Europe and Africa Regional Marine Forum Mooring Equipment Guidelines (MEG) - Overview and Update

Andy Dogherty – MEG4 Revision SG Chairman

OCIMF

MEG Revision - Background

- MEG3 – 3rd Edition published in 2008
  - OCIMF PTC already noted as due for update
- Scope review determined a major revision required
  - Lessons learned from incidents, notably HMSF
    - Incident involving member company LNG vessel – ‘ZARGA’
  - Industry heightened concerns raised at IMO
    - Developments at IMO to enhance SOLAS
  - Focus on role of Human Factors in mooring
    - Enhance awareness on Human Centred Design
    - Positive impact of effective HF management in mooring
  - Facilitate technological advances in safe mooring

Known **Mooring Incidents**

IMO:

- MSC 95/19/13 – Japan had more than 90 accidents in five years with two losses of lives.
- SDC 4/INF.3 – ICHCA International Ltd. (ICHCA), 42 incidents, 25 line failures, 20+ loss of life; over 22 years

Known Mooring Incidents

MAIB:

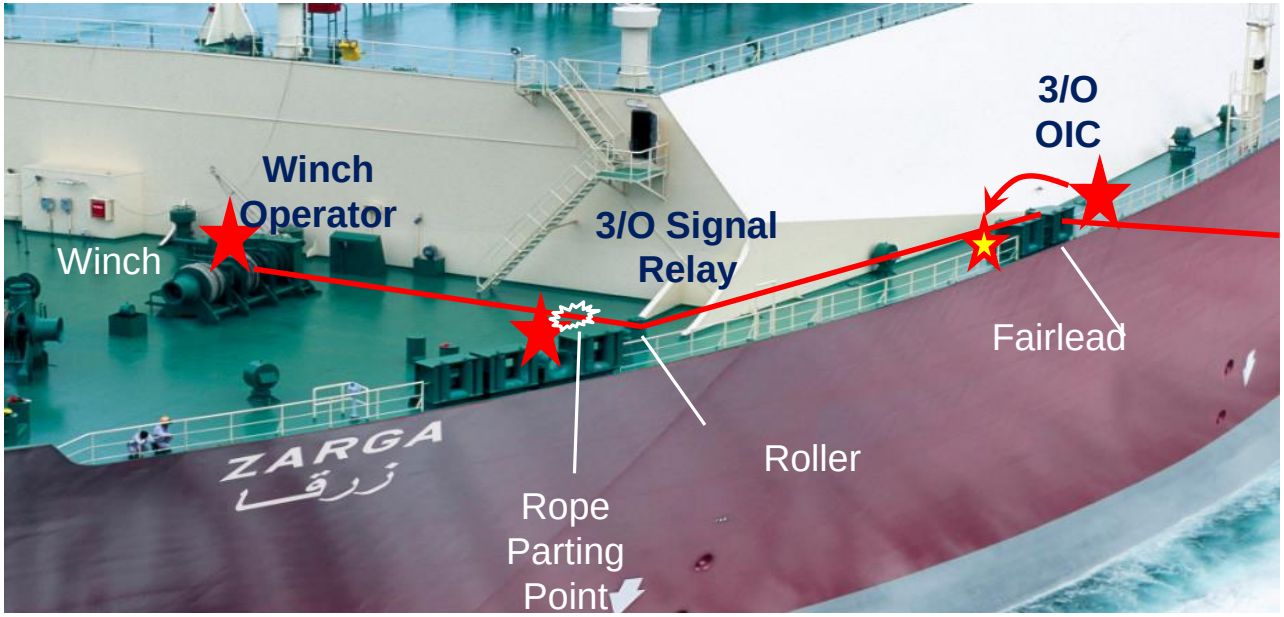
- Between 2007 and 2016:
  - 37 mooring line failures or snapbacks resulting in three fatalities and 23 injuries.

EMSA:

- Between 2007 and 2016:
  - 213 incidents recorded during ship operations that include "berthing". These resulted in 4 fatalities and 96 injuries.

Source: MAIB January 2018

Zarga



https://www.gov.uk/maib-reports/failure-of-mooring-line-on-board-lng-carrier-zarga-with-1-person-injured

- **Howard Flegg (Inspector of Marine Accidents, MAIB) has provided details**
- **Highly technical report; 100+ pages plus a technical annexes**
  - ***OCIMF supported investigation and leveraged from lessons learned in MEG4***

Mooring Equipment Guidelines (MEG4)

KEY MESSAGES

1. Snap-back
   - Complex
   - No safe area
2. Fit-for-purpose ropes
   - HMSF vs others
   - Purchasing
   - Monitor usage
   - Line Management Plan (LMP)
   - Retirement before failure
3. Human Factors (HCD)
   - Design
   - Operations & Maintenance

Equipment, ropes, tails and layout should be designed, operated and maintained as an integrated mooring system

OTHER IMPORTANT FACTORS

* Effective mooring management
  - Through life-cycle management using a Mooring System Management Plan (MSMP)
* Terminology clarification
  - Standardisation of terminology to help eliminate misinterpretation across stakeholders

MEG4 – Enhanced Guidance

1. Snap-back
   - Industry alignment against snap back ‘zones’ marked on deck.
   - Consider whole mooring deck as area of ‘elevated’ risk
2. Line Management Plan (LMP)
   - Effective management of operation, maintenance and retirement of mooring lines and tails.
3. Human Factors
   - Step change in mooring safety through human centred design considerations and implementation of safety critical task analysis
4. Mooring System Management Plan (MSMP)
   - Enhancing the shipboard SMS with a goal based approach to the effective management of the ‘total mooring system’
5. Terminology Clarification
   - Minimum Breaking Load Ship Design (MBL SD)
     - *MBL of new, dry mooring lines which ship’s mooring system is designed*
   - Working Load Limit (WLL)
     - *Maximum load a mooring line should be subjected in operational service*
   - Line Design Break Force (LDBF)
     - *Minimum force a new, dry, spliced mooring line will break at per MEG4*

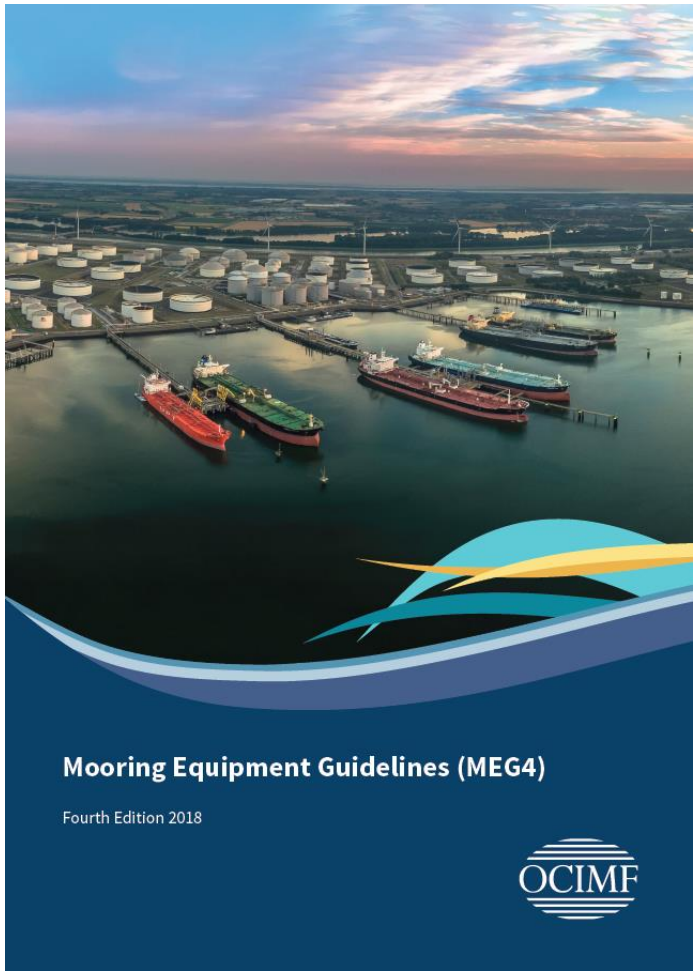
Mooring Equipment Guidelines (MEG4)
Recognition

- Wide variety of industry bodies and SMEs involved;
  - ✓ Rope manufacturers associations;
  - ✓ Classification societies;
  - ✓ Ship operator associations;
  - ✓ Ship building associations;
  - ✓ Terminal design association;
  - ✓ Equipment Manufacturers;
  - ✓ Human Factors expertise ….
- Working Groups – Main WG; HMSF; WCDC; HF

Main WG

HMSF WG

MEG 4



Target Publication Release

June 2018

Chapters

1 – Introduction to Mooring ← *MSMP*

2 – Human Factors ← *HCD*

3 – Mooring Forces & Environmental Criteria ← *WCDC*

4 – Mooring Arrangements and Layouts

5 – Mooring Lines ← *LMP*, *Snap-back*

6 – Mooring Winches

7 – Mooring and Towing Fittings

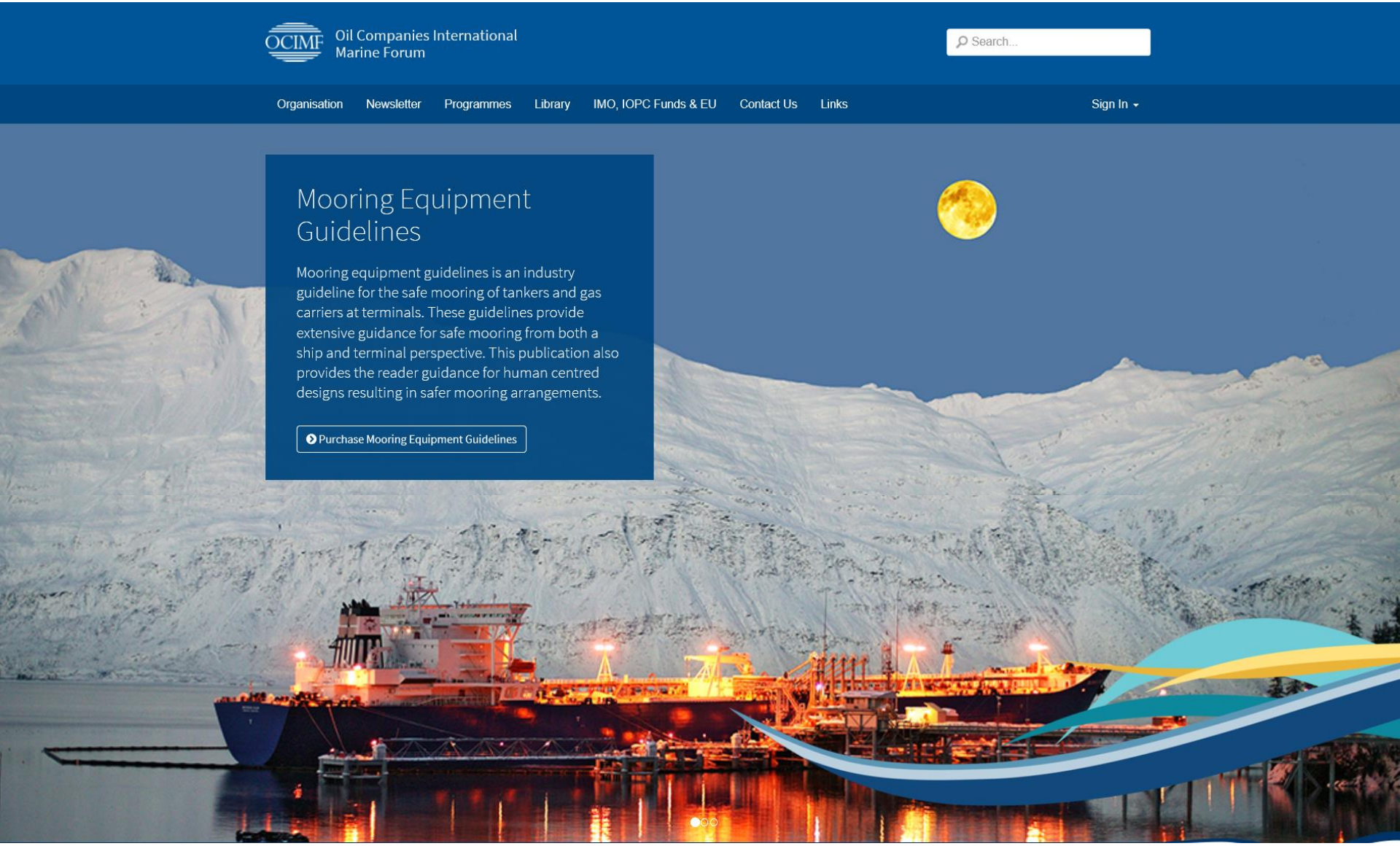
8 – Structural Reinforcements

9 – Berth Design and Fittings

10 – Ship/Shore Interface ← *Terminal Interface*

11 – Alternative Mooring Technology ← *New Technology*

MEG 4 Website



MEG 4 Website

New Terminology

During the revision of MEG it was clear there is confusion in the shipping industry with the term Minimum Breaking Load (MBL) and other terminology relating to line strength.

Further, there was no industry guidance on condition based monitoring of mooring lines and tails. Since nearly all mooring injuries are a result of mooring line failures, OCIMF has strived to provide guidance and clarity on the condition monitoring of mooring lines. Below is a list of some new terms that will be introduced in MEG4. We also encourage you to visit the Clarifications section for further information.

Minimum Breaking Load Ship Design – MBL SD

MBL SD is the minimum breaking load of new, dry , mooring lines for which a Ship's mooring system is designed, in order to meet OCIMF Standard Environmental Criteria restraint requirements. The MBL SD is the core parameter against which all the other components of a Ship's mooring system are sized and designed, with defined tolerances.

Line Design Break Force – LDBF

LDBF is the minimum force that a new, dry, spliced, mooring line will break at, when tested according to Appendix D of MEG 4. This is for all cordage (synthetic) materials except Nylon which is tested wet and spliced. When selecting lines, the LDBF of a line shall be 100%-105% of the MBL SD. LDBF replaces the terms "MBL of the line" or "rope MBL", currently used in MEG 3.

Working Load Limit – WLL

WLL is the maximum load that a mooring line should be subjected to in operational service, calculated from the MEG 4 Standard Environmental Restraint criteria. The WLL of mooring lines should be used as user operating limiting values, not to be exceeded.

Line Management Plan – LMP

LMP is used to manage the operation and retirement of mooring lines and tails. The LMP also documents the requirements, assumptions and evaluation methods used in determining the line retirement criteria. The LMP is specific to an operator, Ship type, and trade route; however, MEG4 gives general guidance on establishing a LMP.

MEG 4 Website

Feedback to OCIMF

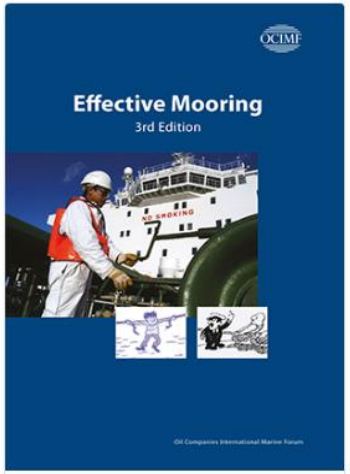
If you have a query relating to MEG4, please first visit the Clarifications section where the answers to the many commonly asked questions can be found

Leave Feedback

Templates | Related Publications | Related Links | Clarifications | Gallery

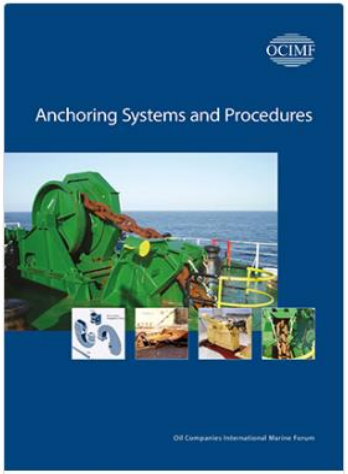
Related Publications

This section provides links to OCIMF and other industry guidance they may be of benefit with respect to mooring design and operations.



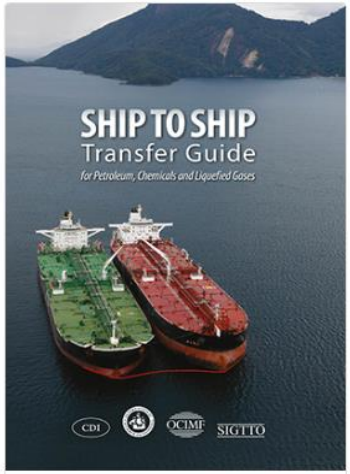
Effective Mooring

This popular title, now in its third edition, provides practical guidance on the basic principles of mooring. This booklet will be



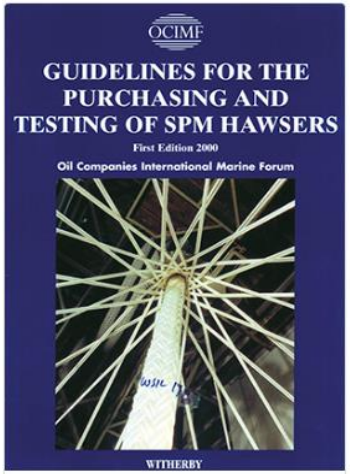
Anchoring Systems and Procedures

This publication highlights the design capabilities and limitations of anchoring systems and



Ship to Ship Transfer Guide for Petroleum, Chemicals and Liquefied Gases

This industry guide provides recommendations on STS



Guidelines for the Purchasing and Testing of SPM Hawsers

Provides detailed specifications and guidelines for specification, purchasing and testing of SPM

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Related Links

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.

EMSA

The European Maritime Safety Agency was established to ensure a high, uniform and effective level of maritime safety, maritime security, prevention of, and response to, pollution caused by ships as well as response to

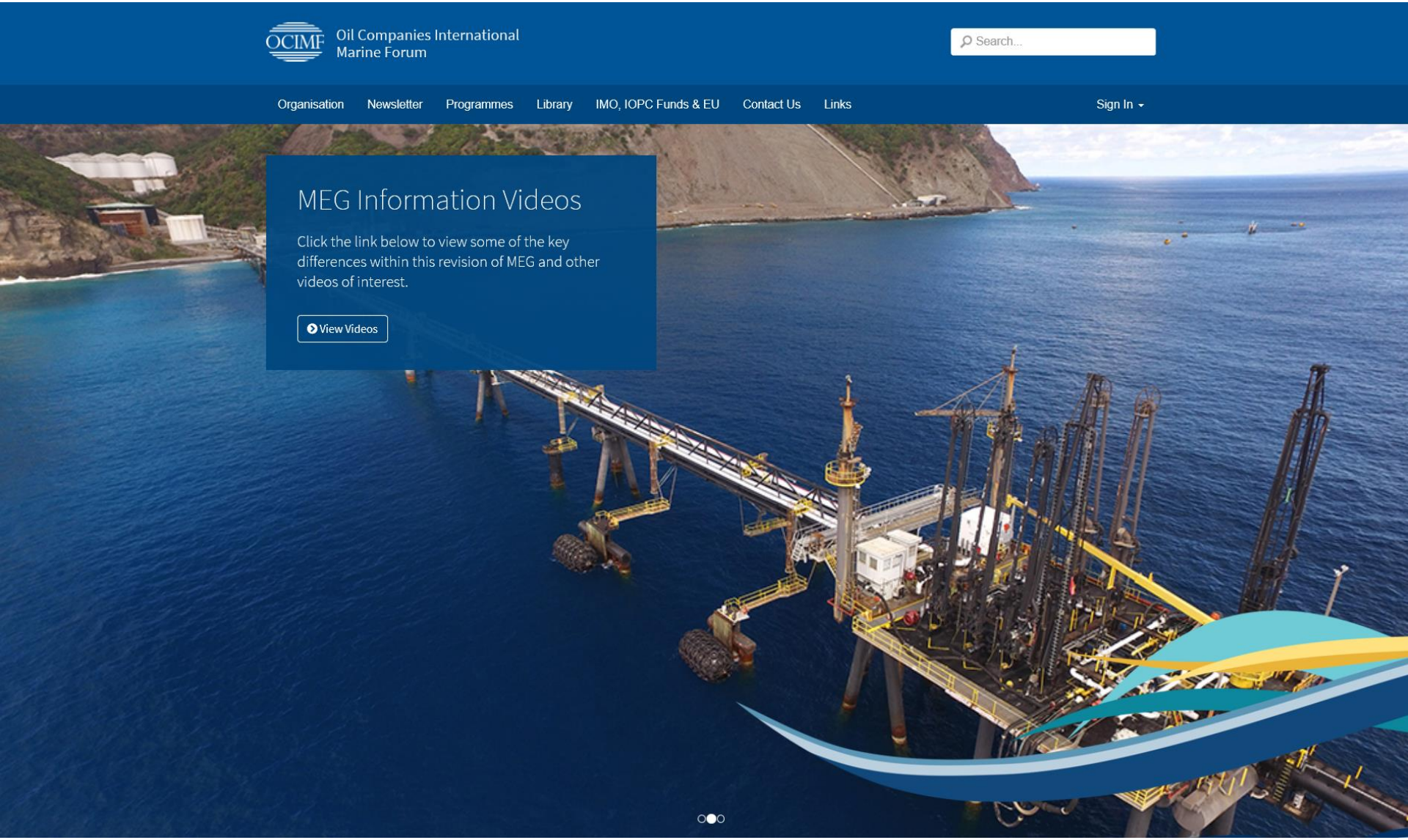
MAIB

The MAIB investigates marine accidents involving UK vessels worldwide and all vessels in UK territorial waters.

IACS

Dedicated to safe ships and clean seas, IACS makes a unique contribution to maritime safety and regulation through technical support, compliance verification and research and development.

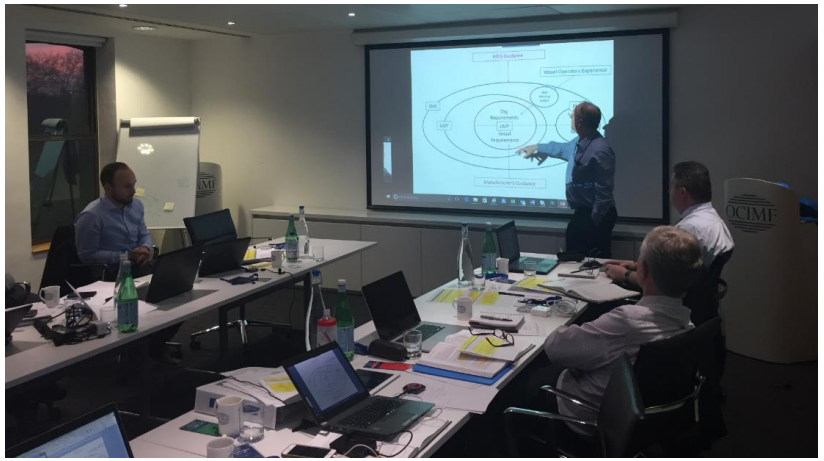
MEG 4 Website



How MEG aids IMO and SOLAS

Industry Collaboration:

- Incident investigators; MAIB
- Ship Owners/Operators, Builders and IACS
- Ports and Terminals
- Mooring line manufacturers



IMO Goal Based Standards

Regulation → Functional Objectives → Achievement of Functional Objectives

http://www.imo.org/en/OurWork/safety/safetytopics/pages/goal-basedstandards.aspx

Current SOLAS

Regulation 3-8

Towing and mooring equipment

1 This regulation applies to ships constructed on or after 1 January 2007, but does not apply to emergency towing arrangements provided in accordance with regulation 3-4.

2 Ships shall be provided with arrangements, equipment and fittings of sufficient safe working load to enable the safe conduct of all towing and mooring operations associated with the normal operation of the ship.

3 Arrangements, equipment and fittings provided in accordance with paragraph 2 shall meet the appropriate requirements of the Administration or an organization recognized by the Administration under regulation I/6.†

4 Each fitting or item of equipment provided under this regulation shall be clearly marked with any restrictions associated with its safe operation, taking into account the strength of its attachment to the ship's structure.

SDC5 Draft SOLAS

DRAFT AMENDMENTS TO SOLAS REGULATION II-1/3-8

The existing regulation 3-8 is replaced with the following:

"*Towing and mooring equipment*

7 For ships of 3,000 gross tonnage and above the design of the mooring arrangement and the selection of appropriate mooring equipment including lines shall be based on guidelines developed by the Organization**, applying a human-centred design approach.

8 Ships of less than 3,000 gross tonnage shall comply with the requirement in paragraph 7 above as far as reasonably practicable, or with applicable national standards of the Administration which provide an equivalent level of safety.

9 For all ships, mooring equipment including lines shall be inspected and maintained in suitable condition for their intended purposes***.

Draft IMO Guidelines

I. Guidelines for Mooring Design – *NEW*

GUIDELINES ON THE DESIGN OF MOORING ARRANGEMENTS AND THE SELECTION OF APPROPRIATE MOORING EQUIPMENT AND FITTINGS FOR SAFE MOORING

II. Guidelines for Selection, Inspection, and Retirement of Lines – *NEW*

GUIDELINES FOR INSPECTION AND MAINTENANCE OF MOORING EQUIPMENT INCLUDING LINES

Draft Mooring Design Guidance

4 Functional objectives

In order to achieve the goals for the correct equipment selection and mooring arrangement design safety objectives set out in paragraph [...], the following functional objectives should be applied. Ships shall be provided with mooring equipment and fittings, according to ship types:

.1 designed with systems to provide mooring personnel with the loads on the mooring lines during mooring operations and while the ship is moored to verify that the limitations of the lines are not exceeded;

.2 arranged to minimize obstructed access to and operation of the mooring equipment;

.3 arranged to minimize obstructed access to working space, and minimize obstructed view of the mooring area;

.4 arranged to minimize the need for complex mooring line configurations during the normal operation of the ship;

.5 selected and arranged to minimize the need for manual handling of mooring lines under load; and

.6 selected and arranged to minimize the exposure of personnel involved in mooring operations to the dynamic loads of mooring lines.

It's a Journey…

Safe Mooring

IMO

DRAFT Language

1. Lines in SOLAS
2. HCD
3. Line tension monitoring

MEG

1. Snap-back is complex
2. Fit for purpose lines
3. Human Factors (HCD)
4. Mooring 'system' management

You

What are key items to send your crew home safely?

1. Line Tension Monitoring?
2. HCD Mooring?
3. Condition Monitor Lines?

A Voice for Safety