Loss Prevention Guide

NORTH
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ROCKS AND HARD PLACES: HOW TO AVOID THEM

The North of England P&I Association

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THE NORTH OF ENGLAND P&I ASSOCIATION

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Chapter 1

IT IS YOUR RESPONSIBILITY

Vessel groundings and fixed and floating object (FFO) damage – the term used when a vessel damages property other than another vessel – are among the most high profile and costly of all maritime accidents. The cost in both personal and financial terms has increased in recent years, but human error remains the most common factor.

Groundings and FFO incidents are rarely caused by a single factor. They are usually due to a combination of several factors that, together, cause an incident.

A vessel's navigational systems and procedures for voyage planning, bridge team management and watchkeeping are designed to reduce the risk of incidents. All are interdependent, and it is when these systems and procedures start to break down that incidents occur.

Every voyage and the plans made in support of the voyage is part of one complex, sometimes confusing, and always changing system. Each and every component of the voyage is reliant on all of the other components to ensure that a vessel, the crew, its cargo and the environment are kept safe.

Systems do not break down by themselves and procedures do not bypass themselves, it is the incorrect actions or omissions of the people using the system and/or procedures that cause them to break down. If you are part of the bridge team it is your responsibility to ensure that the systems are properly used and implemented.

Remember, as a member of the bridge team it is your responsibility to ensure that your vessel is kept safe during a voyage.

This guide is not intended as a textbook on voyage planning and the avoidance of groundings or FFO incidents. It is designed to bring to the attention of ships' officers the key factors that we at North, based on many years of extensive experience in dealing with such incidents, believe are the key contributory factors in groundings and FFO incidents.

The guide includes suggestions on avoiding these contributory factors and aims to promote understanding of how the risks can be minimised through following good practice.

In addition, one or more case studies are included at the end of most chapters to provide examples of poor practice. Based on real groundings and FFO incidents, each case study describes a developing situation and asks a number of questions – but the answers are not provided. The intention is to encourage thought by, and discussion between, members of the bridge team so that you may consider the factors that contributed to the incidents and how they could have been avoided.

It is much less costly to learn from the mistakes of others than to learn from your own mistakes.

GROUNDINGS

Grounding occurs when a ship is 'out of its draught' and is no longer 'safe afloat'. Sometimes this is intentional and planned, for example a drying berth in a tidal harbour, but many groundings are unplanned and accidental. Accidental groundings can be sudden and dramatic – some even occur at full ahead – or they can be slow and foreseen, like taking the ground on a falling tide or being driven aground with a dragging anchor.

Accidental groundings should not happen but they do, all too frequently; sometimes with disastrous consequences. Ships' officers are trained to appraise a voyage, prepare voyage plans, monitor those plans and execute them in such a way that groundings should not occur. Among other things company procedures, industry guidance, seafarer training, vessel traffic services and international regulations are designed specifically to ensure that voyages are carried out in a way that safeguards the vessel, the crew, the cargo and the environment against grounding.

FIXED AND FLOATING OBJECTS

Fixed and floating object damage (FFO) differs from grounding because the vessel generally remains afloat and because the contact is generally with a man-made object such as a navigation mark, subsea cable, dock or crane. Even a 'heavy landing' can become an FFO incident if it damages fenders or the berth.

FFO damage can lead to very costly claims, particularly where specialised port equipment such as container gantry cranes or roll-on roll-off loading ramps are damaged and a dedicated berth is put out of use. The vast majority of FFO claims are avoidable through implementation of good practice and by operating effectively as a bridge team.

SUMMARY

Groundings and FFO incidents are potentially very dangerous and costly. As a master or member of the bridge team it is your responsibility to ensure that they do not happen and that your vessel is kept safe during a voyage.

Chapter 2

VOYAGE PLANNING

IMO GUIDELINES

The International Maritime Organization (IMO) resolution A.893(21) *Guidelines for Voyage Planning* stresses the importance of voyage planning.

IMO resolution A.893(21) – importance of voyage plan

The development of a plan for voyage or passage, as well as the close and continuous monitoring of the vessel's progress and position during the execution of such a plan, are of essential importance for safety of life at sea, safety and efficiency of navigation and protection of the marine environment.

It then goes on to set out the elements that make up a plan.

IMO resolution A.893(21) – elements of voyage plan

Voyage and passage planning includes **appraisal**, i.e. gathering all information relevant to the contemplated voyage or passage; detailed **planning** of the whole voyage or passage from berth to berth, including those areas necessitating the presence of a pilot; **execution** of the plan; and the **monitoring** of the progress of the vessel in the implementation of the plan.

The appraisal, planning, execution and monitoring stages of a voyage plan should be known to all deck officers. Discussed in this guide are some of the key contributory factors that lead to groundings and FFO incidents with a particular focus on the monitoring stage.

Failure to monitor the voyage properly, not surprisingly, often leads directly to grounding and FFO incidents.

PREPARING THE VOYAGE PLAN

At the most basic level a voyage plan is simply a line on a chart (pencil on paper or electronic line on electronic chart display and information systems (ECDIS)) that shows where a vessel is intended to go. Layers of complexity are then overlaid onto this line by adhering to good practice, following regulations, implementing company procedures and complying with master's standing orders. The end result should be that a vessel navigates along a well-planned, safe track that should reduce the risk of groundings or FFO incidents to a minimum.

Analysis of North's large P&I claims reveals that voyage planning deficiencies are a causal factor in the majority of FFO incidents and in all groundings. However, a poor voyage plan is rarely the sole reason incidents occur. It is more usual to see a poorly prepared voyage plan contributing to an incident as a part of a series of events. Whether or not poorly prepared voyage plans lead directly to groundings and FFO incidents, there are no circumstances where preparing a voyage plan that does not conform with industry standard practice and company procedures is acceptable. The incident described in Case Study 1 shows the dangers of preparing plans not in accordance with best practice.

Some key points to keep in mind when preparing a voyage plan are as follows.

- **The plan must be berth to berth** – if a vessel does not have its own plan for the pilotage the master–pilot exchange (MPX) cannot be properly conducted. Failure to prepare a berth-to-berth plan puts you in a position where you are obliged to adopt the pilot's plan without having properly studied the pilotage route. While it is recognised that these plans often change during the MPX, the planning process is the key element in highlighting potential hazards and allowing the master, and other members of the bridge team, to have a professional discussion with the pilot about what to expect at each stage of the pilotage. The MPX should result in the pilot, master and bridge team adopting a shared plan for the intended pilotage. If the master has one plan and the pilot another, there is no shared plan and the vessel is at increased risk.
- **The voyage must be planned to ensure a vessel's safety at all times** – it is never acceptable to plan a voyage to take advantage of television or phone signals or for any other reason not connected with safety of navigation if this puts a vessel at increased risk.
- **The plan should incorporate a combination of industry best practise, local regulations, company procedures and master's standing orders** – there is no shortage of guidance on voyage planning, such as the *Bridge Procedures Guide* published by the International Chamber of Shipping and *Bridge Team Management – A practical guide* published by the Nautical Institute. This guidance should be used to help you develop your voyage-planning skills.
- **Check and cross-check the plan** – to ensure it is accurate, safe and comprehensive before it is implemented, and check it again at the beginning of each watch, when you change course and when you change charts. Always be familiar with the navigational hazards ahead when on watch.

SUMMARY

A well-prepared and safe voyage plan helps to support the bridge team. The last thing you need when navigating a vessel in confined waters, or in busy traffic, is a plan that has errors or insufficient detail which may cause confusion and lead you into danger.

It is your responsibility to keep the ship safe. A detailed, accurate and safe passage plan is a crucial tool to help you meet this responsibility.

The IMO provides guidance on voyage planning in the annex to resolution A.893(21).

Case Study 1

A voyage plan was prepared that stayed close to the coast when a safer, and recommended, deep-water route was available and which added no extra distance to the voyage.

It is thought that the reason for this was to maintain a mobile phone signal. Subsequently, a departure from the coastal plan was made to save time.

The result was that the vessel grounded on a rocky shoal at full sea speed.

Questions

- What do you think of the voyage plan?
- When would it be justified for a voyage plan not to follow the recommended safe route?
- What steps should be taken when departing from the voyage plan?
- Would this incident have occurred if the voyage had initially been planned to follow the recommended route?

Case Study 2

Scenario

You are the officer responsible for voyage planning. The master instructs you to prepare a voyage plan from your load port in Brazil to a discharge port in the USA. You carry out the voyage plan in port and transfer the waypoints to the global positioning system (GPS) receiver, the electronic chart system (ECS) and the paper chart.

Your voyage plan takes you about 1 nautical mile to the east of an island. There is a west-setting current of around 1 to 2 knots in the vicinity. This is not noted in the voyage plan and no additional highlighting of the island has been carried out.

You submit your plan to the master as required by company procedures, but he does not review it in detail as he is busy with other paperwork.

Questions

- Do any aspects of the plan or procedures potentially put the vessel at risk?
- How could you have acted to reduce the risk?
- What do your company procedures say about voyage planning and cross-checking?

(This case study is continued in Chapter 3.)

Chapter 3

MONITORING OF THE VOYAGE PLAN

In Chapter 2 we discussed the importance of a comprehensive and safe voyage plan as a key tool to assist the bridge team in their prime responsibility of keeping a vessel safe while at sea. Poor voyage planning can be a key contributory factor in incidents as it makes it more difficult to monitor and execute the voyage plan properly.

Close monitoring, and timely execution, of the voyage plan allows you to keep a vessel safe and to avoid groundings and FFO incidents. In this chapter, position monitoring and the importance of looking ahead are discussed. The chapter concludes with a note on 'the con' and the importance of knowing who has 'the con'.

POSITION MONITORING

The IMO *Guidelines for Voyage Planning* states in relation to monitoring:

IMO Resolution A.893(21) - monitoring voyage plan

The progress of the vessel in accordance with the voyage and passage plan should be closely and continuously monitored.

This statement is self-evident. However, in incident after incident there are failings or weaknesses in monitoring a vessel's progress. This is usually due to the officer of the watch (OOW) or bridge team failing to use standard techniques properly to monitor the progress of the vessel. Included below are some basic points which should be borne in mind when you, or a team you are part of, are monitoring a vessel's progress.

Fixing a vessel's position is the traditional method of monitoring a vessel's progress.

You will be aware that position fixing is historic – it only shows where a vessel has been – therefore it must be combined with other techniques that allow real-time monitoring of a vessel's position or which allow you to look ahead to see where the vessel is going to be.

Modern vessels are fitted with an array of navigational equipment which, when used correctly, offers valuable assistance in monitoring the voyage. Advantage should be taken of all the navigational equipment with which a vessel is fitted for position monitoring, keeping in mind some of the following points.

- It is dangerous to rely solely on the output from a single position-fixing system.
- Positions obtained by electronic positioning systems should be cross-checked regularly by visual bearings and transits whenever available.
- Visual fixes should, if possible, be based on at least three position lines.
- Transit marks, clearing bearings and clearing ranges (radar) can be of great assistance.
- The echo-sounder provides a valuable cross-check of depth at the plotted position.
- Buoys should not be used for position fixing but may be used for guidance when shore marks are difficult to distinguish visually; in these circumstances their positions should first be checked by other means.
- The charted positions of offshore installations should be checked against the most recent navigational notices.
- The functioning and correct reading of the instruments used should be checked.
- A vessel's position should be fixed at regular intervals appropriate to the proximity of navigational hazards. The interval of these fixes should be determined separately for each section of the voyage.

LOOKING AHEAD AND REAL-TIME MONITORING

As stated, position fixing can only ever be a record of where a vessel has been. A competent watchkeeper will always use simple techniques such as dead reckoning (DR) and estimated positions (EP) to predict where a vessel is going to be after an appropriate interval. Time and again these simple techniques are found to be absent from the chart when incidents are analysed and where looking ahead may have avoided the incident.

Modern electronic displays allow a vessel's track to be monitored in real time. Care should be taken to ensure that the display shows sufficient 'look-ahead' distance, that the display has an appropriate level of detail and importantly that the safety features of the equipment, such as depth alarms, are utilised

Another well-known monitoring tool that is often neglected is parallel indexing. This is a simple and effective way of continuously monitoring that a vessel is maintaining its track, and is particularly valuable in restricted waters.

Parallel indexing can be used in any situation where a radar-conspicuous navigation mark is available. It also serves as a valuable cross-check on a vessel's progress when using an electronic chart.

An appropriate position-fixing routine using two or more methods, cross-checked by electronic display information, parallel indexing, DRs and EPs should ensure that you are always aware of both the vessel's current and future position in relation to hazards. These techniques enhance your situational awareness. Where these simple techniques are not being properly implemented, the plan is not being effectively monitored and the risk of incidents occurring is increased.

Monitoring of a vessel's progress along the pre-planned track should be a continuous process. If in doubt about a vessel's position check and double check it in relation to potential hazards. If still in doubt, seek assistance in accordance with the master's standing orders.

It is your responsibility to monitor the plan, execute the plan and keep your vessel safe.

PASSING 'THE CON'

'The con' is the responsibility for controlling the vessel, including responsibility for monitoring the voyage plan.

Occasionally we see incidents occurring which have been contributed to by misunderstandings over who has the con when two or more officers are on the bridge. This sometimes leads to a situation where the officers assume that one of the others is monitoring a vessel's progress.

The situation can be further complicated during pilotage situations, especially lengthy pilotage situations, with the pilot(s) and bridge team potentially all having control at different stages of the pilotage.

The individuals exchanging the con must be absolutely clear when responsibility has passed between them and the rest of the bridge team must also be clear as to who has control.

The only way to ensure clarity is to adopt a strict procedure for handover of the control of the vessel. Always be certain whether or not you have the con.

A simple procedure is all that is required. For example, the handover can be confirmed by the question, 'Do you have the con?' from the person relinquishing control and the answer, 'I have the con' from the person taking over. Any change in the con should always be noted in the bridge log book or notebook.

When you have the con it is your responsibility to monitor the plan, execute the plan and keep your vessel safe.

SUMMARY

Close monitoring, and timely execution, of the voyage plan allows you to keep a vessel safe and to avoid groundings and FFO incidents.

Case Study 3

Scenario

The vessel in Case Study 2 is approaching the part of the voyage which takes it close to the island. A course change takes place at 18:00 and the OOW at the time does not check the new course for potential hazards and only passes on limited information concerning hazards to the next OOW.

The master relieved the OOW on the bridge at 21:00 but was concentrating on correspondence with the ship operator. He did not notice the potential hazard prior to handing the watch back to the OOW at 22:00. The radar screen was cluttered due to low cloud and rain. Position fixing was by GPS and entered in the log book at 2 hourly intervals.

The vessel grounded at 22:10.

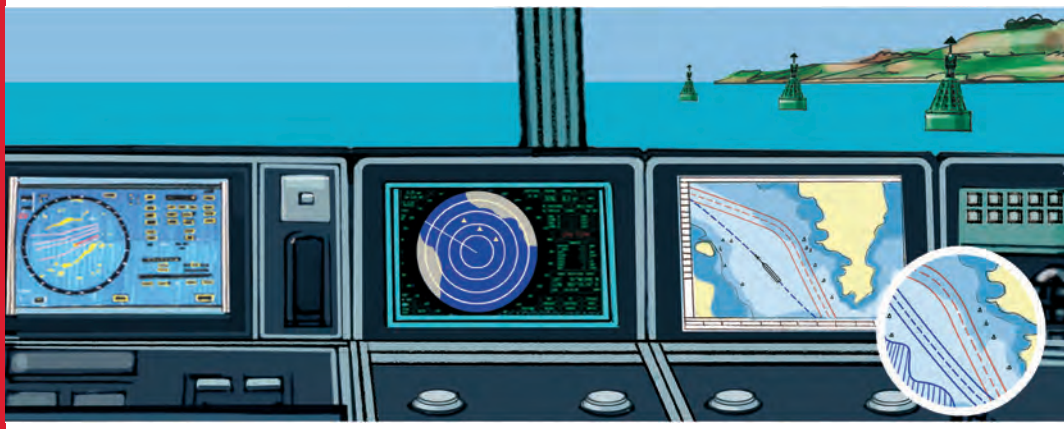
Questions

- What factors led to the grounding?
- What actions by the various members of the bridge team may have prevented the incident?
- Could vigilant monitoring of the voyage and looking ahead have overcome the weaknesses in the voyage plan?

(You can find the full report of the incident on which this and the previous case study is based on the German Federal Bureau of Maritime Investigation website: http://www.bsu-bund.de/SharedDocs/pdf/EN/Investigation_Report/2011/Investigation_Report_174_10.pdf?_blob=publicationFile)

Chapter 4

DEPARTURE FROM THE VOYAGE PLAN



There may be many valid reasons why a vessel has to depart from the prepared and agreed voyage plan, such as change of orders, a casualty evacuation or avoiding unexpected weather systems. However good the reason, any departure from a route that has been carefully planned to minimise exposure to danger will increase risk to a vessel, especially if the new route has not been selected in accordance with the original planning procedure.

Where time allows, any departure from the original voyage plan should be planned again, fully in accordance with the ship's safety management system. A new, supplementary voyage plan should be made to cover all changes in route, and the charts and/or the electronic navigation system should be clearly marked. The reason for the changes should be recorded in the log book and a bridge team meeting should be held to ensure that all watchkeeping officers are properly briefed.

Sometimes however, urgent requirements do not give enough time for the level of planning required by the safety management system. In such situations you should, at the very least, draw the new track on the chart or insert it on the electronic navigation system. The new track should then be checked for potential hazards and an appropriate fixing routine should be started immediately. If you simply depart from the original voyage plan without checking ahead, you may place the vessel in immediate or unforeseen danger.

As soon as time allows, the new track should be planned in accordance with the ship's procedures and a new voyage plan should be prepared.

Departing from the voyage plan is, of course, distinct from rigidly following the course line marked on a chart. You should not hesitate to leave the course line whenever it is right to do so, including for collision avoidance, search and rescue or any other proper navigation purpose.

SUMMARY

If you depart from the plan you must do so only after due consideration. Always look ahead and identify potential hazards – it is your responsibility to ensure that your vessel is safe.

Case Study 4

Scenario

You are the OOW on a large vessel. Your vessel is navigating in a heavy traffic area. You are approaching a wheel-over position and note that there is very heavy traffic in the vicinity of the wheel-over position. While using the radar for collision-avoidance purposes you attempt a trial manoeuvre along a new track that cuts the corner and where there appears to be less traffic.

The trial manoeuvre is successful in avoiding the majority of traffic and you decide on the basis of this trial manoeuvre alone to depart from the planned track. You alter course on to the new track and continue to monitor the traffic situation visually and by radar.

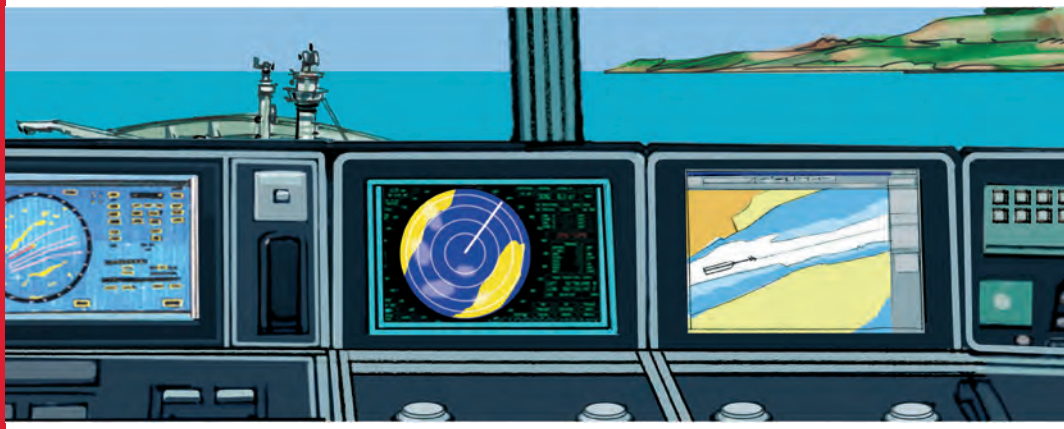
Fifteen minutes later the vessel grounds on a charted shoal.

Questions

- Was the departure made for a valid reason?
- What were the failings of the OOW in this situation?
- What did the OOW do right?
- What actions by the OOW or by the bridge team may have avoided this grounding?

Chapter 5

AIDS TO NAVIGATION



Modern aids to navigation are of great assistance to the OOW when monitoring the passage plan and in maintaining situational awareness.

However, sometimes the equipment can be a contributory factor to incidents if, for example, it is not well understood by the user, or has not been correctly set up, or you are unaware of safety settings associated with the equipment. It is important therefore to familiarise yourself fully with the equipment on board your vessel so that you will be aware of its characteristics and how these could affect your ability to navigate a vessel safely. This is particularly important where you have received generic training, such as generic ECDIS training, but are obliged to use equipment on which you have not been specifically trained.

As a member of the bridge team you have no control over the type of equipment on board; if you have sailed with a particular make and model of equipment before you will most likely be aware of its features and set up, if not then it will take time to become familiar with the equipment.

Do not hesitate to ask questions of other officers and carry out any on-board training that may be available for the equipment to ensure familiarity.

Aids to navigation are exactly that – so make sure they do aid you to navigate your vessel safely.

TESTING EACH OTHER'S KNOWLEDGE

It is recommended that OOWs test each other on various features of the navigational equipment on board when the vessel is in port or during quiet times on ocean passage at changeover of watches. Spending even a couple of minutes a few times a week when changing over watch can greatly increase your knowledge of the equipment on board and it can be fun testing your colleagues.

ARE YOU A VIRTUAL WATCHKEEPER?

Modern aids to navigation are so effective that it is easy to become over-reliant on the equipment and to conduct your watches via electronic means. This must be avoided as it hampers situational awareness – you are not fully aware of what is going on around you. Navigation aids must always be used to assist in your understanding of what is going outside a vessel and should not be the only source of outside information. There is no substitute for looking out of the windows.

SUMMARY

Always familiarise yourself with equipment you have on board so that it can assist you. Never allow yourself to become a virtual watchkeeper. It is your responsibility to set up and use navigational equipment appropriately to aid you in the safe navigation of your vessel.

Case Study 5

Scenario

The vessel was fitted with two ECDIS units that were used as the primary means of navigation and on which the voyage plan had been prepared. The safety settings in use were a safety contour of 10 metres (the vessel had a draft of 10.6 metres), a cross-track deviation limit of 0.2 nautical miles, and an anti-grounding warning zone that covered a narrow arc ahead to a range of about 10 minutes steaming.

The vessel was undertaking a coastal voyage with occasional draft restrictions near the planned route and moderate traffic. The vessel was approaching a planned waypoint requiring an alteration to starboard. At this time, the OOW visually sighted an inbound sailing vessel about 3 miles on the starboard bow. After coming on to the new course on the autopilot, he decided to pass the sailing vessel to port and adjusted the course further to starboard. Simultaneously, he observed another small vessel about a mile away, right ahead and coming head on, and made a further small alteration to starboard.

The ECDIS anti-grounding warning zone alarm then activated on the display (which had been retrofitted and was located behind the OOW) but no audible alarm sounded, a deficiency not known at the time. The OOW continued to monitor the traffic situation.

A short time later the vessel grounded on a charted shoal at full speed.

Questions

- Were the safety settings in use appropriate to the circumstances of the voyage?
- Was the OOW, and by extension the bridge team, fully familiar with the ECDIS equipment in use?
- What other factors may have contributed to the grounding?

(You can find the full report of the incident on which this case study is based on the UK Marine Accident Investigation Branch website: http://www.maib.gov.uk/cms_resources.cfm?file=/CSLThames.pdf. You may also be interested to read another report in which unfamiliarity with ECDIS was also a feature: http://www.maib.gov.uk/cms_resources.cfm?file=/OvitReport.pdf)

Chapter 6

NAVIGATING WITH A PILOT ON BOARD

IMO RECOMMENDATIONS

Annex 2, paragraph 1, of IMO resolution A.960(23), *Recommendations on training and certification and operational procedures for maritime pilots other than deep-sea pilots*, contains the following statement.

IMO resolution A.960(23) – efficient pilotage

Efficient pilotage depends, among other things, upon the effectiveness of the communications and information exchanges between the pilot, the master and the bridge personnel and upon the mutual understanding each has for the functions and duties of the other.

Paragraph 2 then sets out the duties of the master, bridge officers and pilot.

IMO resolution A.960(23) – pilotage duties

2 Duties of master, bridge officers and pilot

2.1 Despite the duties and obligations of a pilot, the pilot's presence on board does not relieve the master or officer in charge of the navigational watch from their duties and obligations for the safety of the ship. It is important that, upon the pilot boarding the ship and before the pilotage commences, the pilot, the master and the bridge personnel are aware of their respective roles in the safe passage of the ship.

2.2 The master, bridge officers and pilot share a responsibility for good communications and understanding of each other's role for the safe conduct of the vessel in pilotage waters.

2.3 Masters and bridge officers have a duty to support the pilot and to ensure that his/her actions are monitored at all times.

It is clear from these statements that bridge teams are not in any way relieved from their responsibilities when a pilot is on board and that effective bridge team work, including the pilot as part of the team, is necessary to conduct a safe pilotage. These ideas are discussed in this chapter and, in particular, the importance of the master–pilot exchange (MPX) in underpinning the pilotage process.

The very fact that a pilot is on board means that a vessel is operating in a high-risk area. You cannot afford to relax, switch off and 'leave it to the pilot'.

The purpose of a pilot is to assist the bridge team and to provide local expertise and ship-handling experience in ports, areas of high traffic density, shallow waters or other navigational hazards.

The presence of a pilot is intended to reduce the risk, and in most cases it does so. However, pilots are human like everyone else; they make errors in judgement, they can be distracted, become ill, lose situational awareness and so on.

Many aspects of pilotage cannot be controlled or influenced by the bridge team, for example a vessel has no control over the training and competence of the pilot supplied.

Equally the pilot has no control over the skill and competence of the vessel's bridge team or the efficiency of its equipment.

One area that can be controlled by the bridge team is information exchange.

Information exchange between a bridge team and a pilot, and effective integration of the pilot with the bridge team is critical in reducing the risk of incidents.

The key aspects of pilotage that may be influenced or controlled by the bridge team, including information exchange, are considered next.

PRE-ARRIVAL INFORMATION

Pilots and port authorities need to carry out their own planning for a vessel's arrival. All of a vessel's arrival information, including information on any vessel defects, should be sent at the earliest opportunity and any updates provided to the pilotage authority immediately should changes occur. Ideally a vessel will also get relevant pre-arrival information from the port, the pilots, the harbour authority and from port agents and charterers.

BERTH-TO-BERTH PLAN

As discussed in Chapter 2, a vessel must have a comprehensive berth-to-berth plan based upon and incorporating all relevant information. This plan forms the basis for a professional discussion between the bridge team and the pilot when developing their shared plan during the MPX.

MASTER–PILOT EXCHANGE (MPX)

Analysis of North's large P&I claims identifies deficiencies in the MPX in 9 out of 10 FFO incidents.

The MPX meeting is critical for conducting a safe pilotage. It is the formal mechanism for information exchange between the bridge team and the pilot and will form the basis for the understanding of the entire pilotage by both the bridge team and the pilot. Developing a shared understanding of the plan for the pilotage should take place during MPX.

During the MPX the pilot's suggested plan should be considered in conjunction with a vessel's voyage plan so that a shared final plan can be confirmed prior to committing the ship to the pilotage. Without the development of a shared plan, the bridge team cannot properly support and monitor the pilot during pilotage. Analysis of incidents shows that typical failings surrounding the MPX are as follows.

- **Rushing** – do not rush or be rushed. Take time to get a plan that is safe and understood by all.
- **Ready acceptance of a pilot's plan** – do not accept the pilot's plan without considering it carefully. If you have prepared your own plan well you should have sufficient knowledge of the port to judge the pilot's plan on its merits, ask relevant questions and suggest changes.
- **Always agree a contingency plan including abort points with the pilot.**
- **Information is shared only between the master and the pilot** – ensure the whole bridge team is aware of the shared plan and any critical points.
- **Proceeding with the pilotage despite legitimate concerns** – if the master is not satisfied with any aspect of the plan, then the vessel should not be committed to the pilotage.

MONITORING A VESSEL DURING PILOTAGE

A vessel is at higher risk of grounding, or an FFO incident, during pilotage and enhanced monitoring of the vessel's position and future track should take place. Looking ahead is critical to ensuring that the vessel remains safe. This is the responsibility of the whole bridge team.

MONITORING THE PILOT

A shared plan makes it much easier for the bridge team to monitor the pilot's actions to ensure the plan is being followed. All of the pilot's actions should be monitored at all times. If in doubt about anything the pilot may be doing, the master or any other member of the bridge team should immediately seek clarification. If still in doubt, and if time allows, the situation should be discussed with the pilot. If necessary, as a final step the master should take the con and take all necessary steps to make the vessel safe.

Companies should consider building scenarios where the master may have to take over from a pilot into their training programmes.

Some simple steps should be kept in mind to assist with monitoring the pilot.

- Interact with the pilot, confirm his/her orders and verify when they have been carried out, for example helm orders, engine orders and speed over ground.
- At all times monitor the ship's speed, position, under-keel clearance and projected track as well as all dynamic factors affecting the voyage plan, including tidal and weather conditions, visibility and traffic density.
- Maintain a continuous chart plot of the ship's position, estimated future positions and the time of passing navigational aids. Alert the pilot to any inconsistencies with the agreed voyage plan, for example an unexpected depth reading.

- Discussions with the pilot should be polite and professional. A good technique is to ask the pilot a series of 'open questions' about the next stages of the voyage plan. Such questions are valuable because they do not suggest the answer and therefore the pilot has to think before he/she replies. They will also provide useful information for the bridge team. Examples of open questions are as follows.

    - What is the tidal stream at the next bend?
    - What is the minimum depth on the next leg?
    - What is the permitted speed for this channel?

MAINTAINING THE MASTER'S AUTHORITY

Masters are responsible for their vessels and pilots are their advisers, so masters should have authority over pilots. However, in many incidents that occur during pilotage this relationship appears to reverse, with the master and bridge team relinquishing not only control of a vessel but also their authority to the pilot.

This can occur for many reasons but is entirely within a vessel's control. To maintain their authority, masters must use the MPX to establish that, although they respect the pilot's advice and local expertise, they are responsible for their vessels during pilotage, which will help to maintain their authority. Key to this is the ability to discuss the pilotage plan in a professional way. A prerequisite for discussion is a good berth-to-berth plan.

ON-BOARD TRAINING AND PROCEDURES

Masters must take the lead in preparing the bridge team to support them and to monitor the pilotage phase of voyages. Bridge team training should take place on board and procedures must be followed – remember your company procedures have been developed to help you keep the vessel safe. The master should train the crew to put the procedures in place in a way that best supports the master. Pre- and post-pilotage meetings are useful after each pilotage in order to discuss how the pilotage developed and where there may be issues to address or where things went well. 'Discussion' is the key word here; teamwork requires mutual respect and understanding and every member of the bridge team should feel that his/her views will be welcomed.

Teamwork can only develop by having mutual respect and understanding for each other.

SUMMARY

The only way that you as the master or member of the bridge team can reduce the risk of a grounding or FFO incident on your vessel while under pilotage is to control or influence what you can, ensure that procedures are followed and that you do your job as part of the bridge team.

The key role of the MPX is clear. Think about your attitude to, preparation for, and participation in the MPX – can you afford not to conduct a comprehensive MPX?

It is your responsibility to keep your vessel safe during pilotage.

Case Study 6

Scenario

A vessel was departing a large port in restricted visibility of less than 0.5 nautical miles. The pilot boarded the vessel and proceeded to the bridge where vessel information and pilot cards were exchanged between the master and pilot. No discussions concerning the forthcoming pilotage were conducted. Shortly after departure the vessel hit a bridge.

In the accident report concerning the MPX the pilot commented, 'I handed him the document, and he took it, and I think he read it, but I don't recall him discussing it with the mates or the helmsman... I handed it to him and was expecting him to read it. It says right on it, if you have any questions, ask.'

The master commented, 'Normally as a captain I would welcome the pilot with my open arms, enthusiastic, and I would show my hospitality in offering him if he need any food or coffee or tea, etc. And then [this] pilot came on board with a very cold face. Some of them just don't want to pay attention on us and some of them would not like to talk with us... it seems the pilot coming on board was with cold face, doesn't want to talk.'

The report goes on to say, 'The master said that he became concerned about the safety of the voyage when VTS [vessel traffic service] called the pilot after the vessel was under way. As a result, the master stated that he, 'observed [the pilot] very carefully to see if there was any mistake.'

Both the company and the port had procedures in place that were not followed on this occasion. The company required a berth-to-berth voyage plan, whereas it was pilot station to pilot station, and both the company and port required a properly conducted MPX.

According to the accident report, the bridge team did not act to support the master or the pilot as required by company procedures. Port procedures also required the vessel not to leave the berth during restricted visibility of less than 0.5 nautical miles.

Questions on MPX

- Could the master have controlled the pilot's attitude in this incident?
- What can the master influence or control?
- Why might the master have chosen not to discuss the plan in this incident?
- Can masters use their position to ensure that the plan is properly discussed?
- What do your company procedures say about MPX?
- Is it ever acceptable not to have a comprehensive MPX?
- Is the bridge team in a good position to monitor the voyage plan, the expected position of the vessel and the pilot?
- Who is responsible for the situation in this case study and what should that person have done?

Questions on monitoring

- How limited would the master's understanding of the pilot's actions and orders be due to the lack of discussion during MPX?
- Can you monitor a plan if you are not aware of what the plan is?
- What effect does the lack of MPX have on the effectiveness of the bridge team?

Questions on authority

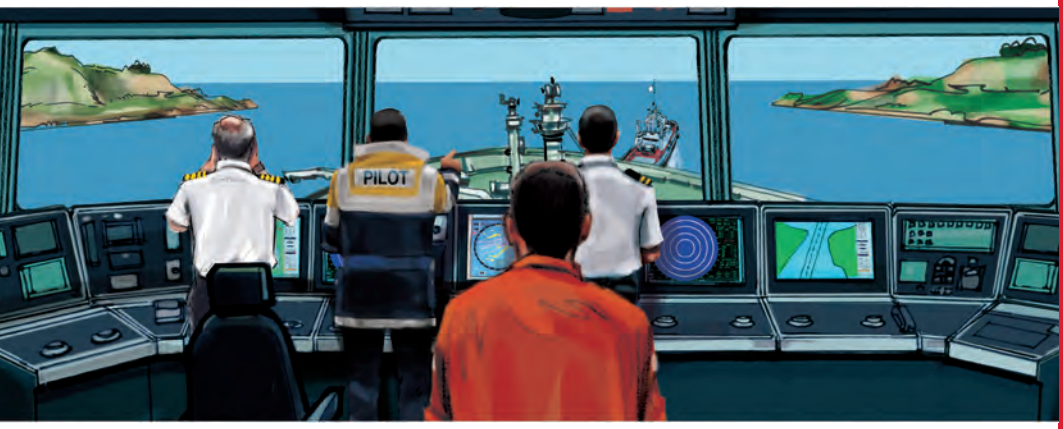
- Did the master exercise his authority at MPX in this incident?
- Could the lack of a berth-to-berth plan have contributed to the master's failure to communicate at MPX?
- Could this failure to communicate then have further undermined the master's authority while conducting the pilotage?

Questions on procedures

- Do you always prepare a berth-to-berth plan?
- Is the MPX sometimes very brief, or rushed or simply non-existent?
- Does the bridge team properly support the master and the pilot?
- Does the master discuss what he expects from the bridge team?
- Is it acceptable to fail to implement company procedures?
- What are the risks associated with breaching company procedures?

Chapter 7

THE BRIDGE TEAM



It is people who implement the systems that control a vessel, and every voyage depends on people, working individually and together as a team, to ensure safe navigation.

Previous chapters have explored the voyage plan, monitoring the plan, departure from the plan and pilotage. It is clear from these chapters that the whole process is inter-dependent. Each part depends on the next part, and on each person understanding and putting each part into action. This means that a high degree of teamwork is an important contributor to the safety of the ship on a voyage.

Poor teamwork is a contributory factor in many incidents. Some of the most common barriers to effective teamwork are explored below.

TEAMWORK AND COMMUNICATION

Communication is the glue that holds teams and the systems they operate together. If communication is good the team is likely to function well; if communication is poor the team is much less likely to function well.

Poor communication in terms of a bridge team could be as a result of failure to speak up, failure to pass on important information, blocking communication through poor attitudes towards colleagues, and failure to hold meetings or briefings before high risk parts of the voyage. These barriers to effective communication should be understood and overcome.

The bridge team should all have undergone some crew resource or bridge team management training which may have included communications, cultural preferences and power–distance relationships. Think about how these ideas can be applied to your day-to-day work.

A ship has a vertical command structure. The officers and crew will automatically look to their seniors for signals about how they should act.

For the bridge team it is the master who sets the tone. It is critical that every master understands this and considers how their behaviour affects the bridge team. Think about how you want your bridge team to act and how best you can encourage an open, supportive and professional team culture that includes all ranks and best assists you in doing your job well.

Bridge watchkeeping officers should think about their role within the team and what the master expects from them. The more junior you are the more remote and powerful a master might seem. Always remember that the master has experience of your role, make sure you assist them and always speak up if you think something is wrong or you are unsure.

It is in everyone's interest to ensure that the bridge watchkeepers and the master function as a team. Encourage the right kind of behaviour, get everyone talking and stick to the tried and trusted company routines. It is not all serious work though – teamwork can benefit greatly from on-board social activities.

As master you will be ultimately responsible for the safe navigation of your vessel, even when you are asleep. As a watchkeeping officer you are responsible for the safe navigation of the ship, both when on watch in open waters and when acting as part of the bridge team during coastal navigation and under pilotage.

UNDERSTANDING CULTURAL ISSUES

Every culture has its own typical set of behaviours. Sometimes cultural preferences can support team working and on other occasions they may undermine it. Knowing your own cultural preferences and those of your colleagues can help you become a better officer. There is a lot of material published on cultural preferences and you might benefit from doing some research on your own and your ship mates' cultural preferences.

The only way to overcome unsupportive cultural issues is to understand them in yourself and others, and to work to develop a professional way of acting and communicating when working as a team that reduces the likelihood of cultural preferences negatively affecting operations. This is also something that companies might explore during training ashore.

SUMMARY

If the master and bridge watch-keeping officers can function effectively as a team, then the risk of a vessel having a navigation incident is much reduced. Effective teams will also properly control their vessel while under pilotage. Ensure that any potentially unsupportive cultural issues are understood and appropriate allowances made.

Case Study 7

Scenario

A deep-draught vessel was navigating in a busy traffic-separation scheme. The bridge team consisted of the master, OOW and helmsman, all of whom were of different nationalities. The master took over the con from the OOW and changed course, thereby leaving the planned route, to avoid an area of high traffic density.

The new track was checked by the OOW, who was aware that there were areas on the new heading with draught restrictions for the vessel. The OOW asked the master if he was 'satisfied' with the new track, to which the master nodded. The vessel continued along its track towards the area with a draught restriction, the OOW remained silent, the master continued to focus on collision avoidance.

A few minutes later the vessel ran aground.

Questions

- What went wrong in this incident?
- How could the master have acted differently when communicating with the OOW?
- How could the OOW have acted differently when communicating with the master?
- Could these small changes in behaviour have avoided this incident?
- What cultural factors may have been in play to stop the OOW being more assertive?
- Do you need to work on your bridge team communications?

Chapter 8

SITUATIONAL AWARENESS

Many marine accident reports refer to a 'loss of situational awareness' as a contributory or causal factor. Perhaps the simplest definition of situational awareness is 'knowing what is going on around you'. If you do not know what is going on around you, both internal and external to a vessel, then you are not in a position to assess correctly the potential risks to the vessel and to execute a safe voyage.

It is obvious that to keep the ship safe you must know what is going on around you at all times. But sometimes there are barriers to situational awareness. The US Coast Guard identifies six barriers to situational awareness:

- perception based on faulty information processing
- excessive motivation
- complacency
- overload
- fatigue
- poor communications.

Although any of these barriers may contribute to an incident, common factors in many groundings and FFOs are overload, complacency, fatigue and poor communications.

INFORMATION OVERLOAD

Your brain is subject to many limitations. One such limitation is in relation to 'working memory'. Research has shown that the average person's working memory can only hold around seven separate pieces of information at any one time. In effect, when in complex navigational situations, a navigator may start to lose situational awareness due to the

volume of information that has to be processed.

This can easily be demonstrated by considering just some of the information that the master may have to process during an approach to a busy port

- monitor the pilot
- monitor tugs
- monitor traffic for collision-avoidance purposes (this in itself can be difficult and confusing)
- communicate with officers at mooring stations
- monitor VHF
- monitor the helmsman
- monitor engine movements
- monitor the vessel's position
- monitor effects of wind and tide on the vessel.

That is nine different things going on, which is two more than your working memory can cope with. And there are others.

Each of the points above will involve several separate pieces of information, so it is easy to see that the volume of information that needs to be taken into account when approaching port can far exceed the ability of any one individual to process the information properly and understand what is going on around them.

Information overload is why we use bridge teams when approaching port and in other critical navigational situations. A team approach spreads the information around and allows critical information to be filtered out and communicated to the master.

Often the master and bridge team can be distracted by unnecessary information coming from inside or outside a vessel, such as the cook asking about menus, or phone calls from the agent. Strict protocols in relation to access to the bridge and telephone communications during critical navigation periods should be in place. For example, mobile phones should not be used. You already have enough to think about.

COMPLACENCY

Complacency stems from the assumption and feeling that everything is under control, particularly when carrying out routine tasks such as entering a familiar port. Complacency will affect the level of vigilance employed by individuals. Think about how you feel when entering a new port for the first time. You will typically be more on edge, more vigilant and more ready to react than you would be when entering a familiar port.

However, the risks associated with entering a port for the first time and the tenth time do not change appreciably – it is only the team's perception of the risks that changes. Good procedures that are tightly controlled help to reduce the effects of complacency. Try to reassess the risks periodically when entering a familiar port; this helps to refresh your vigilance.

FATIGUE

Fatigue affects performance and judgement. Research suggests that mental fatigue affects working memory. This means that if fatigued you will have more difficulty than normal in processing information and knowing what is going on around you.

If extremely fatigued you may fall asleep and have zero situational awareness; this has been the cause of many groundings. Manage your fatigue in line with company policy (see Chapter 9).

POOR COMMUNICATION

Good communications with the bridge team, the pilot, the tugs and others such as vessel traffic services (VTS) or other vessels is vital to ensuring that you know what is going on around you. Poor communications means a reduction in your situational awareness. It is important that the bridge team trains together so that they are practised in understanding what is required of each individual and when and how to communicate.

SUMMARY

Situational awareness means knowing what is going on around you, which can be achieved if you do the following.

- Work in teams – teams are better able to handle the complexities of the situation and overcome the barriers to situational awareness than individuals.
- Train the bridge team – and encourage open communication.
- Follow strict procedures – especially when you are approaching port or a critical navigation area.
- Do not get distracted by unnecessary information – when on watch do not be distracted by carrying out administrative tasks.

Always be aware of a vessel's position in relation to its surroundings. It is your responsibility to keep your vessel safe.

Case Study 8

Scenario

A large container vessel is navigating in a busy traffic separation scheme (TSS) following the previously planned route. The bridge team consists of the master, chief officer and a helmsman. The bridge team is informed by VTS that three vessels will be entering the TSS from a nearby fairway and is asked to slow down.

The master, who had the con, misinterpreted the information from VTS and misidentified one of the vessels. He continued to monitor the traffic situation very closely visually and using ARPA. He took action to avoid collision which resulted in the vessel leaving the planned route.

The chief officer was monitoring ECDIS and was aware that the new track now had the vessel running towards a shallow area but was confident in the master's actions as they had sailed together several times and did not alert him to the potential danger. Warnings from VTS were also ignored.

The master continued to concentrate on collision avoidance until the vessel grounded.

Questions

- What factors lead to the master losing situational awareness in this incident?
- Was the master overloaded with information?
- Was effective use made of the bridge team?
- Were communications effective?
- Was complacency a factor?

(You can find the full report of the incident on which this case study is based on the UK Marine Accident Investigation Branch website: http://www.maib.gov.uk/publications/investigation_reports/2010/maersk_kendal.cfm)

Chapter 9

FATIGUE

If you are asleep on watch your ability to safely navigate the ship is **zero**. You have failed in your responsibility to keep the ship and the crew safe.

Fatigue is common at sea and arises from many causes including long hours, difficulties sleeping due to noise, vibration, and ship movement, and the interrupted rest/work patterns sometimes experienced.

Some level of fatigue is almost inevitable while at sea and usually the effects of fatigue can be minimised by adopting good working practices and adhering to hours-of-rest regulations.

As discussed in Chapter 8, fatigue can affect a seafarer's ability to process information and therefore their decision making. This has been cited as a factor in many incident reports.

Fatigue and fatigue management on board can be complex and many different strategies to manage fatigue can be adopted by seafarers and the company. It is important that company procedures are well designed and implemented to control fatigue.

The most hazardous form of fatigue for a vessel is the inability of the watchkeeping officer to stay awake. There have been numerous vessel groundings where ships have run straight into land at full sea speed as a direct result of the watch-keeping officer falling asleep on the bridge, with no lookout present, and the bridge navigation watch alarm system (BNWAS) disabled. The lessons from these incidents are many but it is clear that two simple steps would have prevented most of them.

- Never try to keep watch singlehandedly at night.
- Never disable the BNWAS at sea.

If the two simple steps above are always adhered to, the risk of a vessel grounding due to the watchkeeping officer being asleep are much reduced. Ask yourself what is worse, the lookout grumbling because you make them stay on the bridge, the master grumbling because the BNWAS has sounded, or you falling asleep on watch and grounding your vessel with potential for loss of life and environmental damage.

SUMMARY

The safe navigation of the vessel is your responsibility – you cannot be both asleep and navigating safely. Never keep watch on your own at night and never disable the BNWAS at sea.

Case Study 9

Scenario

You are the chief officer on a small general cargo vessel engaged in coastal trading. You arrive at a load port after being on watch and once loading begins you are around to monitor the operation. Cargo operations continue until late that night and resume early the next morning. Later that afternoon the vessel completes loading and sails.

You complete the company hours-of-rest documentation but under-report the hours worked. As the master is on watch, you take the opportunity to grab 4 hours sleep. At 23:00 you are back on watch and note that the BNWAS is switched off, but you are unconcerned as this is usually the case. No lookout is posted.

While on watch you carry out your normal duties and, as you have an eye infection, at one point you sit in the pilot chair to administer some eye drops.

The next thing you know you are awakened by the vibration and impact of the vessel grounding.

Questions

- What factors contributed to the grounding in this incident?
- Which factors can be controlled by the crew?
- Would these factors have avoided the grounding if implemented properly?

(You can find the full report of the incident on which this case study is based on the UK Marine Accident Investigation Branch website: http://www.maib.gov.uk/cms_resources.cfm?file=/Danio.pdf)

Chapter 10

SPEED AND ANGLE OF APPROACH

Damage to berths, jetties, cranes, loading equipment and machinery, pipelines, and vessels alongside can all be consequences of getting the approach wrong. There have been many claims caused by pilot and bridge team error over the years. These claims can be very costly indeed.

Where a vessel is manoeuvring to come alongside a berth there are many different factors the master must take into account including engine movements, depth under the keel, helm orders, distance from the berth, proximity of other vessels, proximity of berth equipment, communications with personnel on mooring stations, weather, speed, approach angles, availability of line handlers, monitoring the actions of pilots and tugs and listening to VTS.

There is an awful lot going on and it is easy to see how the master or pilot may lose situational awareness or get lost in the detail. As discussed in Chapter 8, proper support from the bridge team can help the master and pilot maintain situational awareness.

In the majority of serious incidents two factors are at play; the first, and by far the most important in terms of damage, is speed; the second is angle of approach.

SPEED

Speed is the single most important factor to take into consideration when approaching a berth.

The potential for damage to a structure is proportional to the energy imparted to it. The energy of a vessel approaching a berth is explained below.

The berthing energy (kinetic energy) of a vessel is determined by the following equation.

Berthing energy equation

$E = ½ m v^2$

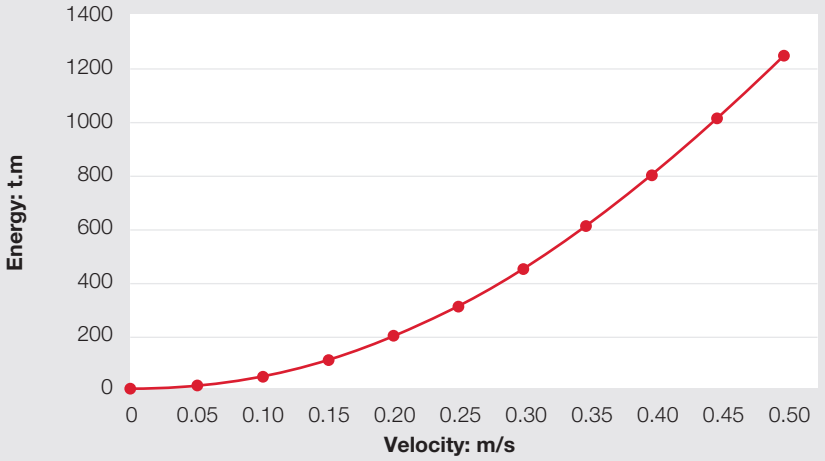
where E is berthing energy, m is the mass of a vessel in tonnes and v is the velocity of a vessel in metres per second.

In effect, the mass of a vessel at the time of berthing is fixed. Velocity is variable and is the only factor under the master's control.

You can see that v in the equation is squared and this determines that speed is the crucial factor in berthing energy.

Simply put, $1^2=1$ and $4^2=16$, so if you are approaching a berth at 4 knots, your vessel has 16 times more berthing energy than it would at 1 knot. A graphical representation of this relationship is shown below.

Berthing energy – velocity relationship for 10,000 t vessel



Clearly the large mass of a vessel coupled with a high approach speed spells trouble. Berths are not typically designed and constructed for direct contact with a vessel. They will be designed for vessels to contact them at very low speeds, usually less than half a knot, and with the vessel more or less parallel to the line of the berth.

ANGLE OF APPROACH

The angle of approach to a berth has to be very low, typically less than 10°. Larger angles run the risk of impacting the berth between fenders and causing damage.

SUMMARY

When approaching a berth always think about the following.

- Speed is the single most important factor. Always keep approach speed uppermost in your mind when manoeuvring near a berth.
- Angle of approach must be shallow.

If in any doubt ask the pilot his or her intentions and/or slow down. Preventing a vessel causing damage to a berth is your responsibility.

Case Study 10

Scenario

A large laden bulk carrier is making its final approaches to the berth. A pilot is on board, deck officers are at the fore and aft mooring stations and the bridge team consists of the master, the pilot, second officer and helmsman. Two tugs are in attendance.

The pilot advises the master that the plan is to turn the vessel off the berth and not use an available turning circle as this will save time as he is very busy and has several more vessels to attend. The tugs will be made fast fore and aft to assist with the turn. The master agrees to this manoeuvre as there appears to be lots of room and the weather conditions are good.

The pilot proceeds to the bridge front, takes the con and starts issuing various orders. At about half a nautical mile from the berth, the vessel is proceeding at 5 knots. The master reminds the pilot that the speed is 5 knots. The pilot acknowledges the master's statement but takes no action.

At 2 cables from the berth the pilot orders stop engines and orders starboard 20° as he commences the vessel's turn off the berth. At the same time he orders the after tug to begin pulling to take way off the vessel. The vessel's speed is 4 knots.

As the vessel starts to turn the speed begins reducing and, at a cable from the berth, is 3 knots. The vessel's bow is now turning rapidly toward the berth. The officer forward is counting down the distance to the berth. It is clear the vessel is closing quickly. The master tells the pilot he is going too fast and the pilot orders full astern.

One minute later the vessel strikes the berth at an angle of 45° and a speed of 2 knots causing extensive damage to the berth and damage to the fore part of the vessel.

Questions

- Why do you think this incident happened?
- What actions may have been taken by the master to prevent it?
- What should the other members of the bridge team have done?

Chapter 11

TUGS

Tugs, like pilots, are most commonly used in areas of high traffic density and shallow water, and where there is an increased risk of groundings and damage to FFO.

The master is normally advised on the type and number of tugs to be used for any particular operation, which is based on the pilot's or the port authorities' requirement and experience. However, in any situation where the master may feel that the tugs available are insufficient for the purpose, this should be discussed and an agreed solution reached in advance of the operation.

PLANNING TUG OPERATIONS

For the tug(s) to offer maximum assistance and to be able to assist a vessel in avoiding either damage to FFO or preventing groundings, both the vessel and the tug require additional information to ensure that they are suitable and can conduct the required operations.

The MPX should always include the programmed plan for the tug operations. Some typical information that should be included might be as follows.

- Intended plan of tug use including, pushing, pulling, locations and shifting of tugs.
- The type of tractor arrangement including the maximum bollard pull.
- Whether the tug or ship will provide the towing line.
- Tug's maximum operational speed to ensure proper escorting and manoeuvring capabilities.
- Confirmation of safe working load of bollards on which the towing line is connected.
- Confirmation of pushing points and their location.
- The type and depth of a vessel's bulbous bow.
- Whether a vessel is fitted with any quick-release system for the towing line.

Prior to engaging the services of tugs it should be a matter of routine practice to ensure that the tugs provided offer sufficient total required bollard pull, taking into consideration the environmental conditions and specifically a vessel's windage area. The generic formula for calculating bollard pull with winds on the beam (up to 30° either side) is as follows.

Bollard pull with cross-wind equation

$F = 0.08 \times A \times V^2$

where F is the bollard pull in kilogrammes-force (1 tonne-force = 1000 kgf), A is the ship's longitudinal wind area in square metres and V is the wind speed in metres per second.

If total bollard pull for the presented tugs is insufficient, then the master in conjunction with the pilot should consider the availability of additional tugs or tugs with a higher bollard pull with no allowance made for bow and stern thrusters.

SUMMARY

If the tugs are not sufficiently powerful to assist a vessel properly, or the plan for the tugs is not properly understood or implemented, then the risk of a grounding or FFO incident is increased. You should take time to discuss the power, positioning and proposed use of tugs during the MPX and monitor the communications between the pilot and the tugs. If a local language that you do not understand is being used, make sure you ask for clarification of any orders.

If the tugs are not used properly, and a grounding or FFO incident results, the vessel will often be held responsible. It is your responsibility to ensure that this does not happen.

Case Study 11

Scenario

A small container vessel was heading up river with a tug fast on the centre lead aft. The pilot advised the master that the plan was to turn to port in the river with the tug assisting the turn, allowing the vessel to stem the current and maintain control while berthing starboard side to.

During the planned turn all communications between the tug and pilot were conducted in the local language, which the master and bridge team did not understand. As the vessel approached the berth the pilot advised that the tug would pull astern to control the speed. This instruction was relayed to the tug; however the tug's position relative to the vessel was not checked.

The tug was sitting off the vessel's port quarter when the instructions were given, and this created a turning force instead of a braking force. This combined with the forward positioning of the pivot point while the vessel was moving ahead caused the bow to shear and make contact with the berth.

Questions

- What factors contributed to this incident occurring?
- What could have been done differently to prevent the contact being made?

Case Study 12

Scenario

You are on a container vessel 295 metres in length with a freeboard of 25 metres approaching port. The pilot advises that up to three tugs will be available for the berthing.

The plan is for the vessel to enter the port and turn in the basin, then back onto the berth where it will berth port side to on a heading of 090°. The expected weather during arrival at the port is for southerly winds of 25 knots gusting to 30 knots.

Questions

- Calculate the minimum total bollard pull of the tugs required to ensure that the manoeuvre can be conducted safely given the expected weather conditions.
- In order to make the most effective use of the tugs available, discuss how they should be utilised during the turning and berthing manoeuvre.
- Discuss how the pivot point of the container vessel will change at each stage of the manoeuvre and the effect this will have on the effectiveness of the tugs.

Chapter 12
WEATHER CONDITIONS

Wind, poor visibility and sea state can all contribute to groundings and FFO incidents. The higher the wind speed, the poorer the visibility and the worse the sea state the more difficult it becomes to navigate safely. This is particularly the case when entering and leaving port or navigating in constrained waters. Obviously in such conditions extra vigilance needs to be exercised to mitigate the risk.

WIND

Clearly vessels may be more difficult to control in confined waters or when approaching or leaving a berth in high wind conditions. Typically the risk is mitigated by actions such as taking extra tugs (see Chapter 11), by using larger engine and helm movements and by having all personnel on high alert during the operation.

As a master you will need to think carefully about the wind and how it affects the manoeuvring characteristics of your vessel – this needs to be communicated to a pilot if there is one on board. It may even be that the operation has to be delayed to allow an improvement in the weather conditions. You should not commit to an operation that clearly puts the safety of a vessel at risk.

As a member of the bridge team you need to be extra vigilant of what is happening around you so that, should things start to get out of control, you can provide the necessary input to the master. It could be that you are on the forecastle and that the distance to the quay starts to change rapidly – this should be immediately communicated to the bridge as they may have their main focus elsewhere at that time.

Ports will sometimes remain open in conditions that may be marginal or unsafe for your particular vessel – make sure you have considered the risk carefully before committing to entering or leaving a port or berth.

RESTRICTED VISIBILITY

It is so much harder to navigate when you cannot see anything and this increases the risk. Many ports will be closed in heavy fog but may be open in marginal conditions and obviously you may have to pass through constrained waters in fog during the passage. It is important therefore that in such circumstances the bridge team works together to ensure that a vessel's position is maintained in accordance with voyage plan.

SEA STATE

Large waves and swell can act to reduce the under-keel clearance of a vessel by actually reducing the available depth of water and/or by causing a vessel to roll heavily. These are factors that need to be taken into account when passing through constrained waters. Ask yourself whether or not the sea state is going to reduce the available depth of water to an extent that it might put a vessel at risk. If it might then perhaps the evolution should be delayed until the weather abates.

SUMMARY

It is your responsibility to keep your vessel safe in adverse weather. Strong winds, restricted visibility and rough seas may all increase the risk of groundings and FFO incidents.

Chapter 13

MACHINERY PROBLEMS

Groundings and FFO incidents are sometimes caused by or contributed to by machinery problems and break downs. This guide is aimed at bridge team issues and does not address groundings or FFO incidents due to machinery problems.

Needless to say, high standards of maintenance and operation are required to ensure that the machinery and equipment on board are in full working order and do not contribute to such incidents.

INDEX

ROCKS AND HARD PLACES: HOW TO AVOID THEM

The North of England P&I Association

Vessels running aground or colliding with fixed or floating objects (FFO) are among the most high profile and costly of all maritime accidents. The cost in both personal and financial terms has increased in recent years, but human error remains the most common factor.

A vessel's navigational systems and procedures for voyage planning, bridge team management and watchkeeping are designed to reduce the risk of groundings and FFO incidents. All are interdependent, and it is when these systems and procedures start to break down that incidents occur. Everyone who is part of the bridge team is responsible for ensuring that the systems are properly used and implemented.

This guide is designed to bring to the attention of masters and officers the key factors which, based on North's many years of extensive experience in dealing with such incidents, are the key contributory factors in groundings and FFO incidents. It includes suggestions on avoiding the contributory factors and aims to promote an understanding of how the risks can be minimised through following good practice.

Real-life case studies are included at the end of most chapters to provide examples of poor practice. The case studies and the questions they ask are designed to be the starting point for wide-ranging discussions on all aspects of avoiding groundings and FFO incidents.

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North is a leading mutual marine liability insurer based in Newcastle upon Tyne, UK, with regional offices in Greece, Hong Kong, Japan and Singapore. The Club has developed a worldwide reputation for the quality and diversity of its loss prevention initiatives.