

## THE ANALYTICAL ESTIMATION OF GROUNDING CAUSING FACTORS

**Tornike Zhvania\***, Scientific Supervisors: **Zurab Bezhanovi\***, **Luiza Sikharulidze\***

**\*Batumi State Maritime Academy, Batumi, Georgia**

**Abstract.** *The aim of the paper is to present the results of the analytical studying of major causing reasons of ship grounding and to propose possible ways of their avoidance. The source of the implemented research is based on the data (real cases of ship grounding related with different types of merchant vessels operating in different areas and operative situations) of the International Maritime Organization, The European Maritime Safety Agency and Marine Accident Investigation Branch. Thus, the paper proposes the results of study of the factors, frequently causing vessels' grounding despite the COLREGs, SOLAS and ship safety management system requirements, directly related to the provision of safety of ship handling. The assumption of the paper presents distribution of the causing factors regularity.*

**Key words:** *research, grounding, to avoid, actions*

### **1. Introduction**

About 90% of the global business is implemented by the international shipping. Without it the import and export of cargoes on the range required for the modern global world would be impossible. Sea-based trade continues to enlarge, providing benefits for traders across the world through reasonable costs. There are over 50,000 merchant ships trading globally, shipping every kind of cargo.

The world fleet is registered in approximately 150 states, and implemented by over a million seafarers of almost every nationality.<sup>1</sup>

Shipping was one of the first businesses to introduce broadly applied international safety standards. Thus, due to its international nature, the safety of shipping is governed by the International Maritime Organization (IMO), which has proposed a complete scheme of global maritime safety rules. World shipping is one of the most strictly regulated activities and was one of the first to adopt constantly implemented international safety regulations.<sup>2</sup>

The rules concerning merchant shipping are established at the global range. Merchant shipping is essentially global, it is obvious that it is the subject to provide rules on issues, such as ship construction standards, navigational rules and sets of crew proficiency.

## **2. The Key Rules Managing Merchant Fleet Safety.**

The following major international conventions developed by the International Maritime Organization and the International Labour Organization ensure safety at sea and marine pollution prevention. At the same time, numbers of other maritime documents and procedures related with specific matters are also in force.

Thus, the instruments, which provide safety at sea, cover activities of the merchant ships, shipping companies and the crew members.

### **2.1 The following rules deal with the merchant ships:**

- SOLAS (the International Convention for the Safety of Life at Sea, 1974) provides a full set of minimum standards for the safe ship construction and the basic safety appliances (e.g. fire protection, detection and distinction; navigation, lifesaving and radio) to be provided on board. SOLAS also requires regular surveys and the issue of the appropriate certificates.
- MARPOL (the International Convention for the Prevention of Pollution from Ships, 1973/1978) sets up requirements to prevent marine pollution. MARPOL prevents pollution from different sources such as oil, bulk chemicals, dangerous goods, sewage, garbage and atmospheric pollution.
- COLREG (Convention on the International Regulations for Preventing Collisions at Sea, 1972) presents the major "rules of the road".
- LOADLINE (the International Convention on Loadlines, 1966) provides the minimum permissible free board, due to the season and the ship's operational area.

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<sup>1</sup> <http://www.ics-shipping.org/shipping-facts/shipping-and-world-trade>

<sup>2</sup> <http://www.ics-shipping.org/shipping-facts/safety-and-regulation>

- ISPS (the International Ship and Port Facility Security Code, 2002) establishes obligatory requirements to protect ships and port facilities at all stages during a voyage/passage.

## **2.2 The documents listed below deal with the shipping company:**

- ISM (the International Safety Management Code, 1993) requires shipping companies to obtain a license to act. The companies as well as their ships must ensure the audits to guarantee that a safety management system is in action, including appropriate procedures and communication between crews and their shore-based management.

## **2.3 The instruments regarding the crew members:**

- STCW (International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978/1995/2010) establishes minimum standards of competence for seafarers.
- Under ILO 147 (The ILO Merchant Shipping (Minimum Standards) Convention, 1976) it is demanded from the local administrations to have tuned legislation on labour issues such as appropriate hours of work, medical issues and seafarers' working terms.

## **3. The analysis of the most frequent reasons of ships grounding.**

Despite such comprehensive prevention of possible incidents, unfortunately their number is increasing. That is why the aim of the paper is to present the results of the analytical studying of the causing reasons of ship grounding and to propose the ways of their avoidance.

In order to realize the noted aim in the first part of my research I investigated “the IMO Lessons learned - Consolidated version grounding” – the collection of the real cases of ship grounding related with different types of merchant vessels operating in different areas and operative situations.

Backed by the results of the implemented analysis, I distributed the grounding causing reasons in the following manner (the frames of the paper don't give possibility to present the whole set of the studied cases, that is why only the most attractive ones are given below):

### **3.1 Grounding, caused by improper actions taken by deck departments crew and pilot:**

- The actions of the master, such as his request for full speed and full rudder angle, increased the loss of control of the ship, since the ship was moving in a narrow channel with little clearance underneath and at the sides.
- The pilot disembarked the ship before the ship left the channel, that increased the chance of an accident.
- The officers did not use a proper scaled paper chart. The chief officer overlooked the target displayed on the radar and did not carry out a proper lookout.
- No alternative passage plan had been made after the vessel deviated. Any deviations from previous passage plans should be made in writing and communicated to bridge team members.

- The master of the cargo vessel had joined the vessel two days before the accident. He was not familiar with the vessel's windlass and ground tackle. No other member of the crew knew how to use the windlass to anchor the vessel.<sup>3</sup>

### **3.2 Grounding, caused by difficult weather conditions:**

- The ship anchored on a lee shore. There was no protection from the wind and sea in the anchorage area, and the ship's anchored position was upwind of the breakwater.
- The weather conditions were such that the ship was unable to maintain its position using anchoring equipment. <sup>3</sup>

### **3.3 Grounding, caused by ignorance of the IMO Standard Marine Communication Phrases:**

- poor communication and cooperation between the master and the pilot during sailing in confined and restricted visibility water area caused accident. <sup>3</sup>

### **3.4 Grounding, caused by improper use of navigational equipment and poor knowledge of ship particulars:**

- While transiting from the inner harbour to the main entrance channel, the vessel failed to execute a turn successfully and was set to starboard towards the side of the channel. The ship made contact with rocks on the edge of the channel. <sup>3</sup>

### **3.5 Grounding caused by fatigue:**

- The watch system together with other functions allocated to the watchkeepers resulted in an excessive workload for the officer on watch. Fatigue with a resultant deterioration of safety awareness appears to have affected the behaviour of the officer on watch. No look out was posted on the bridge, no regular fixes were taken, no course monitoring was conducted and the watch alarm was switched off.<sup>3</sup>

### **Conclusion.**

Thus, taking into account the essence of the listed above reasons, as the prevention of vessel grounding (one of the most dangerous accidents) we propose the measures to prevent grounding:

- planning and further tuning of actions undertaken by the deck department crew and the pilot through constantly developed passage/anchoring/mooring plan;
- appreciation of the ship particulars to ensure the best application of her handling characteristics;

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<http://www.imo.org/en/OurWork/MSAS/Casualties/Documents/Consolidated%20version%20of%20Lessons%20Learned/Consolidated%20version%20grounding.pdf>

- protection from the wind and sea in the anchorage area to prevent the increased draught due to the ship's movements caused by the swell;
- strict control over possible fatigue through effective bridge resource management;
- regular check of conventionally required use of the IMO SMCP.

At the same time, in case the ship is grounded, the crew shall never forget about the **Actions need to be taken in case of Stranding or Grounding**, proposed by “Bridge Procedures Guide” developed by the International Chamber of Shipping.

- sound the alarm to muster the crew/passengers (7 short, 1 long);
- account for all personnel and check for injuries;
- stop engines and auxiliaries if grounding is severe;
- sound bilges and inspect void areas;
- take bearings and plot your position - then attempt to determine reason for grounding from the charts;
- survey the area around the grounding (from chart);
- determine the tide and tidal stream;
- check weather predictions for the area;
- sound around the vessel to determine the extent of the grounding
- check for hull damage (if severe damage has occurred, it may be best to stay grounded);
- display appropriate signal 'vessel aground'.<sup>5</sup>

#### References:

1. <http://www.ics-shipping.org/shipping-facts/shipping-and-world-trade>
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4. <http://www.imo.org/en/OurWork/MSAS/Casualties/Documents/Consolidated%20version%20of%20Lessons%20Learned/Consolidated%20version%20grounding.pdf>
5. Bridge Procedures Guide, International Chamber of Shipping, London, 2016