SVERIGES ÅNGFARTYGS ASSURANS FÖRENING
The Swedish Club
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Collisions and Groundings

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Main areas of concern

- Poor communication onboard the vessel because of poor MRM which is poor communication between bridge team members, poor communication with the pilot or the other vessel
- Ignoring the Safety Management System
- Level of crews' experience
- Pilot onboard during 53% of all collisions in congested waters
- Fatigue is a particular problem on smaller coastal vessels, where it is not unusual to just have two watchkeeping officers onboard including the captain

Remedies

- Support and belief from top management in MRM
- Shoreside need to lead by example and ensure that correct procedures are implemented and followed
- Educate the bridge team about the importance of MRM, verify this during internal audits and inspections
- Crew seminars and Captain conferences held to promote safety and company values
- Trained and skilled employees who can identify and prevent the chain of errors at an early stage
- Identify the root cause in order to prevent reoccurrence

Introduction

When radar was introduced, it was believed that it would mean the end of collisions at sea, but unfortunately that is not the case. Today's vessels are equipped with many different tools and technologies to prevent them from colliding or running aground, but unfortunately casualties still happen.

Below is a list of core questions relating to "why does it happen and, how can we prevent it from happening again?"

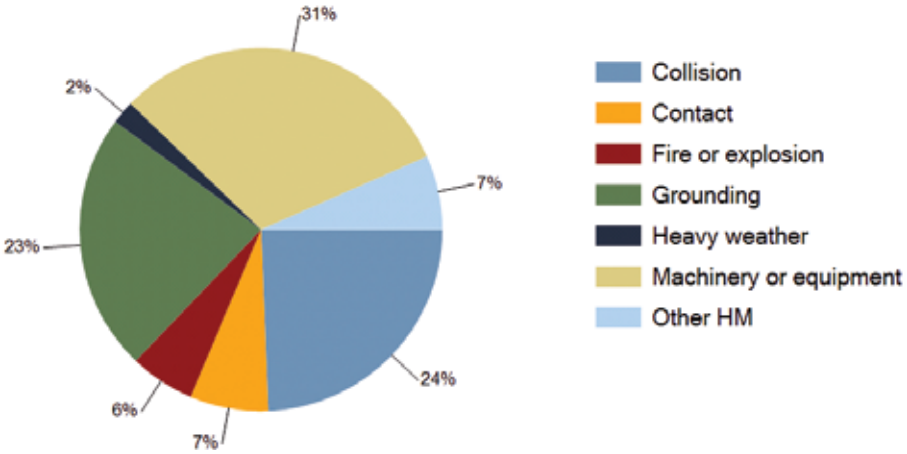
- Are there any special recurring problems?
- Can preventive measures be applied to all vessels?
- How can communication improve within the organisation?
- How can fatigue be prevented?
- Why is the Safety Management System ignored (SMS)?

Shipowners are currently investing more money than ever in training and new equipment. At the same time, the problem of inexperienced crew has never been more obvious than today, and it is difficult for shipping companies to find experienced crew. Equally, in a harsh economic climate, it may not be a top priority to invest in implementing a sustainable safety culture.

The cost of running vessels with inexperienced crew may prove to be substantial. A new capesize bulker in today's market is a multi-million dollar investment. Managing these vessels with an inexperienced crew could be bad asset management and exposes investors to unnecessary losses. The average cost of a collision involving a bulker over the past 10 years is USD 1,400,000 and USD 900,000 for a grounding. Investing in training would be cheap in comparison.

The consequences for shipping companies are not purely financial, but also include: loss of lives, damage to the environment and loss of reputation.

H&M: claims distribution, cost 2001 – 2011, limit >= USD 10,000 (Non capped)



The cost of vessels colliding and running aground is substantial for our members. From the statistics shown in the chart we can see that almost 50% of the cost of all HM claims relate to these categories. Reducing the number of these types of incidents would generate substantial savings for both members and the Club.

As per 2011-08-17.

Abstract of the findings

Main areas of concern

- Level of crews' experience
- Lack of properly implemented safety culture
- Communication
- Ignoring the Safety Management System
- Fatigue

Consequences

- Loss of life
- Environmental damage
- Damage to property
- Loss of earnings
- Criminalisation of seafarers

Remedies

- Implement a sustainable safety culture
- "Buy in" from top management in implementing Maritime Resource Management (MRM)
- Invest in further enhancing crews' experience and competence
- Identify the root cause of casualties

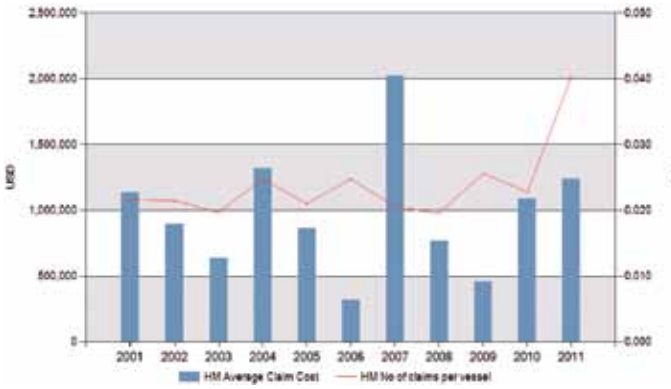
The accident

It might seem strange that vessels still collide and especially on the open sea, where two vessels might be the only ones on the horizon.

The main reasons for a typical collision include the Officer Of the Watch (OOW) not following the COLREGs or the company's Safety Management System. Collisions are often caused by a combination of inexperience and systematic issues in the organisation. This could manifest itself in the attitude that it has become acceptable, within the shore-based organisation (or onboard), to take unsanctioned risks and make shortcuts.

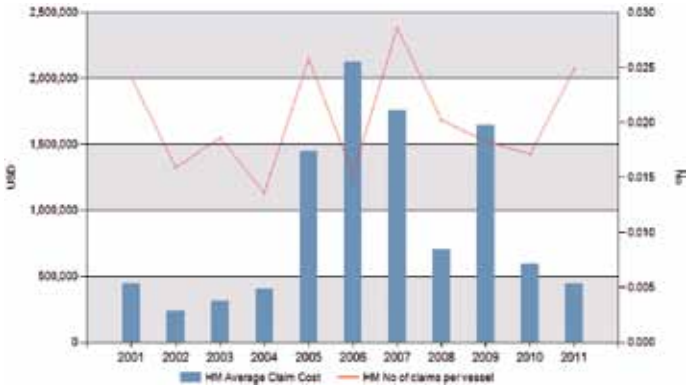
This collision led to the total loss of the bulker. The container vessel had a speed of over 20 knots at the time of the collision.

H&M collision: average claim cost & frequency 2001 – 2011, limit >= USD 10 000 (Non capped)



As per 2011-08-17.

H&M grounding: average claim cost & frequency 2001 – 2011, limit >= USD 10 000 (Non capped)



As per 2011-08-17.

The above graph shows that 2007 was a very expensive year, and that the cost dropped substantially in 2008 when the recession hit. Interestingly though, the frequency graph is stable until 2011 where we see a huge increase. Otherwise the cost graph changes more frequently. The fall in cost since 2007 probably relates to the high speeds of container vessels during the last economic boom, and with high speed comes high cost. During 2008 and 2009 container vessels started to operate slow steaming, and the cost of collisions fell significantly. It is worrying that we are now seeing an increase in both cost and frequency.

The graph for groundings is a little different to the graph for collisions. It is obvious that both the cost and frequency for groundings were much higher during the last economic boom. Unfortunately there is an increase in frequency for 2011.

Both graphs shows that there is a connection between an economic boom and the cost of navigational errors, which a collision or grounding is. Underlying factors include, high speed, pressure for the vessel to be on time, high demand for freight capacity and high commodity prices.

Immediate cause

It is becoming apparent that many of the collisions happen because the company's Safety Management System and navigation procedures have been ignored. If the Safety Management System had been followed, it is likely that this would have prevented the collision. Simply having a Safety Management System is not enough, as there must be a belief at the company that the system must always be followed. This belief has to be transferred to the crew on the vessel. It needs to be one of the company's priorities to improve safety. Shoreside need to lead by example and ensure that their Superintendents and Safety departments are inspecting and verifying that correct procedures are implemented and followed. The difficulty is how to implement this.

The immediate cause of a collision or grounding is usually as stated above, that the OOW did not follow the Safety Management System. To be more specific, the following issues are recurring:

1. Poor lookout
2. Inadequate bridge team management
3. Assumptions
4. Complacency

Having poor lookout is a huge problem and is usually a combination of different factors where the OOW did not look out of the windows, did not have a designated lookout, did not plot the target, or was confused by the information that the radar or the Electronic Chart Display and Information System (ECDIS) provided, leading the officer to make the wrong decision.

Many collisions happen in restricted visibility, but the main cause is not poor visibility but the fact that the OOW failed to follow the correct procedures like calling for extra resources, reducing speed or plotting the target concerned. This is similar to losing situational awareness, which means that the OOW is not fully aware of the factors affecting the vessel at any given time. Reducing speed would greatly enhance situational awareness.

Many accidents happen with the pilot onboard. Statistics covering 277 collisions between the years 2000-2010 show that a pilot was onboard during 109 of these cases. It is evident that the pilot did not communicate properly with the rest of the bridge team. The pilot and the captain are jointly responsible for drawing up a well-defined and agreed passage plan. It is, however, important to remember that the captain is ultimately legally responsible. It is not acceptable for the bridge team to relax and think that the pilot is in charge; the pilot is present as an advisor and the final decision always rests with the captain.

Making assumptions about the displayed information and being complacent by not verifying if the information is correct or not is also a major contributing factor. For vessels trading in congested waters, the dense traffic and proximity to land will greatly increase the risks for the vessel. To be prepared for these risks it is imperative that the OOW is aware of errors and limits of his navigation equipment, for example if the OOW believes that 0.3 M is an acceptable closest point of approach (CPA) this could be dangerous if any of the parameters feeding the radar calculation are wrong, such as the speed, or whether speed over ground or speed through water is chosen. The presented CPA on the radar might be different to the actual CPA. To be proactive and prepared for these risks is the best remedy. When in doubt, the captain should be called, as this extra resource might mean the difference between disaster or not.

In a couple of accidents the OOW or the captain stated that they were unsure about the other vessel's intentions or thought that they had spoken to the vessel concerned when they, in fact, had spoken to another vessel or were confused about the displayed information. The main problem is not that they were confused but that they did not do enough to clarify the situation.

Another interesting statistic shows that, out of 277 collisions between 2000 and 2010, 193 occurred in congested waters, 38 in costal waters and 41 in open seas. Of the 193 cases, a pilot was onboard on 109 of the collisions. This means that a pilot was onboard during 53% of all collisions in congested waters.

It is an unsurprising statistic that most collisions happen in congested waters, as most vessels will be at greatest risk when approaching or leaving harbour because of traffic density and proximity to the grounding line, but it is a worrying statistic that a pilot is onboard on more than every second collision in congested waters.

This emphasizes even more that it is imperative that the vessels use MRM, which also covers the interaction between captain and pilot. There are sufficient resources on the bridge to cope with the extra information, traffic, communication with VTS and other vessels and monitoring the safe passage.

If there are defined procedures on how to deal with these extra risks, these will prevent many errors.

Root cause

The immediate cause is usually not the root cause to why a collision or grounding happens. For an unfortunate accident to happen, there are usually a chain of errors. If any of these errors had been identified and rectified, it is likely that this would have prevented the accident. In order to be able to remedy the real reason for the accident, the root cause has to be identified, because if the root cause is not identified there is a major risk of the accident recurring.

A good quality and safety system should identify and prevent the chain of errors at an early stage. The best defence for this will be to have experienced, well-trained, dedicated employees who understand the importance of safety and who follow procedures. The company culture must provide a positive climate to promote safety suggestions and especially listen to concerns about safety and how to improve operations. This means that the company really has to make the crew understand that they are expected to question the tasks they are doing and raise concerns through near misses and non-conformities. Safety is all about continuous improvement within the company and is a never-ending project. This could be implemented if companies adopt the MRM concept.

If two vessels collide, the immediate cause may be that they did not follow COLREGs. To remedy this, the OOW has to be taught the COLREGs This is obviously not the root cause, as the OOW should know the COLREGs in order to become a licensed officer. The root cause may be many different issues and it is essential that the company makes it a priority to investigate and find out what really caused the accident. It is usually not the first obvious cause, but to be able to remedy the real problem it needs to be identified and dealt with. It might be that the company did not check when they hired the OOW whether he was competent or not, the OOW was using technology that he had not been properly trained for, or misunderstood the displayed information; the OOW had been working long hours because there were a limited number of officers onboard and there wasn't a proper lookout.

Prevention

So how can a shipping company minimise the risk of their vessels colliding or running aground?

First, the company has to recognise that this is a substantial risk, and that the company can influence it. It is not enough hiring a crew with the correct certificates and having an approved Safety Management System; there needs to be a company culture that states that these are our values and that ensures that all employees are trained to know what is expected of them.

One of the main problems is that the Safety Management System is often ignored and that technology and instruments provided are not utilised. The interesting question is how can this be allowed?

In a couple of cases the captain did visit the bridge when the vessel was in restricted visibility, maintaining full speed and had no designated lookout. Why was no concern raised? How could this be acceptable when it clearly states in the Safety Management System that a designated lookout has to be posted and that the captain should be on the bridge at all times during restricted visibility. In other cases the captain has entered and left the bridge during manoeuvring and obviously did not have full situational awareness. Most people reading this will know that this is not what a prudent mariner does, and even the officer on the bridge might have known that it is not the correct procedure; yet it is happening time after time.

This collision happened in restricted visibility.

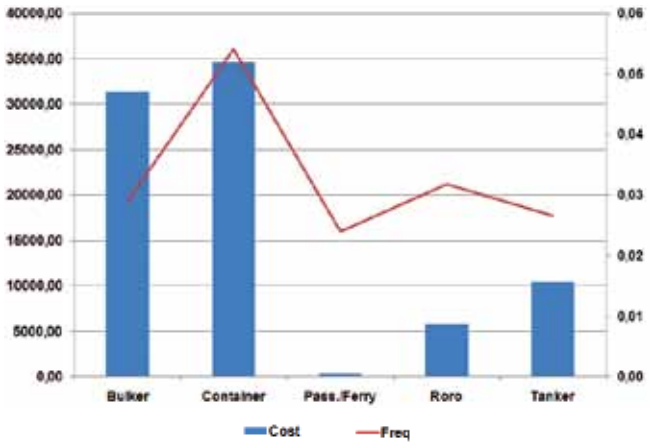
The reasons for collisions or groundings do not seem to change a lot over the years, as the same mistakes are being made over and over again. There are some new errors, such as being distracted by mobile phones or officers not being properly trained to handle new technology.

A major factor in preventing collisions and groundings is an investment in the crew. The Swedish Club has a rating system for ship managers called Ship Management Evaluation (SME). This rating system measures the operator by analysing the answers to 20 questions that are related to the operation, safety and training of the crew onboard the vessels. Tanker and cruise ship managers score the highest in this rating system, and it is interesting to see that the collision and grounding frequency is also very low for them.

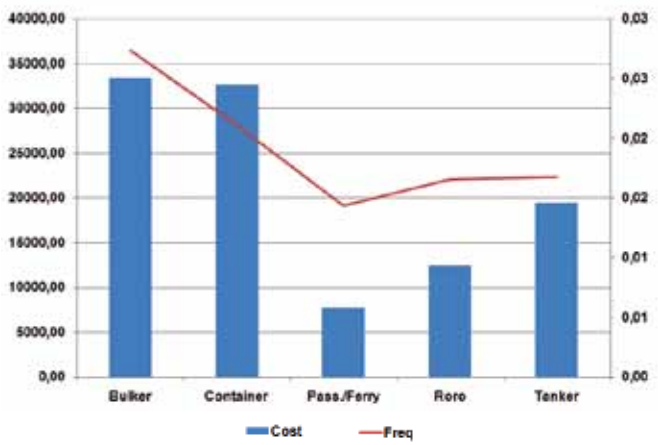
H&M collision: cost & frequency as per vessel type 2006 – 2011, limit >= USD 10,000

H&M grounding: cost & frequency as per vessel type 2006 – 2011, limit >= USD 10,000

From the graphs we can see that focusing on the crew's competence and having an efficient organisation is a good investment.



The graph above shows that the cost and frequency for collisions are much greater for bulker and container vessels than for any other types of vessels. As per 2011-08-17.



The cost and frequency of groundings are more similar between the different vessel types, but container and bulker vessels still incur the greatest cost. As per 2011-08-17.

Bridge Design

On today's modern bridge there are not only a lot of different navigational equipment but also equipment that makes it possible to monitor all activity onboard the vessel, cargo handling, ballast operations, fire alarms, security cameras, communication and engine performance. Today's officers have multiple tasks to deal with during the voyage that are not related to navigation. This can increase officers' stress levels especially if they are not confident about using the equipment, or have not received the proper training. To be able to optimally utilize the equipment, the design and ergonomics of it has to be considered. It has been discovered that poor design and ergonomics have been a contributing factor to some accidents.

The objective of the modern bridge should be to have an efficient place with a high safety level. The ideal bridge should be designed to be efficient during critical operations, such as piloting and manoeuvring. The objective should be that it is designed for teamwork where two people can monitor each other and carry out tasks equally.

In the study "Bridge ergonomics and usability of navigational system as a safety and quality feature" carried out by the University of the Aegean, it was found that ergonomic problems were one of the causes of a number of accidents. Two of these cases were groundings in Finnish waters, and it was found that poor ergonomics and poor bridge design were contributing factors.

In the first grounding the authorities found that the control panel for the bow thrusters was not ideally positioned as it was placed behind the officer's chair. The vessel was also equipped with a joystick that could be used for manoeuvring but wasn't used because it was not in a user-friendly position. The main reasons for this accident were the master's lack of familiarization with the bridge equipment and lack of proper MRM.

In the second grounding the pilot used the autopilot for an alternation but realized that more rate of turn was needed. However, instead of using the available rate of turn joystick, hand steering or non-follow up, he simply used autopilot. The investigation discovered that some of the bridge equipment was not in an ergonomic and user-friendly position. The pilot also had problems understanding some of the radar's functions and using it properly. Because of this he lost situational awareness. It was found that the crew was well-trained and the pilot was very experienced, but the cause of the grounding was that the alteration was delayed by one and a half minutes as the pilot used autopilot. The investigators found that one of the contributing factors to the grounding was that the bridge was dysfunctional and not user-friendly. These two groundings show the importance of bridge design. It is imperative to make an evaluation when new bridge equipment is installed, as there is a risk that new equipment can increase the risk of an accident if it is not positioned in a user-friendly way, or ergonomically designed. If the officer has to use the equipment that is positioned poorly, he might lose situational awareness momentarily, which could be a contributing factor to an accident.

Safe manning

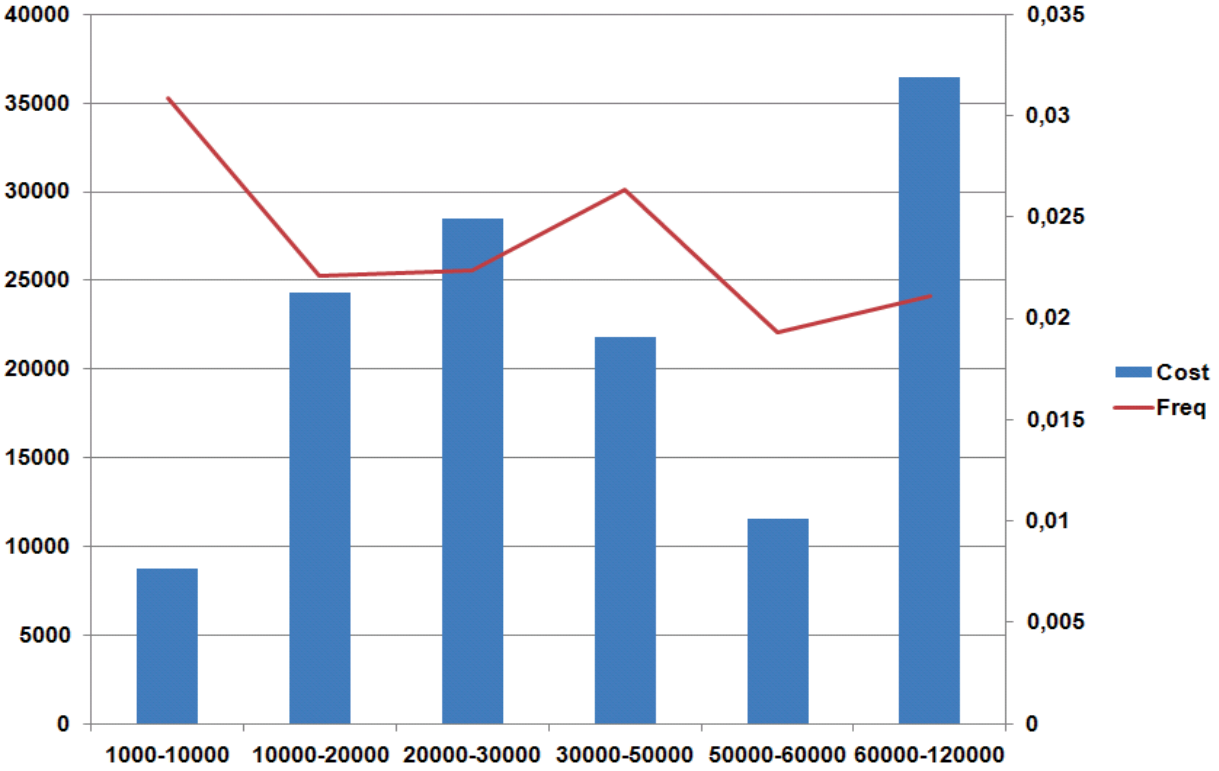
Fatigue is also a growing problem onboard vessels. With fewer crew members onboard, the pressure on everyone is growing. This is a particular problem on smaller coastal vessels, where it is not unusual to only have two watchkeeping officers including the captain, compared with larger vessels where three watchkeeping officers plus the captain is the norm. To operate the vessel with only a safe minimum manning might be sufficient for some trades and areas, but it might not be applicable in areas with dense traffic or many port calls. To navigate a coastal vessel in Europe with two watchkeeping officers including the captain might be acceptable according to the safe manning certificate, but the vessel's trade might have changed and the number of port calls might have increased, which makes it almost impossible for the watchkeeping officers to get enough rest.

The impact of fatigue has also been identified by the Australian Maritime Safety Authority (AMSA) as a major concern after some incidents in 2010. During the Port State Control inspection they not only inspect the hours of rest but also ensure that the Standards of Training, Certification and Watchkeeping for Seafarers (STCW) convention is followed. If the records are found not to be in accordance with STCW, there is a risk that the vessel will be detained. In the "Marine Accident Investigation Branch (MAIB) Bridge Watchkeeping Safety Study report" from 2004, it was identified that most accidents around the UK happened when there was only one officer on the bridge, and the major cause was fatigue. It was identified that this is something that the International Maritime Organization (IMO) should try to remedy through the STCW convention.

The recommendations made by MAIB were proposed by the UK's Maritime and Coastguard Agency (MCA) to IMO, but unfortunately there were no changes to the STCW code during the IMO Manila conference on 25 June 2010 which ratified the Manila amendments to the STCW code. The amendments did not implement any stricter regime for vessels' safe manning; in Resolution 6 it states; "REAFFIRMS ALSO that any decision relating to ships' manning levels is the responsibility of the Administrations and shipowners concerned taking into account the principles of safe manning adopted by the International Maritime Organization". This would have been an excellent opportunity to make safe manning requirements stricter. Now it is still only up to the professional company to ensure that they have sufficient crew, that the crew is trained and understands the company's values and policies. Fatigue will probably become an even hotter topic in coming years.

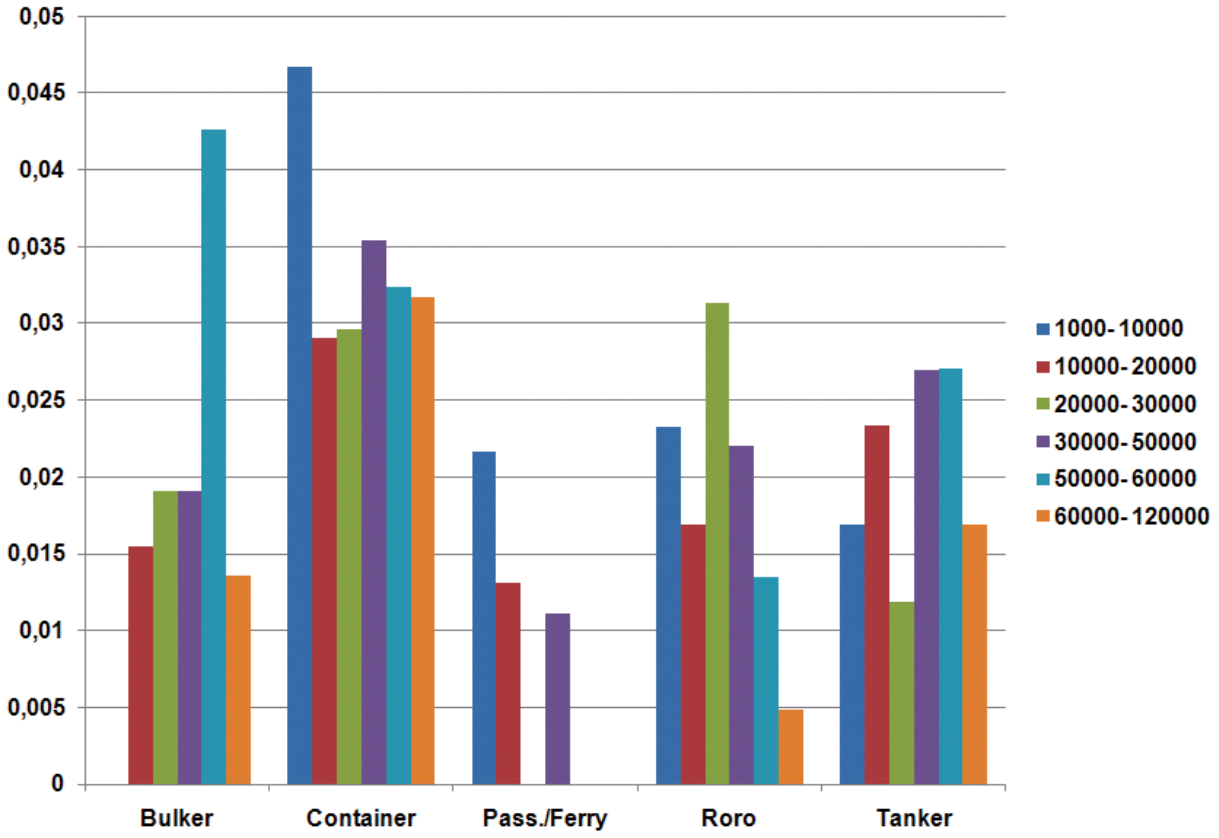
Statistics

Collision: cost and frequency as per vessel size 2001 – 2011, limit >= USD 10,000



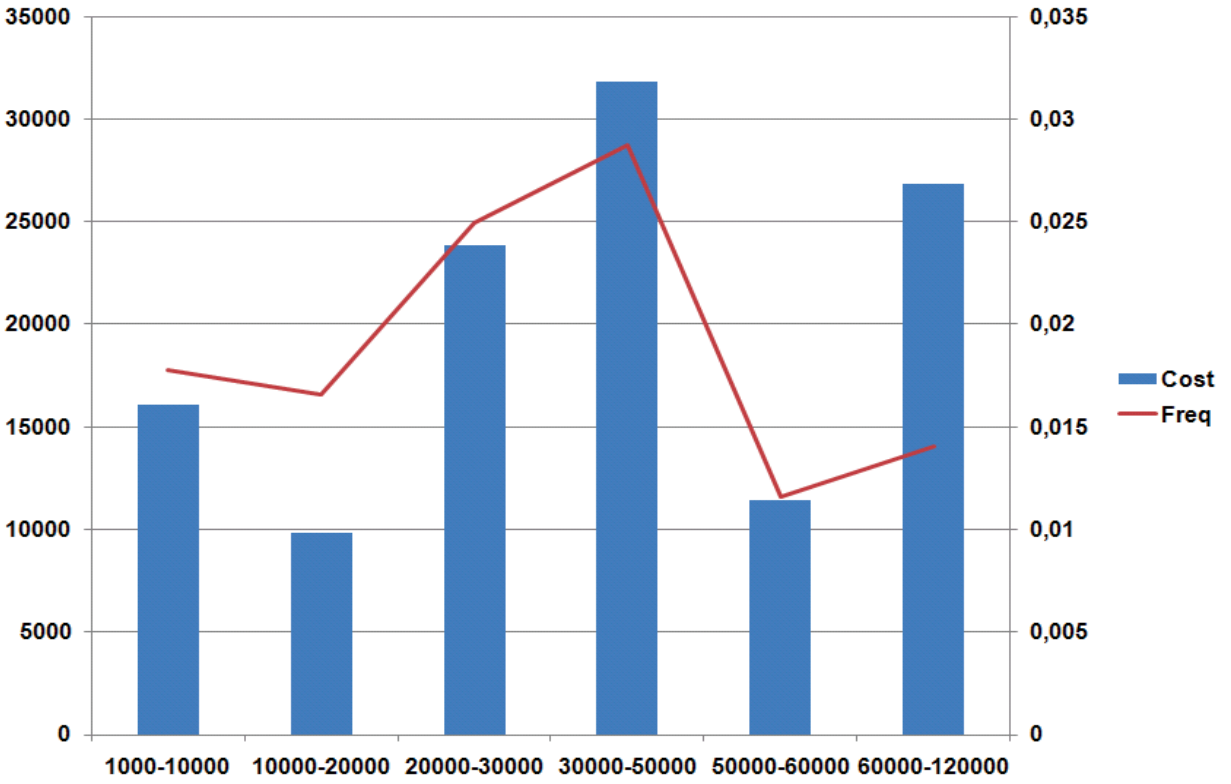
The collision frequency is highest for smaller vessels, but the cost is greatest for larger vessels. As per 2011-08-17.

Collision: frequency as per vessel size and type 2001 – 2011, limit >= USD 10,000



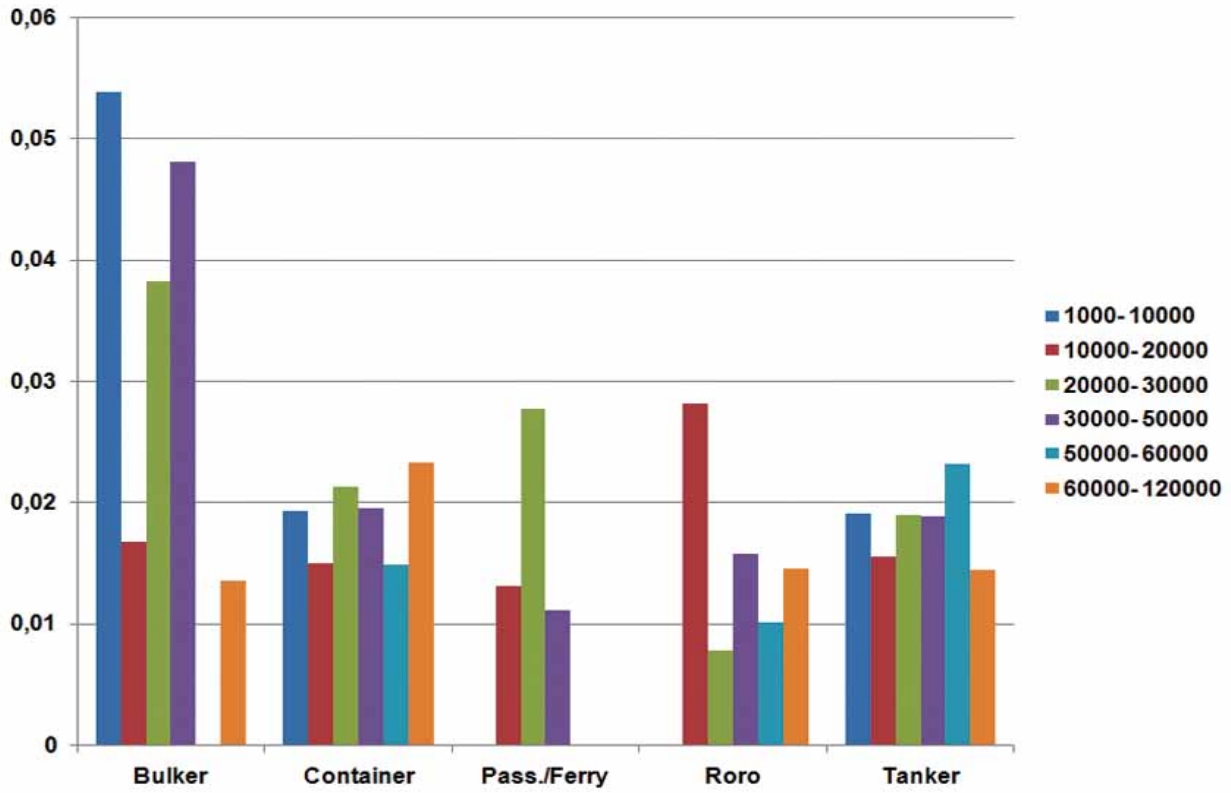
Smaller container vessels have the highest frequency. Interestingly though, the largest vessels have the lowest frequency for all different vessels except for container vessels where it is more similar between different vessel sizes. As per 2011-08-17.

Grounding: cost and frequency as per vessel size 2001 – 2011, limit >= USD 10,000



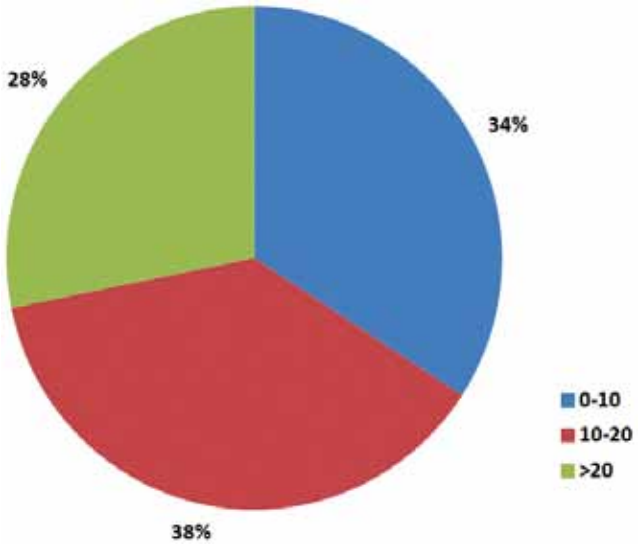
The statistics above are different to the collision statistics, here the mid-size vessels have the highest frequency and the largest vessels the lowest frequency, but when large vessels run aground it is very costly. As per 2011-08-17.

Grounding: frequency as per vessel size and type 2001 – 2011, limit >= USD 10,000

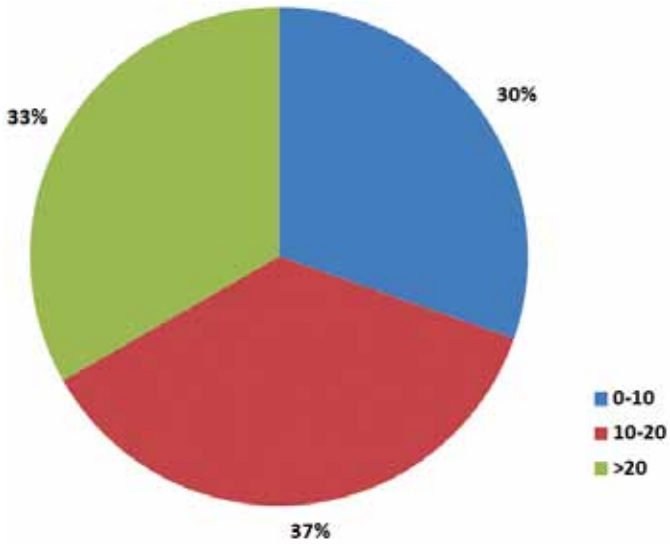


The graph above is slightly different to the graph for collisions. Small and mid-size bulkers have the highest frequency. The frequency for tankers and container vessels is very similar between the different sizes, for RoRo and ferries the smallest vessels have higher frequency. This still indicates that the manning level is a problem to be concerned about. This is even more worrying when most collisions happen in congested waters where small coastal vessels usually operate. As per 2011-08-17.

Collision: vessel age, 2006 – 2011



Grounding: vessel age, 2006 – 2011



Distribution between age groups in relation to collisions and groundings is even. This would indicate that equipment is of less importance while the crew's experience and the company's safety culture is more relevant. As per 2011-08-17.

Conclusion

As discussed in the introduction, it seems that it does not matter how good the technology or tools are on the vessels, as vessels still collide. The main reasons seem to be a less viable safety culture and a lack of experienced crew. The combination of these two areas, which concerns both the vessel and shoreside management, leads to navigational errors. To be able to prevent a collision or grounding, it is imperative that the operator believes that an investment in safety and training is an investment and not a cost. If the company is willing to invest money and time in their crew, this will most likely lead to the crew feeling more part of the company and the vessel, as they feel that the company thinks they are an asset and not a cost.

It is also very important to identify the root cause of the problem, because the immediate cause is probably just part of a greater failure in the system. Then, of course, the immediate cause needs to be acknowledged and rectified. The most common immediate causes are: poor lookout, lack of communication, which is poor MRM, not using all available equipment and technical means as crew are supposed to, not following company procedures, complacency and poor voyage planning. These are issues that can be addressed through crew seminars, internal audits and concentrated campaigns to highlight recurring issues. To be able to rectify the root cause, it is essential that top management implements a safety culture, believes in the entire safety concept and leads by example. In the office this needs to happen by the directors constantly instructing their departments to review their procedures so that the real cause can be identified.

It is evident that there is a correlation between a good economic climate and higher claims costs. During a boom there is more pressure on the shipping companies to deliver cargo on time, and there might be more competition from new operators.

There is also a problem with fatigue on vessels, as the number of crew members onboard always seems to decrease. This could be addressed with stricter safe manning requirements; it is a difficult political issue but something that cannot be ignored.

The overall conclusion is not very surprising and shows that the companies with the fewest collisions and groundings are those companies that invest most in their shore-based organisation and invest most in training and equipment.

Main areas of concern

- Poor communication onboard the vessel because of poor MRM which is poor communication between bridge team members, poor communication with the pilot or the other vessel
- Ignoring the Safety Management System
- Level of crews' experience
- Pilot onboard during 53% of all collisions in congested waters
- Fatigue is a particular problem on smaller coastal vessels, where it is not unusual to just have two watchkeeping officers onboard including the captain

Remedies

- Support and belief from top management in MRM
- Shoreside need to lead by example and ensure that correct procedures are implemented and followed
- Educate the bridge team about the importance of MRM, verify this during internal audits and inspections
- Crew seminars and Captain conferences held to promote safety and company values
- Trained and skilled employees who can identify and prevent the chain of errors at an early stage
- Identify the root cause in order to prevent reoccurrence

All statistics from The Swedish Club's database from 2001 until August 2011.

Contact persons

Anders Hultman
Loss Prevention Project Co-ordinator

Tel: +46 31 638 426
Mobile: +46 704 784 992
E-mail: anders.hultman@swedishclub.com

Joakim Enström
Loss Prevention Officer

Tel: +46 31 638 445
E-mail: joakim.enstrom@swedishclub.com

Loss Prevention publications

- Claims at a glance
- Bridge & Engine instructions
- Main Engine Damage
- Securing of Cargo for Sea Transportation

SVERIGES ÅNGFARTYGS ASSURANS FÖRENING
The Swedish Club
Est. 1872

Contact

Head Office Sweden
Visiting address: Gullbergs Strandgata 6,
411 04 Gothenburg
Postal address: P.O. Box 171,
SE-401 22 Gothenburg, Sweden
Tel: +46 31 638 400, Fax: +46 31 156 711
E-mail: swedish.club@swedishclub.com

Emergency: +46 31 151 328

Greece
5th Floor, 87 Akti Miaouli, GR-185 38 Piraeus, Greece
Tel: +30 211 120 8400, Fax: +30 210 452 5957
E-mail: mail.piraeus@swedishclub.com

Emergency: +30 6944 530 856

Hong Kong
Suite 6306, Central Plaza, 18 Harbour Road,
Wanchai, Hong Kong
Tel: +852 2598 6238, Fax: +852 2845 9203
E-mail: mail.hongkong@swedishclub.com

Emergency: +852 2598 6464

Japan
Suzuyo Hamamatsucho Building 5f,
2-1-16 Kaigan, Minato-Ku,
Tokyo 105-0022, Japan
Tel: +81 3 5442 5466, Fax: +81 3 5442 5922
E-mail: mail.tokyo@swedishclub.com

Emergency: +81 3 5442 5466

Norway
Tjuvholmen Allé 3,
House of Business, 6th Floor,
N-0252 Oslo
Tel: +47 9828 0514
E-mail: mail.oslo@swedishclub.com

Emergency: +46 31 151 328