IMO International Maritime Organization

IMO – the International Maritime Organization – is the United Nations specialized agency with responsibility for the safety and security of shipping and the prevention of marine pollution by ships.
Silja Opera

- London 9-2005, Thames River
- IMO # 7827213
- Built 1980 Wartsila, Turku, Finland.
- Rebuilt after a fire in 1992
IMO International Maritime Organization

History

• 1948 International Conference in Geneva, where the IMO was formally established.

• The original name was IMCO, Inter-Governmental Maritime Consultive Organization, the name was changed in 1982 to IMO.

• The IMO Convention entered into force in 1958, the new organization met for the first time in 1958

• The purpose of the Organization is:

• “To provide instruments for cooperation among Governments in the field of governmental regulation and practices relating to technical matters of all kinds affecting shipping engaged in international trade”
IMO International Maritime Organization

- “To encourage and facilitate the general adoption of the highest practical standards in matters concerning maritime safety, efficiency of navigation and prevention and control of marine pollution from ships”

- **Orange Trident**
- Norfolk, VA (8-2013)
- 2007 Japan, IMO # 9241673
- Now “Panamax Sterling”
The first task for the IMO was to review and adopt a new version of the International Convention for Safety of Life at Sea, (SOLAS).

This was achieved in 1960.

The grows in the 1960th, the amount of oil being transported by sea and the size of oil tankers was of particular concern.

The Torrey Canyon disaster in 1967, in which 120,000 tonnes of oil was spilled demonstrated the scale of the problem.

During the next few years IMO introduced a number of measures to prevent tanker accidents.

They also tackled the environmental threat caused by routine operations such as cleaning of oil cargo tanks, disposal of engine room waste, all of those in Tonnage terms larger than accidental pollution.
IMO International Maritime Organization

- The IMO produced in 1973 the International Convention for the Prevention of Pollution from Ships.  
- I did not come into force in 1973, but due to lack of ratifications, only came into force in 10-1983.  
- **Torre Canyon**,  
- Built 1960 Newport News Shipbuilding.  
- Owner Union Oil Company of California
The 1974 SOLAS Convention came into force in May 1980, this due to the requirements that acceptance was required by at least 25 states with 50 percent or more of the world gross tonnage of merchant shipping.

In 1970 the global search and rescue system was initiated with the establishment of the International Mobile Satellite Organization (IMSO).

The Global Maritime Distress and Safety System (GMDSS) was adopted in 1988 and began to be phased in from 1992 on.

On 1 July 1998 the International Safety Management Code entered into force, applicable to passenger ships, oil and chemical tankers, bulk carriers, gas carriers and cargo high-speed craft over 500 t gross.

On 1 July 2002 other cargo ships and offshore drilling units over 500 tons gross followed.

- **Alfa Britannia**, Lundqvist, Finland, IMO #9154232, Built Daewoo HI, Korea 1998
- **United Star**, IMO #9014846, Built 1992 Samsung, Korea
IMO International Maritime Organization

- The 2000 saw a focus on maritime Security, with the 2004 entry of the International Ship and Port Facility Security, (ISPS Code) a part of SOLAS.
- The IMO Member State Audit Scheme, became mandatory on 1 January 2016.
- **Other Conventions relating to the Maritime Safety:**
  - 1972 (COLREG) Preventing Collisions at Sea.
  - International Convention on Search and Rescue, (SAR).
International Maritime Organization Headquarters,
Albert Embankment,
Lambeth, London.

On the South Bank of the Thames River, up-streams of the Lambeth bridge.
IMO International Maritime Organization

- Special Trade Passenger Ships, (STP 1971)
- International Oil Pollution Preparedness, Response and Co-operation, (OPRC) 1990.
- International Convention for the Control of Harmful Antifouling Systems
- International Convention for the Control and Management of Ship’s Ballast Water and Sediments, 2004
- The Hong Kong International Convention for the Safe and environmentally Sound Recycling of Ships, 2009
IMO International Maritime Organization


- **Navigator of the Seas**
  - IMO # 9227508
  - Royal Caribbean
  - 139,570 t gross
Structure of IMO.

• The Organization consists of an Assembly, a Council and five main Committees: the Maritime Safety Committee.
• The Marine Environment Protection Committee; the Legal Committee; the Technical Cooperation Committee and the Facilitation Committee.

Assembly

• This is the highest Governing Body of the Organization.
• It consists of all Member States and it meets once every two years in regular sessions, but may also meet in an extraordinary session if necessary.
• The Assembly is responsible for approving the work program, voting the budget and determining the financial arrangements of the Organization.
• The Assembly also elects the Council.
Council

- The Council is elected by the Assembly for two-year terms beginning after each regular session of the Assembly.
- The Council is the Executive Organ of IMO and is responsible, under the Assembly, for supervising the work of the Organization.
- Between sessions of the Assembly the Council performs all the functions of the Assembly, except the function of making recommendations to Governments on maritime safety and pollution prevention, which is reserved for the Assembly by Article 15(j) of the Convention.
- It appoints the Secretary-General, subject to the approval of the Assembly.
IMO International Maritime Organization

Stena Britannica

- IMO # 9419175
- Built 2010 Wadan Yard, Wismar.
- 64,039 T gross
- Stena Line, UK
- Ro-Ro Ferry, Harwich UK, Hoek van Holland NL.
Council members for the 2016-2017 biennium

- **Category (a):** 10 States with the largest interest in providing international shipping services:
  - China, Greece, Italy, Japan, Norway, Panama, Republic of Korea, Russian Federation, United Kingdom, United States.

- **Category (b):** 10 other States with the largest interest in international seaborne trade:
  - Argentina, Bangladesh, Brazil, Canada, France, Germany, India, Netherlands, Spain, Sweden.

- **Category (c):** 20 States not elected under (a) or (b) above which have special interests in maritime transport or navigation, and whose election to the Council will ensure the representation of all major geographic areas of the world:
  - Australia, Bahamas, Belgium, Chile, Cyprus, Denmark, Egypt, Indonesia, Kenya, Liberia, Malaysia, Malta, Mexico, Morocco, Peru, Philippines, Singapore, South Africa, Thailand, Turkey.
IMO International Maritime Organization

- **Maritime Safety Committee (MSC)**
- The MSC is the highest technical body of the Organization. It consists of all Member States.
- The functions of the Maritime Safety Committee are to “consider any matter within the scope of the Organization concerned with aids to navigation, construction and equipment of vessels, manning from a safety standpoint, rules for the prevention of collisions, handling of dangerous cargoes, maritime safety procedures and requirements, hydrographic information, log-books and navigational records, marine casualty investigations, salvage and rescue and any other matters directly affecting maritime safety”.
The Marine Environment Protection Committee (MEPC)

The MEPC, which consists of all Member States, is empowered to consider any matter within the scope of the Organization concerned with prevention and control of pollution from ships.

In particular it is concerned with the adoption and amendment of conventions and other regulations and measures to ensure their enforcement.
Sub-Committees
The MSC and MEPC are assisted in their work by a number of sub-committees which are also open to all Member States:

- Sub-Committee on Human Element, Training and Watch-keeping (HTW);
- Sub-Committee on Implementation of IMO Instruments (III);
- Sub-Committee on Navigation, Communications and Search and Rescue (NCSR);
- Sub-Committee on Pollution Prevention and Response (PPR);
- Sub-Committee on Ship Design and Construction (SDC);
- Sub-Committee on Ship Systems and Equipment (SSE); and
- Sub-Committee on Carriage of Cargoes and Containers (CCC).
• **Legal Committee**

The Legal Committee is empowered to deal with any legal matters within the scope of the Organization.

• The Committee consists of all Member States of IMO.

• It was established in 1967 as a subsidiary body to deal with legal questions which arose in the aftermath of the Torrey Canyon disaster.

• **Thialf**, Heerema, IMO #8757740

• 1985 Mitsui, 136709 t gross
• **Secretariat**

The Secretariat of IMO consists of the Secretary-General and some 300 international personnel based at the headquarters of the Organization in London.

The Secretary-General of the Organization is Mr. Kitack Lim (Republic of Korea) who was appointed to the position with effect from 1 January 2016, for an initial four-year term.

• The previous holders of this office have been:
<table>
<thead>
<tr>
<th>Name</th>
<th>Country</th>
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<th>Name</th>
<th>Country</th>
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<tr>
<td>William Graham</td>
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<td>Chandrika Prasad Srivastava</td>
<td>India</td>
<td>1974-1989</td>
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<td>Efthimios E. Mitropoulos</td>
<td>Greece</td>
<td>2004-2011</td>
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Craftsman

- J&T Harrison
- Ex Crown of Toledo
- 1920 taken over by J&T Harrison
- 1930 laid up
- 1933 scrapped
Who carried out the various inspection and certification.

- The flag states.
- The open registers.
- The class societies on behalf of the flag states.
- The class societies have structural requirements, this including unified rules for bulk carriers and tankers, produced by LR, DNV and ABS.
- The class societies class the ships and certify that they comply with their rules.
- A ship has to be classed in order to register it by a flag state.
- 12 class societies are members of IACS, international association of class societies.
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IMO International Maritime Organization

Classification Societies.

Lloyd’s Register.

- The Society for the Registry of Shipping was set up in 1760 by customers of Edward Lloyd’s Coffee House in Lombard Street, London.
- The aim was to give merchants and underwriters recorded information on the quality of their vessels. The Register Book listed vessels rated, or classed, after the condition of their hulls and equipment had been surveyed.
- The subscriptions generated by the Register Book paid for the surveyors to carry out the work. This was the true beginning of classification and the Society was the world’s first classification society.
- Classification was and continues to be all about quality.
- Put simply, it is an assessment against defined standards of the condition of a ship either under construction or already in existence.
- From 1768 the Society used A1 to indicate a ship of the highest class. From 1775 A1 was used and is now famous as a symbol of quality.
IMO International Maritime Organization

Hellespont Alhambra

2002 Daewoo, SB, ME, Korea.
441,585 T DW
L 380 m
B 68 m
D 24.5 m
Now FSO, off Qatar
American Bureau of Shipping.

- ABS has been organized as a not-for-profit since its founding in 1862. ABS has been commissioned by the US government and the US Coast Guard to act in many maritime matters and has hired several former officers from the Coast Guard.
- ABS has more than 5,500 employees worldwide and is broadly divided into 2 groups: Engineering review and Surveying.
- The responsibility of the classification society is to verify that merchant ships and marine structures presented to it comply with Rules that the society has established for design, construction and periodic survey.
- Rules are derived from principles of naval architecture, marine engineering and associated disciplines.
- A new Rule, or a proposed change to an existing Rule, originates with one of the ABS Consulting technical committees, from in-service experience, from a new IACS Unified Requirement or from the ongoing research conducted by the technology staff at ABS. Research projects are conducted either directly by ABS or are undertaken jointly with industry.
IMO International Maritime Organization

Det Norske Veritas and Germanischer Lloyd.

- **DNV GL** is an international *certification body* and *classification society* with main expertise in technical assessment, advisory, and risk management.

- It was created in 2013 as a result of a merger between two leading organizations in the field - **Det Norske Veritas** ([Norway](#)) and **Germanischer Lloyd** ([Germany](#)).

- The company currently has 16,000 employees with headquarters close to [Oslo](#), Norway, and operates with the vision "*Global Impact for a Safe and Sustainable Future*".

- DNV was founded in 1864 in Oslo.

- GL was founded in 1867 in Hamburg.

- They employ 16000 people worldwide and have classed 13000 ships and offshore structures.
IMO International Maritime Organization

Hellespont Metropolis
2002 Daewoo, SB, ME, Korea.
441,585 T DW
L 380 m
B 68 m
D 24.5 m
Now FSO, off Qatar
Bureau Veritas S.A.

- Originally formed in Antwerp in 1828 as Bureau de Renseignements pour les Assurances Maritimes (Information office for the Maritime Insurance).
- The Bureau Veritas name was adopted in 1829. BV is a global company in testing, inspection and certification services.
- Bureau Veritas offer services and solutions to ensure that their clients' assets, products, infrastructure and processes meet standards and regulations in terms of quality, health and safety, environmental protection and social responsibility.
- At the end of 2015, the group had more than 66,000 employees in more than 1,400 offices and laboratories located in 140 countries.
Of all international conventions dealing with maritime safety, one of the most important ones is the International Convention for the Safety of Life at Sea (SOLAS).

It is also one of the oldest, the first version having been adopted at a conference held in London in 1914.

Since then there have been four other SOLAS conventions: the second was adopted in 1929 and entered into force in 1933; the third was adopted in 1948 and entered into force in 1952.

The fourth was adopted (under the auspices of IMO) in 1960 and entered into force in 1965; and the present version was adopted in 1974 and entered into force in 1980.
Daewoo Shipbuilding and Marine engineering
Hellespont Fairfax
Now Ti Oceania

Hellespont Tara
Now Ti Europa

Operated by Euronav, Antwerp, Belgium
The incident which led to the convening of the 1914 international SOLAS conference was the sinking of the White Star liner Titanic on her maiden voyage in April 1912. More than 1,500 passengers and crew died. The Conference was attended by representatives of 13 countries and the SOLAS Convention which resulted was adopted on 20 January 1914. The Convention was to enter into force in July 1915, but by then war had broken out in Europe and it did not do so, although many of its provisions were adopted by individual nations. In 1927, however, proposals were made for another conference which was held in London in 1929.
Titanic.

• Built Harland & Wolff, Belfast 1912.
• 46328 t gross.
• 2435 passengers, 892 crew, total 3327 PoB.
• Lifeboat capacity 1178 Persons?
IMO International Maritime Organization

- By 1948 the 1929 convention had been overtaken by technical developments and the 1948 SOLAS convention was created taking in account that now a permanent international body, IMO, was available.
- It was originally intended that the Convention would be kept up to date by periodic amendments to bring the IMO Convention into force.
- But the new Organization did not meet until 1959.
- It was then decided that rather than amend the 1948 Convention it would be better to adopt a completely new instrument - the fourth SOLAS Convention, 1960 SOLAS.
IMO International Maritime Organization

• The 1960 SOLAS Conference, which was attended by delegates from 55 countries, 21 more than in 1948, was the first conference to be held by IMO.

• Although only twelve years had passed since the last SOLAS Convention was adopted, the pace of technical change was quickening and the 1960 SOLAS Convention incorporated numerous technical improvements.

• Many safety measures which had once applied only to passenger ships were extended to cargo ships, notably those dealing with emergency power and lighting and fire protection.

• The radio requirements were again revised and in the chapter dealing with life-saving appliances.

• Provision was made for the carriage of life-rafts, which had developed to such an extent that they could be regarded as a partial substitute for lifeboats in some cases.
Acapulco

- Built 1923 Armstrong Withworth, Newcastle, UK
- As Mongolia, P&O. 16504 t gross
- 1951-1961, Nassau
- Cruises from New York to Nassau, Bahamas.
- 1961-1963 Acapulco, Mexico,
- LxB 175x72 m
- Scrapped 1964
In 1974 IMO decided to introduce a new SOLAS Convention.

This would not only incorporate all the amendments to the 1960 Convention so far adopted but would also include a new procedure which would enable future amendments to be brought into force within an acceptable period of time.

The 1974 SOLAS Conference was held in London from 21 October to 1 November and was attended by 71 countries.

The Convention which was adopted is the version currently in force and it is unlikely to be replaced by a new instrument because of the new tacit amendment procedure which is included in Article VIII.

Amendments adopted shall be deemed to have been accepted and enforced within two years after that.
Brief overview of the contents of this convention:

- **Chapter I**, General provisions. This includes requirements for passenger ship including that the Passenger Ship Safety Certificate has to be renewed once a year.

- **Chapters II-1 and II-2**
  
  This chapter includes a number of important changes from the 1960 version mainly in the area of fire safety.

- **Chapter II-1**: Construction - subdivision and stability, machinery and electrical installations

  The subdivision of passenger ships into watertight compartments must be such that after assumed damage to the ship's hull the vessel will remain afloat in a stable position.
IMO International Maritime Organization

Harmony of the Seas

Built 2016, STX, France
LXB 362.12x66 m
1.35 billion
226,000 t gross
25 knots maximum
120,000 HP
• **Chapter II-2**: Construction - Fire protection, fire detection and fire extinction
  • Division of the ship into main and vertical zones by thermal and structural boundaries.
  • Separation of accommodation spaces from the remainder of the ship by thermal and structural boundaries.
  • Restricted use of combustible materials.
• **Chapter III**: Life-saving appliances.
  • It included procedures for emergency and routine drills and contained additional requirements for passenger and cargo ships respectively.
• **Chapter IV**: Radiotelegraphy and radiotelephony
  • It prescribes the type of radio installations to be carried
Chapter V: Safety of navigation

The provisions of this chapter are mainly of an operational nature and apply to all ships on all voyages.

It includes the maintenance of meteorological services for ships; the ice patrol service; routing of ships; and the provision of search and rescue services; etc.

It also includes a general obligation for Contracting Governments to ensure that all ships are sufficiently and efficiently manned from a safety point of view.

Requirements for the fitting of radar and other navigational aids are also contained in this chapter.
IMO International Maritime Organization

Normandie

- Built 1935, Saint Nazaire, France.
- 79281 t gross
- LXB 313.6x36.4 m
- 29 knots speed
Normandie

• Built 1935, Saint Nazaire, France.
• Capsized in New York Harbor in 1940
• From passenger ship to aircraft carrier in WW 2
IMO International Maritime Organization

- **Chapter VI**: Carriage of grain
  - Shifting is an inherent characteristic of grain, and its effect on a ship's stability can be disastrous. Consequently, the SOLAS Convention contains provisions concerning stowing, trimming and securing the cargo.

- **Chapter VII**: Carriage of dangerous goods
  - It prescribes the classification, packing, marking and stowage of dangerous substances in packaged form.

- **The Collision Regulations**
  - One subject which was not discussed at the 1974 SOLAS Conference was the revision of the Collision Regulations, which had been on the agenda of all previous SOLAS conferences.
  - The Convention on the International Regulations for Preventing Collisions at Sea was adopted by an IMO conference in 1972 and entered into force in 1977.
• The 1978 SOLAS Protocol
• The requirements for entry into force of the SOLAS Convention - acceptance by 25 States with at least 50 per cent of world gross tonnage of merchant shipping.
• This meant that it would take several years before the Convention entered into force. It finally did so on 25 May 1980.
• In the meantime a series of accidents involving oil tankers in the winter of 1976-77, led to increasing pressure for further international action.
• As a result, early in 1978, IMO convened an international conference on tanker safety and pollution prevention which adopted a number of important modifications to SOLAS as well as to the International Convention for the Prevention of Pollution from Ships (MARPOL), 1973.
IMO International Maritime Organization

Queen Elizabeth

• Built, 1940 John Brown, Scotland
• LXB 314.2x36 m
• 28.5 kn
Since the 1974 SOLAS Convention had not entered into force it was impossible to amend the Convention.

Instead the conference decided to adopt a Protocol which would enter into force six months after ratification by 15 States with 50 per cent of world tonnage of merchant ships (but not before the parent 1974 SOLAS Convention had entered into force). The Protocol entered into force on 1 May 1981. The main points of the Protocol are as follows:

- New crude carriers and product carriers of 20,000 dwt and above are required to be fitted with an inert gas system (Chapter II-2).
- An inert gas system is mandatory for existing crude oil carriers of 70,000 dwt as of 1 May 1983, and as of 1 May 1985 for ships of 20,000-70,000 dwt (Chapter II-2).
In the case of crude carriers of 20,000-40,000 dwt there is provision for exemption by flag States where it is considered unreasonable or impracticable to fit an inert gas system and high-capacity fixed washing machines are not used.

But an inert gas system is always required when crude oil washing is operated.

An inert gas system is required on existing product carriers of 70,000 dwt as from 1 May 1983 and as from 1 May 1985 for ships of 40,000-70,000 dwt and down to 20,000 dwt where ships are fitted with high capacity washing machines (Chapter II-2).

All ships of 1,600-10,000 tons gross tonnage are required to be fitted with radar, and ships of 10,000 gross tonnage and above must have two radars, each capable of operating independently. Requirements for operation and testing of steering gear were also introduced (Chapter V).
United States

- Built 1952, Newport News, Shipbuilding.
- 45,400 t gross
- LXB 302x30.9 m
- Speed 44 knots maximum
All tankers of 10,000 gross tonnage and above must have two remote steering gear control systems, each operable separately from the navigating bridge.

The main steering gear of new tankers of 10,000 gross tonnage and above must comprise two or more identical power units, and be capable of operating the rudder with one or more units.

A number of important regulations designed to improve the survey and certification of ships were also adopted.

These include modifications to the provisions relating to the intervals of surveys and inspections and the introduction of intermediate surveys of life-saving appliances and other equipment of cargo ships and, in the case of hull, machinery and equipment, periodical surveys for cargo ships and intermediate surveys for tankers of ten years of age and over.

Unscheduled inspections and mandatory annual surveys were also introduced. Furthermore the port State control provisions were rewritten.
The 1988 Amendments

In March 1987 the roll-on/roll-off passenger ferry Herald of Free Enterprise capsized and sank shortly after leaving Zeebrugge in Belgium.

The accident resulted in the deaths of 193 passengers and crew members and led to demands for action to improve the safety of a ship type which has proved outstandingly successful from a commercial point of view.

Shortly after the accident the United Kingdom came to IMO with a request that a series of emergency measures be considered for adoption.

The proposals, many of which were based on the findings of the inquiry into the disaster, were presented to IMO in separate packages, the first of which was adopted by the MSC in April 1988.
Herald of Free Enterprise

- Owners: Townsend Thoresen.
- Capsized off Zeebrugge, Belgium. 6 March 1987, 193 PoB died
- Built, Schichau Unterweser, Bremerhaven.
- 13601 T gross
- L x B x d 131.91x23.19x5.72 m
- Speed max. 22 kn
The amendments involve the addition of new regulations 23-2 and 42-1 to Chapter II-1 of the SOLAS Convention.

Regulation 23-2 deals with the integrity of the hull and superstructure, damage prevention and control and requires that indicators be provided on the navigating bridge for all doors which, if left open, could lead to major flooding of a special category space or a ro-ro cargo space.

The same regulation also requires that means be arranged, such as television surveillance or a water leakage detection system, to provide an indication to the navigating bridge of any leakage through doors which could lead to major flooding.

Existing ships could be exempted from this requirement for a period of three years after the entry into force of the amendments (i.e. until 22 October 1992).
The vessel had a set of sliding doors at the stern allowing cars to drive off or on.

At the bow it had a bow visor being able to be lifted, hinged on the upper deck, also a ramp behind the door to allow cars to drive off or on.
IMO International Maritime Organization

Sinking

• The ship left its berth in Zeebrugge inner harbour at 18:05 (GMT) with a crew of 80 and carrying 459 passengers, 81 cars, 3 buses and 47 trucks. She passed the outer mole at 18:24 and capsized about four minutes later.[6]

• When the ferry reached 18.9 knots (35.0 km/h; 21.7 mph) 90 seconds after leaving the harbour, water began to enter the car deck in large quantities.

• The resulting free surface effect destroyed her stability.

• In a matter of seconds, the ship began to list 30 degrees to port. The ship briefly righted herself before listing to port once more, this time capsizing.

• The entire event took place within 90 seconds.

• The water quickly reached the ship's electrical systems, destroying both main and emergency power and leaving the ship in darkness.

• The ship ended on its side half-submerged in shallow water 1 kilometre (0.5 nmi; 0.6 mi) from the shore.

• Only a fortuitous turn to starboard in her last moments, and then capsizing on to a sandbar, prevented the ship from sinking entirely in much deeper water.
Scandinavian Star

• M/S Massalia was built by Dubigeon-Normandie S.A. in 1971 and delivered to Compagnie de Paquebots who put her on the route Marseille–Málaga–Casablanca and also cruises in the Mediterranean Sea. In 1984 she was owned by a number of companies and named Stena Baltica, Island Fiesta and finally Scandinavian Star.

• In 1990, the Scandinavian Star was sold to Vognmandsruten and put into service on DA-NO Linjen's route between Oslo, Norway, and Frederikshavn, Denmark.

• During the night of 7 April 1990, at about 2 a.m. local time, fire broke out and was discovered by a passenger and extinguished. 15 minutes later, a second fire broke out in an unoccupied portion of Deck 3 within the passenger section of the ship.
Scandinavian Star

• Being towed into a Swedish port near Gothenborg.
• Still on fire.
• Built 1971 at Dubigeon-Normandie, France.
• IMO # 7048219
• Scrapped 2004
Although the bulkheads were made of steel structure with asbestos wall boards, a melamine resin laminate was used as a decorative covering and proved extremely flammable in subsequent testing, spreading fire throughout Deck 3.

The burning laminates produced toxic hydrogen cyanide and carbon monoxide gases.

Vehicle storage area ventilated by large fans to remove exhaust fumes was also located nearby, and the fans pulled air through an improperly secured fire door and caused rapid fire progress from Deck 3 through Deck 4 and Deck 5 via stairways located on either end.

The captain later ordered his crew to turn off the ventilation system when he realized it was feeding the fire,
Scandinavian Star

- Being towed into port in Sweden.
- Being operated by Vognmandsruten, Oslo, Norway to Frederikshavn, Denmark.
- 10513 t gross.
Investigators proposed several reasons for why many passengers did not safely evacuate:

1. Many people probably did not hear the alarms due to distance between their cabins and the alarms, and due to ordinary mechanical noise of the ship systems.

2. Some people probably could not find their way out because of thick smoke obscuring the exit routes and signage.


4. Numerous Portuguese crew members did not speak or understand Norwegian, Danish or English, were unfamiliar with the ship, and had never practiced a fire drill. Only a few crew members even thought to put on breathing masks before entering smoke filled corridors.

5. On Deck 5, where most passenger deaths occurred, the hallways were arranged in a layout that contained dead-ends and did not otherwise logically lead to emergency exits.
IMO International Maritime Organization

Scandinavian Star

- Ship before the fire.
- L x B x d
- 142.24x22.2x 5.5 m
- Power 11770 kw
- Speed 20 kn
The April 1992 Amendments

• Measures to improve the damage stability of passenger ships came into force on 29 April 1990 and the April 1992 amendments to regulation 8 of Chapter II-1 mean that a slightly modified "SOLAS 90" standard.

• This will be phased in for ro-ro passenger ships built before that date during an 11-year period beginning on 1 October 1994.

• The application of the modified SOLAS 90 standard to existing ships means that a large part of the world's ro-ro fleet will have to be altered.

• In some cases the changes could be extensive and the high cost involved could lead to some of them being scrapped and replaced with new tonnage.
Those with an $A/A_{\text{max}}$ value of less than 70% for example, had to comply with the amendments by 1 October 1994, the date on which the amendments entered into force.

The complete phase-in period and degree of compliance is shown below:

<table>
<thead>
<tr>
<th>Compliance</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>$A$ over $A_{\text{max}}$ value</td>
<td>1 October 1994</td>
</tr>
<tr>
<td>Less than 70%</td>
<td></td>
</tr>
<tr>
<td>70%-less than 75%</td>
<td>1 October 1996</td>
</tr>
<tr>
<td>75%- less than 85%</td>
<td>1 October 1998</td>
</tr>
<tr>
<td>85%- less than 90%</td>
<td>1 October 2000</td>
</tr>
<tr>
<td>90%- less than 95%</td>
<td>1 October 2005</td>
</tr>
</tbody>
</table>
**IMO International Maritime Organization**

**St George**
- Built 1968
- 7359 t gross
• Built in 1968 by Swan, Hunter, Newcastle upon Tyne. Collided on 15 September 1982 with *Koningin Juliana*. Sold in November 1983 to Folk-Line and laid up in the *River Fal*.
• Sold in September 1984 to Psatha Navigation Co. Ltd, Limassol, Cyprus and renamed *Patra Express*.
• Rebuilt as a cruise ship in 1990 and renamed *Scandinavian Sky II*.
• Sold to MSJ Shipping Services, *Nassau, Bahamas* and renamed *Scandinavian Dawn*.
• Sold in 2000 to Discovery Dawn Partnership, Nassau. Chartered to Viva Gaming & Resorts, renamed *Texas Treasure*. Used as a casino ship at *Corpus Christi* and *Port Aransas, Texas*. Sold to India for scrapping in July 2008.
The *Estonia* disaster occurred on Wednesday, 28 September 1994, between about 00:55 and 01:50 (UTC+2) as the ship was crossing the Baltic Sea, en route from Tallinn, Estonia, to Stockholm.

*Estonia* was on a scheduled crossing with departure at 19:00 on 27 September.

She had been expected in Stockholm the next morning at about 09:30. She was carrying 989 people: 803 passengers and 186 crew.

Most of the passengers were Scandinavian, while most of the crew members were Estonian (several Swedish passengers were of Estonian origin).

The ship was fully loaded, and was *listing* slightly to starboard because of poor cargo distribution.
IMO International Maritime Organization
The first sign of trouble aboard Estonia was when a metallic bang was heard, caused by a heavy wave hitting the bow doors around 01:00, when the ship was on the outskirts of the Turku archipelago, but an inspection—limited to checking the indicator lights for the ramp and visor showed no problems.

Over the next 10 minutes, similar noises were reported by passengers and other crew.

At about 01:15, the visor separated in which the ship's bow door opened and the ship immediately took on a heavy starboard list (initial 30 to 40 degrees, but by 01:30, the ship had rolled 90 degrees) as water flooded into the vehicle deck.

Estonia was turned to port and slowed before her four engines cut out completely.
The vessel's rapid lean and the flooding prevented many people in the cabins from ascending to the boat deck.[10]

A **Mayday** was communicated by the ship's crew at 01:22, but did not follow international formats.

The ship disappeared from the radar screens of other ships at around 01:50, and sank at 59°23′N 21°42′E, about 22 nautical miles (41 km; 25 mi) on bearing 157° from Utö island, Finland, in 74 to 85 meters (243 to 279 ft) of water.

Of the 989 on board, 138 were rescued alive, but one died later in hospital. Ships rescued 34 and helicopters 104; the ferries played a much smaller part than the planners had intended because it was too dangerous to launch their man-overboard (MOB) boats or lifeboats. The accident claimed 852 lives.
IMO International Maritime Organization

**Estonia,**

- Built 1980 Meyer Werft, Papenburg, Germany.
- IMO # 7921033
- 15566 t gross
- \( L \times b \times d \)
- 157.20x24.21x 5.55 m
- Ice class 1A
- 17625 KW installed power.
- 21 kn speed
- 2000 pass, 460 cars
But despite its commercial success of Ro/Ro passenger ships, there have been disturbing accidents involving different types of ro-ro ship, the worst being the sudden and catastrophic capsizing of the passenger/car ferry **Herald of Free Enterprise** in March 1987 and the even more tragic loss of the **Estonia** in September 1994.

In response to those incidents, IMO has adopted a series of amendments to the International Convention for the Safety of Life at Sea (SOLAS) which are intended to ensure that incidents of that type would not re-occur.

More importantly, action should be taken before an incident occurs, applying the proactive policy IMO adopted in the 1990s.
Estonia

- Route Tallinn to Stockholm.
The November 1995 SOLAS amendments

• Major changes to international rules designed to improve the safety of roll on/roll off passenger ships were adopted by a conference held to consider proposals put forward by a Panel of Experts set up by IMO in December 1994 following the Estonia disaster of September 1994, in which more than 850 people were killed.

• The amendments entered into force under tacit acceptance on 1 July 1997.

• The most important changes concerned the stability of ro-ro passenger ships. The Estonia, like the Herald of Free Enterprise in 1987, sank because so much water built up on the cargo decks that stability was impaired and the ship capsized.
19th IMO Assembly - November 1995 - adopted:

A.792(19) Safety culture in and around passenger ships.

A.793(19) Strength and securing and locking arrangements of shell doors on ro-ro passenger ships.

A.794(19) Surveys and inspections of ro-ro passenger ships.

A.795(19) Navigational guidance and information scheme for ro-ro ferry operations.

A.796(19) Recommendations on a decision-support system for masters on passenger ships
The SOLAS 90 damage stability standard, which had applied to all ro-ro passenger ships built since 1990, was extended to existing ships in accordance with an agreed phase-in program.

Ships that only meet 85% of the standard had to comply fully by 1 October 1998 and those meeting 97.5% or above, by 1 October 2005.

(The SOLAS 90 standard refers to the damage stability standard in the 1988 (October) amendments to SOLAS adopted 28 October 1988 and entering into force on 29 April 1990.)

The conference also adopted a new regulation 8-2, containing special requirements for ro-ro passenger ships carrying 400 passengers or more.

This is intended to phase out ships built to a one-compartment standard and ensure that they can survive without capsizing with two main compartments flooded following damage.
IMO International Maritime Organization

MARPOL

Marine Pollution.

- Annex I of MARPOL 73/78 Regulations for the Prevention of Pollution by Oil

- Annex II of MARPOL 73/78 Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk

- Annex III of MARPOL 73/78 Regulations for the Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Form
• Annex IV of MARPOL 73/78 Regulations for the Prevention of Pollution by Sewage from Ships

• Annex V of MARPOL 73/78 Regulations for the Prevention of Pollution by Garbage from Ships

• Annex VI - Regulations for the Prevention of Air Pollution from Ships
Torrey Canyon Oil Spill

• When: March 18-1967
• Where: Scilly Isles, SW UK, the ship came from Kuwait going to Milford Haven in Wales, UK.
• Amount spilled: approx. 30 million gallons of crude oil.
• The Torrey Canyon was one of the first VLCC’s, she was originally built to carry 60,000 tons, later enlarged to carry 120,000 tons.
• Toxic solvent-based cleaning agents were used, were used by Royal Navy vessels to try to disperse the oil.
• That didn't work very well and instead caused a great deal of environmental damage. It was then decided to set fire to the ocean and burn away the oil by dropping bombs.
IMO International Maritime Organization

Torrey Canyon

- The vessel shortly after it ran aground on the rocks of the Scilly Isles
IMO International Maritime Organization

• Torrey Canyon was one of the largest ships afloat. At 974 feet long, the ship had been "jumboized" by Sasebo Heavy Industries in Japan during the oil boom of the 1960s. At that time, its capacity was nearly doubled, giving it a capacity of 120,000 tons of oil. When the accident occurred, the ship was carrying 100,000 tons, or approximately 730,000 barrels.

• The supertanker cruised at 17 knots, took about one minute to turn through 20° and five miles to stop from cruising speed.

• The ship was the property of a U.S. company based in Bermuda, sailed under the Liberian flag with an Italian crew and was working for British Petroleum.

• Because of its size, Torrey Canyon could not pass through the Suez Canal. Instead, the ship's route took it around Africa by way of the Cape of Good Hope. On March 14, it passed between Tenerife and Gran Canaria in the Canary Islands.
From there Rugiati called the ship's agent and was informed that it was imperative that he arrive at his destination by high tide at 2300 on March 18.

Otherwise it would be nearly a week before the tide would be high enough for the tanker to enter the harbor. The earliest the captain could hope to make the harbor was 1700 on March 18.

Rugiati set a course from the Canaries that should have taken *Torrey Canyon* five miles to the west of the Isles of Scilly. The ship was on autopilot. At noon on March 17, he checked his position and found that he was on course. When he went to bed that night, he left instructions to wake him at 0600, expecting to have the Scillies on radar, somewhere off the starboard bow by that time.
• Instead, the next morning the Scillies appeared off the port bow.
• During the night, strong currents had pushed *Torrey Canyon* to the north and east.
• Also, while the captain slept, the chief officer altered the course from 18° to 12°.
Upon awakening, Rugiati ordered a return to his original course of 18°. By now, Torrey Canyon's course placed the Seven Stones in its path. High tide would obscure the reef from sight.

The captain was aware of the problem and planned to make adjustments to take the ship through a deep channel between the Scillies and the Seven Stones.

Some fishing boats obstructed the way, however, causing a delay in his plans. Instead, he made two slight corrections of 3° and 2°, setting a new course of 13°, and left the supertanker on autopilot for a while.

A couple of hours later, Rugiati switched off the autopilot, brought the ship around to 0° and switched the autopilot back on.
The officer on watch could clearly see that *Torrey Canyon* was already among the slightly submerged rocks of Seven Stones.

He noted that it was 0848 on March 18. Informed of the problem, Rugiati, still groggy from only three hours sleep, ordered a hard swing to port. *Torrey Canyon* was not turning.

Rugiati decided that there must be a problem, maybe blown fuses. A quick check revealed none. The autopilot had mistakenly been left on.

The captain now made a desperate attempt to clear the reef. Knowing the normally slow rate of turn, he must have sensed impending disaster. The order was immediately carried out, but with the autopilot still on, *Torrey Canyon* did not respond. Realizing the problem, the captain made a quick switch back to manual.
This generated the desired reaction from the ship, but it was too late.

*Torrey Canyon* hit Pollard's Rock at full speed. Initially, it was estimated that the collision had ripped open six of Torrey Canyon's 18 cargo tanks.

An order of full astern was obeyed but had no effect. The bottom was being torn out of *Torrey Canyon*. 
On the afternoon of March 26, British Navy observers noted that *Torrey Canyon* had become "humped."

The ship's back was broken. Oil was pouring into the sea.

Ten days after the accident, salvage crews conceded that *Torrey Canyon* was lost.
That day it broke into three parts and the balance of the oil poured into the water.

The only solution left was to do what the British Navy originally wanted — set the oil on fire.

The last of the salvage crews abandoned ship, the wreckage was bombed from the air and the RAF sprayed cans of aviation fuel on the slick to make sure the oil caught fire.
The wreckage burned as a result of an engine explosion, but seas were so rough and evaporation of the thin, flammable layer of the crude was so rapid that the slick would not ignite.

The next day the RAF bombed the wreckage again and coated the slick with more aviation fuel.

Even rockets were fired at the floating oil.
IMO International Maritime Organization

• More and more explosives were dropped, but to no avail.
• The Royal Navy made an inspection of the wreck and discovered that all the oil at the tanker site had indeed burned.
• They also determined that the slick was not going to ignite.
• On Tuesday, March 28, 1967, the world's first major oil tanker disaster in history had done its immediate damage at massive cost to both economic and natural resources.
Amoco Cadiz Oil Spill

- When: March 16, 1978
- Where: Portsail, Britany, France
- Amount spilled: 69 million gallons
- The massive Amoco Cadiz was caught in a winter storm that damaged the ship’s rudder and steering gear.
- The ship put out a distress call, but while several ships responded, none were able to prevent the ship from running aground.
- On March 17, the gigantic supertanker broke in half, sending its 69 million gallons of oil into the English Channel.
- The French later sunk the ship.
Over a period of two weeks the entire cargo of 223,000 tonnes of light Iranian and Arabian crude oil and 4,000 tonnes of bunker fuel was released into heavy seas.

Much of the oil quickly formed a viscous water-in-oil emulsion, increasing the volume of pollutant by up to five times.

By the end of April oil and emulsion had contaminated 320km of the Brittany coastline, and had extended as far east as the Channel Islands.

Strong winds and heavy seas prevented an effective offshore recovery operation. All told, less than 3,000 tonnes of dispersants were used.

At the time, the Amoco Cadiz incident resulted in the largest loss of marine life ever recorded after an oil spill.
Amoco Cadiz

- The oil tanker *Amoco Cadiz* ran aground on *Portsall Rocks*, 5 km (3.1 mi) from the coast of *Brittany*, France.

- On 16 March 1978, and ultimately split in three and sank.

- All together resulting in the *largest oil spill* of its kind in history to that date.
En route from the Persian Gulf to Rotterdam, Netherlands, via a scheduled stop at Lyme Bay, Great Britain, the ship encountered stormy weather with gale conditions and high seas while in the English Channel.

At around 09:45, a heavy wave slammed into the ship's rudder and it was found that she was no longer responding to the helm.

This was due to the shearing of studs in the Hastie four ram steering gear. Attempts to repair the damage and regain control of the ship were made but proved unsuccessful.
The German tug Pacific responded to Amoco Cadiz at 11:28, offering assistance under a Lloyd's Open Form (see below). It arrived on the scene at 12:20, but because of the stormy sea, a tow line was not in place until 14:00, and broke off at 16:15.

Several attempts were made to establish another tow line and Amoco Cadiz dropped its anchor trying to halt its drift.

A successful tow line was in place at 20:55, but this measure proved incapable of preventing the supertanker from drifting towards the coast because of its huge mass and Force 10 storm winds.
At 21:04 *Amoco Cadiz* ran aground the first time, flooding its engines, and again at 21:39, this time ripping open the hull and starting the oil spill.

Her crew was rescued by *French Naval Aviation* helicopters at midnight.
Her captain and one officer remained aboard until 05:00 the next morning.

At 10:00 on 17 March the vessel broke in two, releasing its entire cargo of 1.6 million barrels (250,000 m³) of oil, and broke again eleven days later from the buffeting of high stormy seas.

The wreckage was later completely destroyed with depth charges by the French Navy.
Amoco Cadiz

- *Amoco Cadiz* contained 1,604,500 barrels (219,797 tons) of light crude oil from *Ras Tanura, Saudi Arabia* and *Kharg Island, Iran*. Severe weather resulted in the complete breakup of the ship before any oil could be pumped out of the wreck, resulting in its entire cargo of crude oil and 4,000 tons of fuel oil being spilled into the sea.

- A 12 mi (19 km) long slick and heavy pools of oil spread onto 45 mi (72 km) of the French shoreline by northwesterly winds. Prevailing westerly winds during the following month spread the oil approximately 100 mi (160 km) east along the coast.
• Oil penetrated the sand on several beaches to a depth of 20 inches (500 mm). Sub-surface oil separated into two or three layers due to the extensive sand transfer that occurred on the beaches during rough weather.

• Piers and slips in the small harbors from Porspoder to Brehat Island were covered with oil.

• At the time, Amoco Cadiz incident resulted in the largest loss of marine life ever recorded from an oil spill. Mortalities of most animals occurred over the two months following the spill. Two weeks following the accident, millions of dead molluscs, sea urchins, and other bottom dwelling organisms washed ashore.

• Diving birds constituted the majority of the nearly 20,000 dead birds that were recovered. The oyster mortality from the spill was estimated at 9,000 tons. Fishermen in the area caught fish with skin ulcerations and tumors.
Amoco Cadiz

• Built May 1975, Astilleros Espanoles, Cadiz Spain.
• IMO # 7336922
• LxBxD 334.02x51x19.80
• 109,700 t gross
• 233,000 t dw
• 23,700 kw, diesel
• 15 kn
Prestige

• The *Prestige* was a **Greek**-operated, single-**hulled** oil tanker, officially registered in the **Bahamas**, but with a **Liberian**-registered single-purpose corporation as the owner.

• The ship had a deadweight tonnage, or carrying capacity, of approximately 81,000 tons, a measurement that put it at the small end of the **Aframax** class of tankers, smaller than most carriers of crude oil but larger than most carriers of refined products.

• It was **classed** by the American Bureau of Shipping and insured by the London Steam-Ship Owners' Mutual Insurance Association, a shipowners' mutual known as the London Club.
On November 13, 2002, while the Prestige was carrying 77,000 metric tons of cargo of two different grades of heavy fuel oil.

One of its twelve tanks burst during a storm off Galicia, in northwestern Spain.
Fearing that the ship would sink, the captain called for help from Spanish rescue workers, with the expectation that the vessel would be brought into harbor.

However, pressure from local authorities forced the captain to steer the embattled ship away from the coast and head northwest.

At around 8:00 a.m. on November 19, the ship split in half. It sank the same afternoon, releasing over 20 million US gallons (76,000 m³) of oil into the sea.

The oil tanker was reported to be about 250 kilometers from the Spanish coast at that time.

An earlier oil slick had already reached the coast.

The Greek captain of the *Prestige*, Apostolos Mangouras, was taken into custody, accused of not cooperating with salvage crews and of harming the environment.
For the world maritime industry, a key issue raised by the "Prestige" incident was whether classification societies can be held responsible for the consequences of incidents of this type.

In May 2003, the Kingdom of Spain brought civil suit in the Southern District of New York against the American Bureau of Shipping (ABS), the Houston-based international classification society that had certified the "Prestige" as "in class" for its final voyage.

The "in class" status states that the vessel is in compliance with all applicable rules and laws, not that it is or is not safe.
• On 2 January 2007, the docket in that lawsuit (SDNY 03-cv-03573) was dismissed.

• The presiding judge ruled that ABS is a "person" as defined by the International Convention on Civil Liability for Oil Pollution Damage (CLC) and, as such, is exempt from direct liability for pollution damage.

• Additionally, the Judge ruled that, since the United States is not a signatory to the International CLC, the US Courts lack the necessary jurisdiction to adjudicate the case. Spain's original damage claim against ABS was some $700 million.
Erika

- Built 1975, Kasado Dock Co, Japan.
- L x d 184x 10.90 m.
- 13,200 HP
- 37,283 t dw
- Inexpensive, 10% less steel than comparable vessel.
• The ship broke into two pieces on December 11-12 1999 while located in the entrance of the Bay of Biscay in bad weather.
• Sunk on December 12 1999.
• She carried 31,000 tons of heavy fuel oil.
IMO International Maritime Organization

Brear

- Built 1976, Oshima Sb Co, Japan.
- She ran aground near Queensdale, Shetland Island, Scotland, January 5, 1993.
- 233,000 t dw
- L x B x d 334.02x51x19.80 m
- 22,700 diesel, 15 kn
IMO International Maritime Organization

- She lost power due to seawater contamination of the ship’s fuel on January 3, 1993.

- This occurred after a vent pipe on deck broke loose.

- The ship was loaded with 85,000 ton of Norwegian crude oil.
• She was on the way from Bergen, Norway to Quebec, Canada.

• Being 10 miles away from the coast of the Shetlands, the lost power of the main engine was no immediate danger.

• But she slowly drifted to the shore and by January 5 she ran aground.
Phasing out single hull tankers

• MARPOL 13 G ruled that all single hull tankers had to be phased out, starting in 2005 and being completed in 2015 or when the ships (tanker was 25 years old, all subject to tankers of 15 years and older be subject to CAS, Condition Assessment Scheme.

• Gradually the single hull tankers disappeared and were replaced with double hull ones.
IMO International Maritime Organization

Phasing out single hull tankers
IMO International Maritime Organization

1989
Exxon Valdez tanker runs aground

1990
US Congress passes Oil Pollution Act, requiring double hulls on new vessels

2015
Deadline for phase-out of single hull tankers in US waters