER DAMAGE (III 1)

Very Serious Marine Casualty: Damage to wheelhouse resulting in a fatality

What happened?

A standby safety vessel was on station off an offshore platform. It was struck head-on by a large wave, which shattered the navigating bridge windows and dislodged the protective shutters that were in place. The damage that was sustained from the impact rendered both the vessel's navigation systems and propulsion controls ineffective. Large quantities of sea water entered the accommodation spaces, causing widespread flooding. Damage to the vessel's navigation and radio communication equipment rendered it inoperable. Distress communication was achieved using VHF radio microphones in the helmets of the FRC crew.

The deceased body of the chief officer was discovered beneath a pile of damaged bridge equipment. Two rescue helicopters were dispatched to evacuate the survivors. The vessel was left as a dead ship to drift until a tow could be connected.

Why did it happen?

Abnormally large waves can occur in the area in which the casualty occurred.

What can we learn?

- A standby safety vessel should expect to encounter extreme weather conditions as a consequence of its operating area.
- Emergency exercises should incorporate unexpected factors to ensure crew members are fully prepared for the worst case scenario.

Who may benefit?

Shipowners, operators and crews.

STRUCTURAL FAILURE RESULTING IN FOUNDERING WITH LOSS OF LIFE (III 1)

Very Serious Marine Casualty:

What happened?

A general cargo ship loaded with limestone have a bulk density [***] of 1850 kg/m^3 experienced a structural failure when heading directly into rough seas and gale force winds. The vessel sank approximately 15 minutes later. Two of the vessel's eight crew managed to swim clear of the foundering vessel and were subsequently rescued from a liferaft.

Why did it happen?

The cargo, which was high density, had been loaded as a single pile within the central section of the hold. As a result, significant stresses were generated in the vessel's midship section. These were exacerbated by the rough seas in which the wavelength was similar to the length of the vessel.

The ship's hull strength had likely weakened significantly over the previous 2½ years through corrosion and wastage. The maintenance and repair of the vessel had lacked focus and oversight; no structural repairs had been undertaken recently.

Other contributing factors included: non-compliance with the International Maritime Solid Bulk Cargo Code, ineffective safety management, poor quality of survey and audit, lack of oversight of the classification society by the Flag State. The investigation also identified several safety issues concerning the immersion suits and lifejackets available on board the vessel.

What can we learn?

- Dry bulk cargoes should be loaded and carried in accordance with the International Maritime Solid Bulk Cargoes Code (IMSBC Code) in order to ensure a vessel's structural integrity is maintained at all times.

[***] According to the IMSBC Code, a high density solid bulk cargo is a solid bulk cargo with a stowage factor of 0.56 m$^{3/}$t or less, i.e. bulk density of 1780 kg/m^3 or more. The bulk density range on the individual schedule for limestone in the IMSBC Code is 1190 tom 1493 kg/m^3.

- A vessel's course and speed should be adjusted to reduce placing undue stress on the vessel's hull.
- Lifesaving appliances provided on a vessel should be compatible and fit for purpose as well as the need for regular drills that should include the donning of immersion suits.

Who may benefit?

Flag States, port States, shipowners, operators, crews and classification society surveyors

ENGINE FAILURE (FSI 19)

Serious casualty: engine failure and subsequent collision with fairway buoy

What happened?

The about 9,000 gt reefer carrier had just departed port and was transiting the river fairway when it suffered a main engine failure. The bridge team carried out an emergency anchoring routine with the ship being brought up on a single anchor in the vicinity of a channel marker buoy. The engine was restarted about 20 minutes later and the anchor was recovered. During the recovery of the anchor, the ship, under the influence of the wind and tide, struck and moved the channel buoy about 120 metres.
The ship completed temporary repairs to its engine and, under the guidance of the vessel traffic service authorities, began making its approach to enter the river fairway again. The sea conditions meant it was not possible for tugs to put a towline onto the ship.After a series of miscommunications the ship sailed under its own power into the river without tug assistance. Once in the river, the engine failed again and the ship was eventually towed to a safe haven.

Why did it happen?

The seriousness of the engine malfunction was either not understood or ignored by the crew. The ship continued its voyage in restricted waters and into deteriorating weather that was forecast to reach storm force.
Poor communication between the ship, pilot and vessel traffic service authorities resulted in a poor understanding of the serious nature of the main engine failure, and of the risks that the continued operation posed to the ship, its crew and other traffic.
Poor communication and a lack of formal handover of the disabled ship between the participating vessel traffic services resulted in the ship re-entering enclosed waters without sufficient tug capability for the prevailing sea conditions.

What can we learn?

- Masters must fully understand the operating status of the ship's machinery so that a proper assessment of the risk to the ship can be made before continuing with the next phase of a voyage.
- Masters and harbour pilots should consider early use of tug assistance during a developing casualty sequence to allow more options for providing assistance.
- Consideration of the manoeuvring capabilities and environmental conditions when selecting tugs for marine casualty response is important.

DIVING ACCIDENT (FSI 18)

Diver close to be pulled into the propeller during diving

WHAT HAPPENED?

A diver from a self-propelled crane barge entered the water in order to replace a line marking the position of the wreck. As the diver descended to a depth of about 20 metres, the umbilical cord containing his air supply became entangled in the barge's aft Voith Scneider (VS) propeller, and the diver was dragged towards its rotating blades. The diver's air supply was also pulled from the deck but the diver succeeded in transferring to a bottled air supply. The diver was approximately three metres from the rotating propeller when the propeller was stopped by the vessel's chief engineer. The diver then managed to cut himself free and make his way to the surface from where he was recovered without injury.

WHY DID IT HAPPEN?

- The master and officer of the watch thought the propellers had been stopped but they were still rotating.
- The control system for the propulsion had recently been installed and no procedures for its use had been developed.
- No familiarization training had been provided to the crew so when the officer of the watch thought that he had turned off the propellers, he in fact had not.
- Neither the officer of the watch nor the master verified that the VS propellers were stopped and they did not inform the engine-room that diving operations were about to take place.
- The procedures for diving operations in the vessel's safety management system lacked detail and were not sufficiently robust. They placed an undue reliance on the effectiveness of procedures followed by the embarked diving contractor.
- Diving operations had not been identified as a key shipboard operation by the ship manager or during external audits.

WHAT CAN WE LEARN?

- The importance of procedures and familiarization training when new systems are installed on board ship. It follows that it is important that new systems are understood before the crew use them.
- The importance of communications between departments when work is being carried out around machinery.
- The importance of having appropriate guidance on board to assist with risk identification.

OTHER (MAJOR LPG LEAK DURING CARGO SAMPLING) (FSI 17)

What happened?

While taking a sample of the loaded LPG cargo, the sample valve assembly suddenly came off, causing a leakage that turned out to be about 66 tonnes of LPG. Only after 29 hours a specialized company managed to close the leak.

Why did it happen?

The chief officer, who was still busy securing the first sampled tank, did not accompany the cargo surveyor. The cargo surveyor thought that there were two safety valves separating the cargo from the sample device. When he accidentally loosened the sample valve assembly, it fell off. Due to the fact that there was an open connection between the cargo and sample device, LPG started leaking away. Because of the pressure and ice formation he was not able to put the assembly back. The ESD valve, which should stop the flow of gas was then activated but did not fully close.

What can we learn?

Thorough knowledge of the working of safety devices is important. The particular ESD valves used on board do not positively indicate the position of the valve. After activation, the valve will indicate “closed”, although in fact the valve is jammed still in open position. The valves were only tested visually, no pressure tests were performed.

The briefing and supervision of the cargo surveyor did not provide an adequate means for ensuring cargo sampling could take place safely.

SIDE SHELL FAILURE (FSI 17)

What happened?

Following a period of adverse weather while on a voyage, the crew of this cape-size bulker discovered from manual bilge soundings that the water level in the No.1 bilge hold was increasing. Subsequent internal inspection revealed severe damage to both port and starboard shell frames and a crack in the side-shell plating. Fortunately, the vessel was able to make temporary repairs before completing the voyage. Had no port of refuge been available, the consequences may have been catastrophic.

Why did it happen?

Earlier in the voyage, the water ingress alarms had been switched off because they were permanently on alarm. This was attributed by the crew to be due to the high moisture content of the loaded cargo.

What can we learn?

The dismissal of water ingress alarms without further immediate investigation should be avoided. Making assumptions may prove fatal.

PORTABLE BULKHEAD COLLAPSE (FSI 16)

What happened?

Two crew members were in the process of raising a portable bulkhead off its supports, using two separate, portable, hand powered jacks. One jack was operated by each crew member. At one point in time, the bulkhead began to topple, rotating about its lower securing pins and its top edge moving aft. The bulkhead continued to fall aft, generally rotating about the lower securing pins until they became disengaged and the bulkhead fell to the tanktop inside the hold. One of the crew members was fatally crushed between the fallen bulkhead and the tanktop.

Why did it happen?

The crew members were not using the correct lifting equipment as specified by the manufacturer of the portable bulkhead.

Since the lifting of the bulkhead was being done using two hydraulic jacks, it is possible that the lifting was asymmetrical, resulting in the upper securing pins retracting completely from the hold side.

It was a practice on board to operate the portable bulkhead without any reference to the manufacturer's operating and maintenance instructions. These were not found on board nor referenced in the vessel's ISM manuals.

The safety risk involved in the lowering and lifting of the portable bulkhead was not appreciated by crew members and shore personnel alike.

Crew members operated the portable bulkhead without receiving adequate training and no supervision.

What can we learn?

It is important for crew members to ensure that they receive the necessary training before operating any type of equipment fitted on board. Safety committee members on board should also ensure that together with shore based personnel, they conduct risk assessments prior to operating equipment on board. Lack of training should of course be taken into consideration during the risk assessment.

MAIN ENGINE TURBO CHARGER FAILURE (FSI 15)

WHAT HAPPENED?

The second engineer was in the engine-room carrying out some maintenance jobs when he noticed that the main engine's turbo charger was over speeding at a dangerous rate. Before he could reach the control room to shut down the main engine, the turbo charger exploded. This was the second turbo charger explosion in four months, but no one was injured.

WHY DID IT HAPPEN?

- The turbo charger compressor sustained a centrifugal overload condition, resulting in a radial fracture of the impeller;
- A scavenge fire may have provided sufficient energy to the turbo charger turbine to over speed to a dangerous rate;
- Poor cleanliness of the scavenge space;
- A leaking piston crown O-ring resulted in oil forming a gummy residue on the scavenge reed valves and liner ports; and
- Blocked liner ports contributed to fuel after burning.

WHAT CAN WE LEARN?

- Thorough scavenge space inspection and cleaning is very important, especially when the vessel is operating on short voyages with prolonged low load running of the main engine.

SHIP MISSING (FSI 15)

What happened?

A tug, towing an unmanned ship, left port for a long and slow journey. Fifteen days later the last noon-report was received at the company. Another 4 days later, the company requested a radio station to call the tug. No answer was received.

A month later, an EPIRB-signal was picked up and traced to the tug. The position was searched, but only the EPIRB, a small drifting plate and a small oil-slick was found.

Investigation found that the EPIRB had been manually activated. The batteries last for only 92 hours.

Later, the towed unmanned ship was found, but not the tug. The rescuer found the tow rope snapped and two emergency towing rigs had failed.

The tug and a crew of 13 were never found.

Why did it happen?

The reason why the tug was lost is unknown.

What can we learn?

If the company asked for search earlier, there might have been better possibilities finding the crew.

CONTROLLABLE PITCH PROPELLER FAILURE (FSI 15)

What happened?

While entering the port, the Master noticed that the speed of the vessel was greater than usual and that it did not correspond to the pitch settings. The emergency system was selected, but the starboard propeller remained set on full ahead. The starboard anchor was let go, causing the vessel to deviate from its course. Subsequently, the vessel struck a dolphin. The shock from the impact resulted in a blackout and a loss of propulsion.

Why did it happen?

The starboard propeller pitch failed to reverse. The servo control piston had seized inside the cylinder. It was later determined that there was presence of water and rusted particles in the hydraulic pitch control system. The master opted to engage the emergency system and not to stop the starboard engine.

What can we learn?

- Regular tests of various pitch commands are necessary to confirm the operational state of the equipment
- Regular maintenance of the hydraulic control systems and the frequent testing of the oil, prevents the degradation of the equipment and allow for early detection of water and other particles in the system

FAILURES OF PILOT LADDERS (FSI 15)

FAILURE 1

WHAT HAPPENED?

A pilot was disembarking from a ship when both rope sides of the pilot ladder failed. The pilot then fell approximately 27 feet to the deck of the pilot cutter below and was seriously injured.

WHY DID IT HAPPEN?

- The rope pilot ladder was old and had not been adequately maintained.
- The pilot ladder may have been damaged or strained when it was trapped between the ship's hull and the pilot cutter immediately before the accident.
- The pilot ladder was not rigged high enough above the waterline which led to it being trapped between the pilot boat and the side of the ship.
- There were no man ropes fitted which may have allowed the pilot a 'grab' when the pilot ladder started to fail.

What can we learn?

- Pilot ladder needs to be properly stowed, carefully inspected and maintained and correctly rigged.
- Man ropes should be ready to be rigged, at the pilot's request, especially in adverse sea conditions.

FAILURE 2 (FSI 15)

WHAT HAPPENED?

As a pilot was boarding a ship, the pilot ladder's side ropes parted approximately five steps up from the bottom. The pilot was uninjured and subsequently boarded the ship using the pilot ladder on the port side.

WHY DID IT HAPPEN?

- The pilot ladders on the vessel were old and had not been adequately inspected or maintained.
- The pilot ladders were permanently rigged and subject to weather damage.

WHAT CAN WE LEARN?

- Pilot ladders should be manufactured and certified in accordance with appropriate standards.
- They need to be properly stowed, carefully inspected and maintained and correctly rigged.

INADVERTENT RELEASE OF A DAVIT WINCH BRAKE

WHAT HAPPENED?

While a ship was at sea, the bosun was sitting astride of a davit cradle, under a lifeboat, securing a trigger line for the davit's harbour pin. In the course of his work, another seaman inadvertently stood on the davit winch brake operating handle which released the winch brake. The lifeboat started to move and its lashing lines, which were secured, failed under the load which allowed the boat to move further. The bosun was knocked backwards off the cradle and into the sea 15 metres below. Despite search and rescue efforts by local authorities and the crew, the bosun drowned.

Why did it happen?

- The bosun had placed himself in a risky situation and was attempting to perform a two man job on his own.
- The location of the davit winch brake operating handle near the lifeboat davit cradle ladder resulted in the accidental operation of the brake.
- The safety pin arrangement on the davit winch brake operating handle was not correctly adjusted and it allowed the brake to be disengaged with the safety pin in the locked position.
- The wire rope in the lifeboat's lashing line was severely corroded and resulted in its failure under the weight of the moving lifeboat.
- The bosun had had only four hours off duty in the previous 24 as a result of the ship being short staffed. At the time of the accident he was likely to have been suffering from some effects of fatigue.

WHAT CAN WE LEARN?

- Shipboard operations, tasks and/or work methods which place the crew in danger should be avoided.
- Safety equipment, like the davit winch brake handle safety pin, operating handles in way of access ladders and the lifeboat's lashing lines in this accident, should be properly designed and maintained to ensure that they are operating correctly at all times.

ALCOHOL AND GROUNDING (FSI 15)

WHAT HAPPENED?

A ship, after undertaking some survey work, was returning to port when it ran aground. After some time, it floated free and then re-grounded nearby. The crew were evacuated but the master remained on board and grounded the ship again whilst attempted to get it to port. He took the ship off again and sailed back to port.

WHY DID IT HAPPEN?

- The master made a navigational error leading to the first grounding caused by excess alcohol consumption (it was a dry ship).
- Crew were aware of rules being broken but took no action.
- Independent actions by some crew members may have contributed to a more serious outcome.

WHAT CAN WE LEARN?

- Violations (rule breaking) should not be ignored as it may lead to an incident. Seafarers should ensure that they are familiar with the correct use of any equipment supplied.

SLEEPING ON WATCH (FSI 15)

WHAT HAPPENED?

A ship ran aground, at night, when the master (OOW) fell asleep on watch.

WHY DID IT HAPPEN?

- The master was under the influence of alcohol.
- There was no lookout on watch.
- Previous incident involving the master was not properly investigated or followed up by the company.
- Poor navigation practices.
- Watch alarm was not used.

WHAT CAN WE LEARN?

- Violations (rule breaking) should not be ignored as it may lead to an incident.
- Lookouts need to be posted, especially at night.
- Watch alarms should be used if fitted.

MACHINERY DAMAGE ENDANGERING THE PASSENGER VESSEL (FSI 14)

What happened?

A four-engine twin-screw passenger vessel left port with all four engines running but lost propulsion power some thirty minutes later and drifted dangerously close to land.

The engines stopped because of loss of water in the main engine cooling system and consequent over heating. There was considerable delay in restarting the main engines because of loss of air pressure from the air start system. The air compressor had to be shut down as the engineers prepared to restore propulsion power.

Why did it happen?

1 Two separate cooling systems serviced the four main engines, one system for the two port main engines and one for the starboard main engines. The arrangement provided some degree of redundancy, so that the two main engines would still be available should one cooling system fail. However, all four main engines stopped because a cross over valve connecting the two cooling systems had been left open, causing loss of water in both systems.

2 Delay in restarting the main engines occurred because of loss of air pressure in the air start system due air leaks in the system, and failure of the engineers to start the air compressor in good time.

What can we learn?

1 A machinery pre-sailing checklist should be developed for every vessel.

2 Regular checks should be made of all running and standby plants for abnormal running conditions and failure of critical parts. Relieving engineers must be informed of the operating status of all machinery including any adjustments or alterations made during the course of the previous watch and these should be recorded.

3 Marine engineers are advised to pay particular attention to start air pressure systems with regard to efficiency of the compressors and identification of leaks. An accumulation of small leaks can rapidly deplete the charge in an air receiver.

4 Air pressure systems should be regarded as critical systems and instructions placed on board which identify the consequences of failure and the action necessary to restore the system.

5 Marine engineers should be fully aware of the operational status of all machinery under their control and not delay in bringing standby systems into operation.

6 Marine engineers should identify and highlight the minimum starting air pressure required for each of the engines under their control to avoid false or wasted starts.

7 On multi-engine installations, it is advisable to maintain the independence of each separate system as far as possible so that any defect that develops in a system will not prevent continued operation in the other system.

MANUAL MOVEMENT OF A BULKHEAD (FSI 14)

What happened?

The chief mate and one able seaman prepared to jack up a portable cargo hold bulkhead in preparation to shift it. When the bulkhead was just clear of the bottom of the hold, it began to tilt forwards and fall over. The chief mate and the able seaman were trapped under it. Air bags were used by shore emergency services to lift the bulkhead, enabling the casualties to be removed. The able seaman was pronounced dead on arrival at the hospital. The chief officer survived the accident but suffered crush injuries to his chest.

Why did it happen?

1 The chief mate had never been involved in shifting the bulkhead before.

2 No-one checked whether or not the bulkhead's top main securing bolts were in the engaged position.

3 Owner's and manufacturer's bulkhead operating instructions were ambiguous and did not accurately reflect the bulkhead arrangements fitted on board.

4 Planning of the operation was incomplete and its management was disjointed.

5 The risk assessment carried out on board was unrealistic and short-sighted.

What can we learn?

It has to be appreciated that moving a portable bulkhead is a dangerous operation on board and requires a thorough risk assessment. Such an operation should also be authorized following the principles of a 'permit-to-work', thus ensuring adequate planning and execution. Crew members who are not familiar with operating instructions and/or have not received the necessary training should not get involved in an operation such as this unless supervised by trained and experienced crew members.

PIER SIDE BOLLARD FAILURE (FSI 14)

What happened?

A small passenger vessel was in the process of berthing at a pier in a river. As the vessel came alongside the mate placed the eye of a mooring line around a bollard attached to the pier. He then secured the other end of the line to a bollard fixed to the deck. The master then applied some power ahead on the engines to bring the vessel alongside. At this point the vessel's bollard failed where it was attached to the deck and the heavy steel bollard was catapulted over a guard fence at the front of the pier. The flying bollard struck the head of a passenger standing on the pier causing fatal injuries.

Why did it happen?

1 The original mooring bollards fitted to the vessel were not placed in appropriate positions.

2 The bollard arrangement had failed on a number of occasions prior to the incident and had undergone several unapproved modifications.

3 The bollard assembly had failed about three weeks prior to the incident and was unsatisfactorily repaired using a relatively low strength weld.

4 The weld repair failed at the time of the incident and the bollard assembly was thrown through the air by the tension in the mooring line.

What can we learn?

The condition of mooring equipment should be carefully monitored as it is often under high load during mooring operations. Repairs and modifications to mooring equipment should be carefully carried out to ensure that the strength of the equipment is maintained.

A SEAMAN KILLED BY A MOORING LINE

What happened?

A seaman was killed by a wire mooring line while a ship was in the process of berthing. The wire had been led from a mooring winch through a snatch block attached to a U-shaped rope guide on a set of mooring bitts during an unusual mooring operation. While the ship was berthing the seamen was told to go to the starboard winch to relay some instructions to the operator. As he was walking through the bight in the mooring wire, formed by the snatch block, weight came on the wire and the U-shaped rope guide failed. The seaman was caught by the flying wire and sustained fatal injuries.

Why did it happen?

1 The U-shaped rope guide should not have been used to attach the snatch block as it was not strong enough.

2 The mooring operation was unusual and untested and should have been approached with considerable caution.

3 Communication was poor between the mate supervising the operation and the seaman operating the starboard winch since they could not see each other, they did not speak the same language and they did not have radios.

4 The poor communication meant that the seaman, who was killed, had to move through an area of danger and the bight of the loaded wire mooring line, to pass instructions between the men.

What can we learn?

Mooring operations should be carefully planned and carried out. All load-bearing mooring equipment should be fit for purpose and periodically tested. Moving through, or working within, the bight of a loaded wire or cable is very dangerous and should be avoided.

A BROKEN LEG SUSTAINED DURING A BERTHING OPERATION (FSI 14)

What happened?

A ship was in the process of berthing in a relatively strong wind and tide. The master on the bridge was using the main engine, rudder and bow thrusters to hold the vessel alongside while the mooring lines were passed ashore by the forward and after mooring parties. The forecastle party, led by the boatswain, had run a line from each of the port and starboard mooring winches before being made fast ashore. Tension came on the forward mooring lines suddenly which caused one line to part where it was led around a roller fairlead. The section of the line between the fairlead and the winch drum snapped back and fractured the boatswain’s right leg in two places.

Why did it happen?

1 The mooring rope which parted was in a poor condition.

2 The maintenance of the ship's mooring lines was inadequate.

3 The boatswain was standing in an unsafe position in the 'snap-back' zone of the mooring line.

What can we learn?

Mooring operations carry risks due to the loads placed on lines and equipment. Mooring lines must be regularly inspected and carefully maintained. Working within the 'snap-back' zone of a loaded mooring line can be dangerous and should be avoided.

FAILURE OF ROLLER FAIRLEADS (FSI 14)

What happened?

A ship was in the process of berthing at its usual berth when a set of roller fairleads on the forecastle failed. One of the rollers fell from the ship striking and killing a linesman ashore. The ship, equipped only with open roller fairleads, had been using an unusual mooring arrangement because its low freeboard meant that at times the wharf was higher than the ship's main deck. The arrangement included a mooring line led around two roller fairleads in the form of a tight 'S'. While the ship was coming alongside, weight came on the mooring line and overloaded the fairlead rollers forming the 'S', which caused the spindles on both rollers to shear.

Why did it happen?

1 The vessel's open fairlead rollers were not adequate for mooring the vessel alongside wharves where the main deck was lower than the wharf.

2 Running the mooring line around the fairlead rollers in a tight 'S' meant that the rollers were being regularly overloaded.

3 A fairlead roller had failed in similar circumstances on another vessel in the fleet in the past which should have led to a change in the fairleads and mooring practices used on all the vessels in the fleet.

4 The maintenance system was deficient with respect to the roller fairleads.

What can we learn?

All vessels should be fitted with mooring equipment suitable for the vessel's intended service. All load-bearing mooring equipment should be fit for purpose and carefully maintained.

KILLED BY A MOORING WINCH OPERATION (FSI 14)

What happened?

A ship was in the process of berthing with the second mate, an able seamen and an ordinary seaman, working at the after mooring station. The men were busy running a stern line which was led from the underside of the port winch drum. When the ordinary seaman standing at the stern saw that the mooring line had been made fast ashore, he signalled to the second mate to start heaving up on the line. The able seaman was seen to be standing clear of the mooring line in front of the mooring winch. The second mate started heaving and when the ordinary seaman looked over towards the mooring winch a short time later, he saw that the able seamen had been dragged under the rope drum of the winch. The winch was stopped immediately but the able seaman was found to be deceased.

Why did it happen?

1 The able seaman probably caught a piece of clothing on the mooring line as he was feeding it onto the winch drum.

2 The mooring line had to be led from the underside of the winch drum due to the low height of the roller fairleads on the deck.

3 The mooring winch was not fitted with any form of protection or guarding to stop a person being dragged underneath it.

4 There were only two seamen assisting the second mate at the after mooring station.

5 The able seaman may have been tired as he was at the end of a long period of duty.

What can we learn?

Mooring operations are risky and so an adequate number of properly skilled and alert crew must be allocated to the task. Mooring lines should not generally be run from the underside of the rope drum. Aside from the potential risk for crew feeding line onto the drum, this practice reduces the efficiency of the winch brake if it is the standard band type. Mooring arrangements should be carefully designed to ensure their safety and utility in service.

KILLED CLEARING A JAMMED BACK SPRING LINE (FSI 14)

What happened?

A ship was in the process of berthing in a lock with a tug made fast fore and aft. The mooring crew on the forecastle were busy running a back spring line. When it had been made fast on a bollard on the lock wall, the crew continued to let out line as the ship moved forward. At this point the mooring line became jammed between the winch drum and the winch bearing pedestal. One of the seamen was attempting to clear the jammed line when tension came on it and it suddenly came free. The seaman was thrown by the freed section of mooring line, his helmet falling free, and he sustained a fatal head injury.

Why did it happen?

1 There was too much line on the mooring winch's working drum which caused it to slip over the side plate and become jammed between the side plate and the bearing pedestal.

2 There were no rope deflectors in place on the bearing pedestal to prevent the mooring line from becoming jammed.

3 The movement of the vessel ahead should have been arrested until the mooring line jam was cleared. The mate supervising the crew on the forecastle should have ensured that the seaman was in a position of safety when tension came on the mooring line.

4 The seaman's helmet was not fitted with a chin strap.

What can we learn?

Plan mooring operations in advance to ensure that there is not too much line loaded onto the working drums of split drum mooring winches. Clearing of jammed mooring lines should only be attempted when there is no tension on the line. Points of possible line jamming should be fitted with rope guards/deflectors. Crew working in helmets should use chin straps at all times to prevent the helmet from becoming dislodged.

FAILURE OF HATCH COVERS CAUSES LOSS OF A SHIP (FSI 14)

WHAT HAPPENED?

A bulk carrier fully loaded with coal encountered bad weather. Seas constantly washed over the deck and the hatch covers and the tarpaulin hatch covers were destroyed. The holds were flooded and the ship sank. The crew of 20 abandoned the ship into the lifeboat. During the abandonment one crew member fell into the water and disappeared.

Why did it happen?

1. The master misjudged the weather forecast received before the departure, and the gale warning and the forecast of a severe tropical depression received shortly after departure.

2. At the time when the vessel encountered the strong winds and high seas the vessel's course and speed were not adjusted to minimize the effect of the weather.

What can we learn?

The voyage planning should contain careful consideration of weather forecasts, especially in waters with high risks of typhoons. In rough weather course and speed should be adjusted to reduce the effect on the ship's hull and deck.

BRIDGE OPERATIONS (FSI 14)

What happened?

A vessel sailing westward collided in the Kiel Canal with another vessel. Both vessels were manned with canal pilots. The westbound vessel suddenly turned to port and hit the second vessel amidships. Substantial damage was sustained by both vessels.

Why did it happen?

1. The bridge of the westbound vessel was not properly operated in accordance with STCW section A-VIII/2, Part 3-1.

    1. The vessels were using automatic steering systems in a busy shipping area.

    2. The co-operation between the mate and the pilot, particularly regarding the use of the automatic steering systems, was unsatisfactory.

What can we learn?

Masters need to ensure that the bridge is safely manned. Officers on watch are responsible for safe command of the vessel and have to ensure that the intended course is maintained. Pilots must work closely with the master or the officer on watch. The pilot must be notified of the manoeuvrability characteristics of the vessel. He should be made aware of any special instructions and procedure particular to the vessel.

PASSAGE PLANNING (FSI 14)

What happened?

A ro-ro passenger ferry made contact with a breakwater while entering the terminal in severely restricted visibility. Consequently, the forward azimuth thruster blades of the propellers were distorted, the hull indented but not breached. There were no injuries or pollution.

Why did it happen?

1. The bridge team was not sufficiently familiar with the operation of the navigational equipment on board.

2. The master and mate did not make full use of the integrated bridge system, because they were unfamiliar with the system's features.

3. The master and mate were not working together effectively in accordance with the principles of bridge team management, an essential function in restricted visibility.

4. The radar and electronic chart display and information system (ECDIS) could have been used and a passage plan could have been incorporated into the ECDIS.

5. The vessel did not have specific passage and blind passage plans.

What can we learn?

It is necessary that vessels have an adequate blind pilotage plan, and that blind pilotage drills are carried out at regular intervals, as required by a safety management system (SMS).

COMMUNICATION DIFFICULTIES DURING MANOEUVRING (FSI 14)

What happened?

On entering port during dense fog, a refrigerated vessel collided with a dolphin of a pier. During the subsequent attempts to manoeuvre the vessel back in to the right position in the river, the vessel rammed a quay wall with her stern. The ship sustained deformations in the stern area.

Why did it happen?

1. The possible confusion of the bow tug with a supposed small craft or work vessel in a crossing situation.

2. The excessively hasty manoeuvres initiated by the bridge of the vessel, during which the manoeuvring capabilities of the vessel and in particular the effect of the flood stream were not sufficiently taken into account.

3. The communication in different languages between the master and the manoeuvre station, and between the pilot, the tug masters and the land station.

What can we learn?

Using different language reduces the performance of the bridge team, thus increasing the risk of collision. Under such conditions, a risk of accident is enhanced further with the tug and refrigerated vessel operating close quarters manoeuvres in an area of restricted visibility.

AN ACCIDENT IN RESTRICTED VISIBILITY (FSI 14)

What happened?

The general cargo vessel made contact with a buoy in a channel in restricted visibility. The ship's propeller blades were distorted. The buoy was subsequently found to have been severed from its moorings.

Why did it happen?

1. Visibility reduced to about 100 m in snow, and two buoys were no longer visible on the radar displays.

2. The chief officer did not move the main engine pitch control sufficiently to cause a significant reduction of speed.

3. When applying port helm to avoid a buoy, the chief officer did not monitor the rudder angle or the movement of the ship's head. Too much port helm was initially applied, and opposite helm was applied too little and/or too late to prevent the vessel's stern from swinging into the buoy.

4. The chief officer would have been better placed to cope with the sudden worsening of the visibility had he not been alone on the bridge. Had the master been on the bridge as the ship passed the Lighthouse, his knowledge of the ship's handling characteristics, and the area, would have been beneficial as the visibility decreased.

5. The vessel had only two watch keepers, and the duty able seaman lookout was not used.

What can we learn?

The master must at all times make sure that the bridge manning is in accordance with the regulations and rules. It is ultimately the master's responsibility that the bridge is manned safely at all time.

LACK OF A PROPER LOOK OUT (FSI 14)

What happened?

One vessel did not give way to another in accordance with the collision regulations. Both ships were damaged. The port side ballast tanks on one vessel were damaged, and the consequent loss of ballast caused it to list to about 10 degrees starboard.

Why did it happen?

1. The two vessels were under way and the weather conditions were good. However the bridge of one vessel was unmanned, while the OOW on board the other was alone on the bridge.

2. The OOW was concentrating his attention on some ships on his starboard side. In so doing he was unaware of the movement of a vessel and a developing close quarters situation until it was too late to take evasive action to prevent a collision.

What can we learn?

It is important to adhere strictly to Collision Regulations and keep a look-out in a professional way. The OOW should always be guaranteed an increase in bridge manning should the need arise. The need for efficient operation on board ship should not be at the expense of safe navigation.

This need should not influence the availability of the look out when required: any other duties assigned to the look-out should not be given priority over his look-out duties.

SAFE SPEED IN FOG (FSI 14)

What happened?

A container vessel and sailing yacht collided while under way in heavy fog. The master had been on the bridge since sailing (a period of 15 hours).

Why did it happen?

1. The container ship was proceeding at 25 knots in heavy fog conditions.

2. Her master was over confident in the accuracy of the ARPA and willingly accepted a too small passing distance.

3. The skipper of the sailing yacht was unable to use the radar effectively.

4. Both vessels did not keep an effective radar look out.

What can we learn?

When navigating in restricted visibility, it is important to assume a safe speed and to maintain a proper radar and visual look-out. Judgement can be affected by prolonged hours on duty.

SEAMAN INJURED AS A RESULT OF A LIFEBOAT EXERCISE (FSI 14)

What happened?

Two people were injured during the launching of a lifeboat and the operating the on-load release gear as the lifeboat was suspended one metre above the water.

Why did it happen?

1. Ship's crew had never been involved in such an exercise.

2. No one was in position to accurately assess the height of the lifeboat above the water.

3. The signage within the lifeboat did not adequately warn of the dangers of operating the on-load release gear when suspended above the water.

4. No risk assessment was carried out for a routine on-load release gear test.

5. It was not clear who was in control of the exercise.

6. Action of the surveyor assessing the exercise was affected by a heavy workload.

What can we learn?

There is an obvious need for the crew to be well prepared for an exercise of this kind. To avoid confusion during the exercise the seamen's roles and the person in charge need to be clearly identified.

MACHINERY DAMAGE (FSI 13)

What happened?

Whilst trawling, the engineer on watch noticed the main engine surging with smoky exhaust. Further investigation revealed a flooded engine room and the main engine three-quarters submerged. The bilge alarm had not activated. Flooding was progressive and the crew had to abandon the trawler.

Why did it happen?

The exact cause of the flooding could not be determined but failure of an expansion coupling due to excessive stress or a hole/crack due to fatigue failure, erosion, corrosion and galvanic corrosion are pragmatic possibilities. Furthermore, the bilge alarm failed to activate and the seawater suction valves were immediately submerged and hence inaccessible.

What can we learn?

Bilge alarms should be tested at least on a daily basis. Fitting of extended spindles on seawater suction valves may avoid inaccessibility of valves and loss of control of seawater ingress.

DAMAGE TO SHIP OR EQUIPMENT (FSI 13)

What happened?

The freezer trawler suffered a major failure in the factory freezer equipment, resulting in the entire release of the refrigerant into the engine room, displacing the oxygen and shutting down the main and auxiliary engines. Hours later, the trawler developed a list of about 8° to 10°, increasing to approximately 29° due to an accumulation of seawater on the starboard side. Subsequently, the crew called for assistance and abandoned the trawler.
Twenty-five minutes later, she downflooded and sank stern first.

Why did it happen?

The shutdown of all equipment prevented the operation of the seawater discharge pumps. Screw down non-return valves were partially obstructed by waste debris and the unavailability of anti-syphon loops assisted in the ingress of seawater. Furthermore, weathertight and watertight closures were not effectively sealed against downflooding.

What can we learn?

The importance of ensuring that are closures are tight against downflooding. Shore Authorities should be alerted during the early stages of the occurrence to ensure timely search and rescue.

What happened?

During a lifeboat drill in port, the crew of a container ship had some problems hoisting the boat using the davit winch motor controls at the boat deck. The drill was abandoned but as the lifeboat was swinging clear of the boat deck it was thought to be too risky to disembark the crew. After some time manually hoisting the boat using the winch handle and making several attempts to diagnose the winch motor electrical fault, the decision was made to run the winch motor by manually operating the motor contactor from the remote starter panel.
The electrician, who was to operate the motor, was in radio contact with the mate on deck. The lifeboat was raised using this method and just before it reached the head of the davit the mate told the electrician to ‘stop’, however the winch motor continued to run and the fall wires parted after the davit cradles reached their stops. The boat fell to the boat deck initially where it stopped until the falling davit cables impacted the inboard side causing the lifeboat to fall approximately 16 m to the water. There were seven crew aboard the lifeboat, one was killed and three others were seriously injured.

Why did it happen?

- The crew should have been disembarked from the lifeboat when the local winch controls were found to be inoperable.

- They did not have sufficient knowledge of the lifeboat winches' motor control system.
- The operation of the winch motor by manually operating the motor contactor by-passed the motor's safety cut-outs.
- The crew did not operate the local emergency stop button when the lifeboat reached the davit head which would have stopped the winch motor.

What can we learn?

Never hoist a lifeboat by manually operating the winch motor contactor to by-pass the normal safety cut-outs.

What happened?

During a lifeboat drill the crew had difficulty resetting the lifeboat's on-load release hooks. The forward hook opened spontaneously when the lifeboat had been hoisted just clear of the water. The forward end of the lifeboat fell to the water but it was undamaged and there were no injuries to the crew. The boat was eventually recovered after it had been lowered back to the water and the hooks correctly reset.

Why did it happen?

- The forward hook had not been correctly reset.
- The design of the on-load release system allowed the operating handles to be moved to the reset position and locked when the hook locking mechanisms were not fully engaged.
- The crew could not clearly observe when the hook locking mechanisms were fully and correctly reset.
- The crew did not have an adequate understanding of the operation of the on-load release system.
- There had been similar incidents in the past which had not been fully investigated or led to appropriate safety actions.

What can we learn?

The operation and maintenance of lifeboat on-load release systems presents a significant danger to ships' crews. Every ship should have thorough, type-specific, crew training and detailed operation and maintenance instructions for these systems.

What happened?

A ship had undergone a port state control inspection and a number of deficiencies were noted, in particular, that the on-load release hooks on the starboard lifeboat were seized.
The next day the starboard lifeboat was lowered to the water so two seamen could free up and grease the hooks. When they had completed their work, the lifeboat was hoisted back to the embarkation deck and the mate boarded the lifeboat to inspect the work.
Approximately 30 seconds to a minute later, the forward hook opened spontaneously and the lifeboat was left hanging vertically from the after fall. The two seamen and the mate fell into the water. The two seamen, who were wearing lifejackets, managed to bring the mate to the surface and were picked up a short time later by a pilot launch. The seamen had both sustained minor injuries and the mate was hospitalized with more serious injuries.

Why did it happen?

- The release mechanism was poorly maintained and in an unsafe condition.

- The safety pin securing the release lever was missing.
- It is possible that the forward hook was either not fully reset or that the crew in the lifeboat accidentally tripped the release lever.
- The crew did not have sufficient training or instructions to safely maintain the system.
- The on-load release manufacturer's operating and maintenance instructions were not in the language of the crew.
- The ship had no system in place to ensure that the repair and testing of the on-load release system was carried out safely and effectively.
- An ISM Code audit carried out on behalf of the flag Authority did not ensure that the instructions for the maintenance of the lifeboat release system were appropriate, comprehensive and easily understood by the crew.

What can we learn?

Operations involving the maintenance and operation of lifeboat on-load release systems are inherently risky. Every ship should have safe procedures and detailed instructions, easily understood by the crew, for the maintenance and operation of these systems.

What happened?

A ship was undergoing a survey and audit during a change of ownership. The surveyor requested that the port lifeboat be lowered to the water and the on-load release hooks operated. When the crew had reset the on-load release hooks and reconnected the falls the boat was hoisted to the embarkation level where two of the five crew exited the boat.
The mate and two others were left to complete stowing the boat. When the mate was stowing the operating handle for the on-load release system, both on-load release hooks opened and the lifeboat fell 19 metres to the water below. One crew member suffered serious head injuries and required hospitalization, the mate and the other crew member sustained minor injuries and shock.

Why did it happen?

- The crew had not placed a critical locking pin in the on-load release operating mechanism when resetting the system prior to the lifeboat being recovered.
- None of the crew had an adequate knowledge of operation of the on-load release system.
- The ship was in the process of being handed over to new owners and so there was limited time for the new crew to familiarize themselves with the operation of the on-load release system.
- The instructions for resetting the on-load release system inside the lifeboat were inadequate.
- Warning plates and advice issued by the lifeboat manufacturer after a similar incident on another ship had not been supplied to the vessel.

What can we learn?

Crew must have a thorough knowledge of the operation of their lifeboat's on-load release system before drills are conducted. On-load release system manufacturers should make sure that ships fitted with their equipment receive safety notices relating to the prevention of accidents involving their equipment.

What happened?

A lifeboat had been sent ashore for some repairs. While the lifeboat was ashore contractors had partly disassembled the davit winch to check the brakes in preparation for a load test. When the lifeboat was returned to the ship, two crew members boarded to connect the davit falls to the hooks and remained in the boat as it was hoisted. The boat was hoisted normally using the davit winch motor and when it reached the head of the davit hoisting was stopped. At this point the lifeboat began to fall under gravity and continued to descend despite the crew's efforts to stop it using the davit winch brake.

After striking the edge of the quay, the lifeboat landed in the water between the ship and the quay. Both crew in the boat were slightly injured and the lifeboat sustained damage.

Why did it happen?

- The lifeboat ran away because the davit winch brake had been incorrectly assembled.
- The vessel carried no instructions or diagrams showing the correct method of assembling the winch brake.
- The work on the davit winch brake was performed by contractors having limited knowledge of the system.
- The hazards associated with the lifeboat operation were not fully recognized, thus a safe plan for the work was not put in place.

What can we learn?

Maintenance of load bearing equipment on lifeboats and davits may be risky and should be carefully planned and performed by well trained personnel. An unmanned test of the equipment should be conducted after such maintenance has been performed.

What happened?

During the recovery of the nets on a fishing vessel two deckhands were passing a heaving line forward in preparation for bringing the catch aboard. One of the deckhands was standing on the top deck under the starboard main warp waiting to receive the heaving line from the deckhand standing out of sight on the poop below. The deckhand on the poop heard a loud bang and looked up to see that the starboard main warp block had failed. The warp block had released the loaded warp wire, which had fallen on the other deckhand. The skipper in the wheelhouse looked out and saw the deckhand on the top deck lying limp over the hand rail. The crew carried the injured deckhand to the wheelhouse where they found that he had died.

Why did it happen?

- The warp block had failed because a thin sleeve fitted in the bearing housing of the sheave had worked outward and cut a hole in the adjacent cheek plate.
- Maintenance on the warp block was insufficient to detect the impending failure.
- There was no requirement for hauling equipment to be tested and examined at regular intervals.
- The operation of passing the heaving line forward was risky as it meant that a deckhand had to regularly work under the loaded warp.

What can we learn?

Fishing vessels and their operations should be designed so that crews do not have to work in near fishing gear under load. Fishing vessel hauling equipment should be designed and maintained in the same way as lifting equipment.

What happened?

The crew of a passenger vessel were conducting a training evolution on the vessel's fast rescue boat (FRB) while the ship was underway. The boat was lowered with three crew aboard. When it took the water, the engine was running and the boat was being towed by the painter with the suspension hook still connected. At this point the painter was inadvertently released and as the suspension hook was still connected, the boat broached and threw one crewman into the sea. The master quickly stopped the ship and a second boat was launched to recover the FRB's crew. The FRB and its davit had sustained some damage and the crewman who had been immersed in the sea suffered some effects from his time in the cold water.

Why did it happen?

- The boat's painter was disconnected before the suspension hook.
- The boat's crew made assumptions about procedures, which resulted in confusion among the crew.
- The crew's incorrect assumptions were the result of a lack of adequate preparation and briefing for the drill.

What can we learn?

Launching lifeboats or fast rescue craft when the ship is underway is risky and so the crew must be thoroughly prepared and work as a team.

What happened?

During his engine room rounds on a passenger ship an engineer attempted to pass through a closed watertight door. He operated the local controls to start opening the door, and, when it had opened sufficiently to allow him to pass through, he set the door to close. As the door was closing he began to step through. Then either his boiler suit became snagged, or something else caused him to hesitate, which delayed his progress through the door. Despite his frantic attempts to reverse the movement of the door, it closed on his upper left arm crushing it. He was able to free his arm from the door and seek help.
Three hours later he was landed, but efforts to save his crushed arm failed and it had to be amputated.

Why did it happen?

- The third engineer did not open the watertight door fully, in accordance with the operating instructions, before attempting to pass through.
- The high number of door operations and time taken to operate the doors each time may have led to the third engineer taking a 'short cut'.
- There was a lack of clear, consistent and practical operating instructions for the watertight doors.
- There were many previous instances where the crew were found to be taking 'short cuts' when operating the watertight doors. These incidents had been dealt with as disciplinary matters, so the safety issues were not properly recognized.

What can we learn?

Operations involving watertight doors are risky and so every ship must have clear, consistent and practical operating instructions, which are followed by all crew.

What happened?

A scallop fishing vessel was working in rough seas. As the fishing gear was being raised in preparation for being lowered into the water, the vessel rolled to starboard. The roll caused a heavy steel towing bar to swing inboard and strike a deckhand's head. A short time later the skipper noticed the deckhand lying on the deck. Despite the efforts of the crew and the emergency services the deckhand died of his head injury.

Why did it happen?

- Although he was an experienced fisherman, the deckhand was new to the vessel and was not experienced in some of the vessel's procedures for shooting the fishing gear.
- The induction training given to the deckhand was minimal.
- The skipper was unable to monitor the safety of all of the crew when the fishing gear was being shot.
- There had been no formal assessment of risks associated with the fishing vessel's operations.

What can we learn?

Handling heavy items of equipment which are suspended on a vessel subject to the motions of the sea is dangerous. The risks of these operations must be carefully considered and minimized by having safe procedures and good crew training.

WORK RELATED ACCIDENTS

What happened?

Two engine-room crew engaging on maintenance work on the port boiler main steam stop valve of a passenger cruise ship were badly scalded when boiling water suddenly discharged from a pipeline. One of the two crew subsequently died and the other was seriously injured.

Why did it happen?

- The valve isolating the port boiler from the engine-room steam ring main was leaking but the leakage was not detected by the ship's senior engineer.
- Steam leaked across the isolating valve condensed and accumulated in a vertical section of the steam pipe above the valve and the condensate could not be effectively drained due to inadequate drainage facility.
- When the port boiler main steam stop valve located further upstream of the steam pipe was opened up for maintenance, depressurization of the pipeline increased the leakage rate across the insolating valve. This lead to sudden eruption of steam under the condensate layer, discharging boiling water through the opened main stop valve.
- The ship's engineers were aware of the difficulty in draining the steam pipelines during their normal operation. However the difficulty was regarded as a technical rather than a safety issue.
- This resulted in the problem not being reported to senior management for rectification.

What can we learn?

Adequate drainage facility must be provided to different sections of steam pipelines to avoid any possible accumulation of condensate within the pipelines.
When part of a steam plant is to be isolated and opened up for maintenance, care must be taken to ensure that there is no leakage from the other part of the plant containing live steam.
It is important to ensure that safety issues that may arise from technical operational matters are properly assessed and reported to higher management level under the shipboard safety management system.

What happened?

During the operation to hang off the outhaul wire for the port drag scraper cargo bucket on to the port coaming, the bosun of a aggregate suction dredger was trapped between the rotating aft loading tower reject chute and the port coaming and was fatally injured.

Why did it happen?

- The method of hanging-off the outhaul wire using the forward loading tower was proposed by the crew without given consideration to the safety implications of operating the loading tower while crewmembers stood in hazardous positions.
- The second mate, who was relatively new to the vessel and had not been properly instructed on the operation, mistakenly believed that both fore and aft loading towers were required for the operation.
- When he was asked to operate the loading tower from the bridge loading console, he operated the aft loading tower without noticing that the bosun was then standing on a platform between the aft tower and the port coaming.
- The bosun was trapped between the rotating aft loading tower reject chute and the coaming and sustained fatal injury.

What can we learn?

- It is important to assess the risks associated with ship-specific shipboard operations and to include the operational procedures in the ISM documentation.
- Crewmembers responsible for particular operations should be suitably instructed or trained.
- Any hazardous incidents should be reported and reviewed under the shipboard Safety Management System.
- When operating hazardous equipment, it is important to ensure that communication is perfectly clear such that no misunderstanding can occur, and that all personnel are staying clear of hazardous positions.

What happened?

A cargo ship was docking in severe weather conditions. During the operation to connect the forward tug, considerable tension was applied to the towing hawser before it was made fast. The towing hawser came over the lip of the bits on which it was to be made fast with tremendous force, striking a crew member who was standing in a vulnerable position. The crew member died from the injury he sustained.

Why did it happen?

- The ship’s mooring line was used as the towing hawser which had not been made fast before it was passed to the tug.
- The tug was probably going ahead to clear the rope in the water near its propellers while the cargo ship was going astern to close its berth, thus exerting tension on the line suddenly.

- The crew member was standing in a danger zone and had no time to react.

What can we learn?

- All personnel should stand clear of ropes under tension and those that may come under tension.
- The risks associated with working with tugs, including using ship's mooring line as towing hawser, should be adequately assessed.
- If a ship's line is to be used as a towing hawser it should be slacked away to the deck of the tug in a controlled manner, and be capable of turned up on the bits to be made fast without requiring personnel to enter into a danger zone.
- Masters should assess the risk of berthing under extreme weather conditions and consider the postponement of entry into port as appropriate.

What happened?

A young and inexperienced fisherman who had just joined a scallop dredger as a deckhand disappeared while the vessel was engaging in scallop dredging operation. At the time of the incident he was sorting out scallops from the dredges on the port side near the bulwark, which was not directly in the sight of the skipper in the wheelhouse or the other deckhand working on the starboard side. His work involved sorting out scallops from the dredges dumped on deck before pushing/kicking the residue back overboard through the scuppers. The scuppers were fitted with removable centre-hinged flaps usually wedged about three-quarters open. Subsequent to the incident, one scupper flap on the port bulwark was found to have been deliberately removed and stowed in the adjacent frame space of the bulwark.

Why did it happen?

- The cause of the loss of the fisherman overboard cannot be established with certainty.
- He might have removed the scupper flat to facilitate pushing large piece of residue overboard, but in doing so inadvertently slid through the scupper opening.
- The lack of experience of the fisherman might have been a factor of his loss overboard.

What can we learn?

The importance for young persons seeking to join the fishing industry to undergo appropriate pre-sea safety training.

POLLUTION (FSI 11)

What happened?

A tankship was properly secured to a monobuoy during cargo discharge operations. At some time during these operations, the chain stopper opened and the chafing chain was released. The ship was then moored only by a pickup rope that parted shortly thereafter. As the vessel drifted from the monobuoy, the rail hoses parted and approximately 12 tons of oil spilled into the sea.

Why did it happen?

The bridge monitor that was used to control the cargo operation used the same function keys to control different operations. The screen colour was different for each operation; however, the function keys and their sequence were not unique to a given operation. It is believed that one of the officers performing cargo operations unintentionally opened the chain stopper and released the chafing chain while attempting to secure a forward hydraulic pump. The function key sequence was the same for each operation and only the screen colour provided an indication as to which operation was being performed.

What can we learn?

Ergonomics, in the form of operator- machine interface, can be a critical element in shipboard safety.
Ship's crew should display warning signs where there is a possibility of confusion in the operator- machine interface.

LIFEBOAT ACCIDENTS (FSI 11)

What happened?

A lifeboat with four people on board was being lowered into the water when the stern on-load release hook released inadvertently. Three of the four were killed and the fourth injured.

Why did it happen?

The exact reason why the hooks released was not determined. It was thought that the hook locking mechanism may not have been located in the reset position when it was last lifted out of the water. This, combined with jerking of the lifeboat as the davit landed on its stoppers, resulted in the hook releasing the lifeboat.

What can we learn?

Seamen need to be constantly vigilant to ensure that they are aware of the complications of on-load release hook mechanisms.
Some on-load release mechanisms may release inadvertently when the load is off the hook, a condition difficult to detect during launch and recovery routines.
The hooks need to be checked thoroughly to ensure that they are properly secured and that the release and interlock systems work effectively.

What happened?

A lifeboat that was lowered to the embarkation deck of a ship fell into the water while a three person team was performing maintenance. Two of the three team members were injured and treated at a hospital.

Why did it happen?

The lifeboat was supposed to be suspended by the hang-off pendants while the suspension hooks were disengaged for servicing. The person in charge of the maintenance procedure had inadvertently rigged the recovery pendants rather than the hang-off pendants, and the lifeboat fell into the water when the suspension hooks were released.

What can we learn?

Even personnel that are fully trained and qualified to perform a specific procedure can make errors or omissions that result in a serious casualty.
The casualty would have been prevented if the design of the recovery pendants precluded them being mistaken for, and rigged as, the hang-off pendants.
The error may have been detected if the person in charge of the maintenance had briefed the other maintenance team personnel on the exact procedures. Asking a team member to confirm completion of each step during the procedure would have reduced the risk of an accident.
The casualty may not have occurred if the lifesaving equipment maintenance manual contained detailed procedures for supporting the lifeboat from the hang-off pendants.

ACCIDENTS TO SEAFARERS

What happened?

While closing the hatch covers on a small bulk carrier after hold cleaning, an officer climbed onto a partially-closed hatch cover to unshackle and move the wire leading from the winch. He slipped and fell into the hold and was killed.

Why did it happen?

The ship's crew had been using an incorrect procedure for closing the hatches for a long time.
The correct procedure did not require the position of the wire and shackle to be moved during the operation, however it was not written into the vessels' documentation. The decks and hatch covers were wet, oily and slippery and the officer placed himself in a dangerous position by climbing onto, and working at the very edge of, the partially-opened cover. He was wearing neither a safety harness nor a helmet. The vessel did not have any written procedure for opening and closing of hatches. In the absence of any written procedures, the ship's crew were using a
procedure which was dangerous. Furthermore the decks and hatch covers were wet, oily and slippery. This placed the officer in a dangerous situation which was further made worse as he was not wearing a safety harness or a helmet.

What can we learn?

Vessels must have written procedures (as required by the ISM Code) for safely carrying out routine procedures. Ship's crews must be familiar with these procedures and follow them.
Seafarers should not take risks thereby placing themselves, even briefly, in a dangerous position.
Seafarers should always wear safety equipment where appropriate and be alert for any hazards due the presence of oil, grease or water on deck.

What happened?

A crewman on a large stern trawler disappeared at night while the vessel was paying out its nets.
He had been standing near the stern of the vessel. A search was initiated soon after it was discovered that he was missing and his inflated lifejacket was soon found. Its light was illuminated but he was not in the lifejacket. His body was never recovered.

Why did it happen?

It is not certain why he fell overboard as nobody saw the incident, however it is likely that he was dragged over the stern by the nets paying out over the stern roller. It seems that he might have drowned because his lifejacket had not been worn properly.

What can we learn?

Always ensure that you do not get too close to moving nets, wires, rollers, etc., especially if you do not need to be there in order to carry out a task.
He might have survived if his lifejacket had been properly worn and securely fastened.
It is advisable for all fishermen to wear lifejackets when paying out ("shooting") nets.
Beacon-equipped lifejackets will greatly improve your chances of being quickly rescued should you fall overboard.

What happened?

Two crewmembers were found dead after entering a tank that had been cleaned.

Why did it happen?

The men entered the tank for unknown reasons without adhering to the procedures which would not have allowed a person to enter a tank without an entry permit duly signed by their Master or the appropriate officer.

What can we learn?

Familiarisation training in accordance with the Safety Manual, in particular the procedures to be followed for tank entry is of utmost importance. Training should include awareness of the concealed dangers of tanks, cargo spaces and other confined spaces which might, even after cleaning or ventilation, consist of a dangerous atmosphere and the necessity of testing the atmosphere inside the tank before attempting entry (refer to resolution A.864(20) - Recommendations for entering enclosed spaces aboard ships). Advice on entry into enclosed spaces is contained in industry guidelines, circulars issued by IMO and Flag State Administrations regulations/notices to mariners which should be strictly followed.

What happened?

A fishing vessel was hove-to off the coast of Denmark while the crew were stowing the fishing gear. A trawl beam was landed on deck, with the 'beam shoe' landing with the heaviest side uppermost. It was leaning against the bulwark and, as the vessel rolled, its unstable position caused it to fall inboard. A crewman who was standing close by, moved out of its way, but was caught by the towing chain which suddenly tensioned, throwing him overboard. A lifebuoy was thrown to him but, as he could not swim, he could not reach it and by the time the vessel had manoeuvred to recover him, he had drowned.

Why did it happen?

The crewman was not carrying out any particular task in that area, yet was standing in a hazardous position and it seems that he must have been unaware of the danger. No formal risk assessment had been carried out by the vessel's owners, neither were there instructions for crew members to remain in safe locations when not actually carrying out tasks. Had he been able to swim, and had he been wearing a lifejacket, he may not have drowned.

What can we learn?

Always be aware of, and stand well clear of equipment, wires, ropes, etc., which could move unexpectedly.
Remain in a safe area unless you are required to carry out a specific task.
Wear a lifejacket or other buoyancy aid when working on deck during fishing operations.
Anyone employed at sea should be able to swim.

What happened?

The motor of an open outboard-motor-powered harvesting punt failed when it was returning to port with a full load of mussels. The punt drifted broadside to the waves, shipped water, capsized and sank. The two occupants were thrown into the water and drowned. The two persons were wearing heavy rubber pants, a jacket and boots. Neither of them was wearing a life jacket or any floatation device because there were none onboard. No distress call was made.
The motor of the punt had a history of intermittent mechanical problems.

Why did it happen?

There was poor maintenance of the outboard motor. No life jackets were on board.
Persons on board didn't have basic safety training. Insufficient reserve buoyancy of the punt.

What can we learn?

Importance of the maintenance of the outboard motor. Open deck fishing boats should have enough reserve buoyancy to support the full equipment, motor, persons on board and fuel when fully swamped.
Anyone who works on board of fishing vessels should have knowledge of minimum basic safety practices and procedures.