IUMI Policy Agenda

6. Fuels

Brief description

Machinery damage is by far the most frequent cause of loss in marine insurance, and the numbers are likely to increase with the introduction of low-sulphur limits. Historically, 40% of all hull claims by number are machinery damage making up 30% of the costs.

Low-sulphur fuels
The MARPOL regulation limiting sulphur oxide emissions from ships with a global cap of 0.5% will become mandatory on 1 January 2020. IMO's Marine Environmental Protection Committee (MEPC) confirmed the date of implementation in October 2016 and again in October 2018. Concerns have been raised in relation to fuel stability, differences in composition and blending from supplier to supplier and port to port, lower flashpoints than the minimum required by international safety regulations, inadequate safety margins for catalytic fines and ignition delays stemming from inferior combustibility. A new guidance to assist shipowners to safely comply with the 2020 sulphur cap was approved by MEPC 73 in October 2018. The Committee also invited new submissions on how to enhance the implementation and non-availability reporting to MEPC 74 in May 2019.

In May 2018, the Maritime Safety Committee (MSC) was invited by an intersessional working group to consider the safety concerns linked to the transition in its next session. As part of a multi-stakeholder exercise, an industry guidance is also under development by a group of international shipowner and bunker (supplier) associations under the leadership of OCIMF.
The International Standards Organisation (ISO) is expected to produce a new standard for the 0.5% fuel before 2020. Guidance on the type of fuel blends the organization anticipates being available is also under development.

1 January 2015 was the implementation date of the 0.1% sulphur content limit for marine fuel on vessels operating in the northern European Emission Control Areas (ECAs) and the North American Emission Control Area. Statistics from the California Department of Fish and Wildlife show that switch-overs between heavy fuel oils and distillate fuels to comply with the lower 0.1% sulphur limit in the Californian ECA increase the risk of vessels losing power. The risks related to the complex switch-over will have to be carefully monitored, and proper crew training and awareness is needed.

China has published new regulations designating the following three areas as sulphur control areas obliged to use fuel containing less than 0.5% sulphur from 31 August 2018 (Yangtze River Delta), 1 January 2019 (Pearl River Delta and the Bohai Sea) and while berthed in the emission control areas from 1 September 2017. Eleven key ports within the designated areas will apply the same requirement to ships at berth as of January

2017, and the requirement is already in force for key ports in the Yangtze River and Shenzhen Port. At the end of 2019, the Chinese government will assess the situation and consider whether it is necessary to reduce the sulphur limit to 0.1%.

The most commonly used fuel type for inland navigation, EN 590, is a low-sulphur fuel that does not require the use of purifiers. However, bad fuel quality, and infrequent or incorrect cleaning of fuel tanks have all contributed to damages in this segment and should be properly dealt with.

The main challenges with the ultra-low sulphur fuel oil (ULFSO) are: Cold flow properties (heating required), stability (limited experience), and compatibility (increased storage capacity and separation requirements, and higher demands for tank cleaning between bunkering due to the variation in fuel quality). The International Council on Combustion Engines (CIMAC) published in June 2015 a position paper on these new fuels, including some key technical considerations for shipowners and operators. CIMAC has also initiated a working group with technical experts from the industry to address the limited experience and collate information in order to develop a technical guide for these fuels.

In November 2015, the U.S. Coast Guard confirmed several reports stating that main engines may not attain the expected speed when using ultra low sulphur fuel oil. Consequently, the Coast Guard revised its list of recommendations to vessel owners and operators about the importance of establishing effective fuel oil changeover procedures to comply with MARPOL Annex VI emission regulations.

Cat fines

The most typical and well-known contaminant that can destroy an engine in a short time is cat fines. Cat fines are an inevitable by-product of refining and consist of small particles of metal that are deliberately introduced to 'crack' the fuel. Unless removed by purification, cat fines will become embedded in engine parts and cause serious and rapid engine damage. Filtration of fuel has been a requirement on board for many years, but crews are now noticeably less experienced and less reliable in operating the systems. The level of cat fines is also likely to increase with the introduction of new low sulphur regulations, which will require more refining.

Vessel operators and crew often have no idea about the purity of the fuel they use, nor is there any compulsion to find out before using it. Often, the purifiers installed are inefficient and cannot cope. Cases are known where filters have been removed. A discrepancy exists between ISO standards for cat fine content[1] and the content recommended and anticipated by engine manufacturers in engine design. Engines need fuel with a concentration of cat fines at no more than 15ppm, but fuel is produced and sold at 60ppm and more. Effective filtration, purification and fuel management is required. There is clearly a need for more crew training and somebody to verify that the equipment and systems installed actually remove the cat fines on their way to the engine.

According to the fuel testing agency DNV Petroleum Services, the bunker fuel industry in the U.S. has seen a rise in metals content as a result of regulations to reduce the

[1] HFO with a cat fines content of up to 60ppm is compliant with the ISO 8217:2010 fuel standard

level of sulphur in bunker fuel. Low sulphur fuels are less lubricating, and this combined with the introduction of increased amounts of abrasive materials, causes damage. Once cat fines become embedded in engine parts, they cannot be removed. Until fairly recently, such losses have simply been described as engine damage or crew negligence and the real cause not identified. It is only now that definite attributable losses are being reported.

Claims due to cat fines have been identified in the range of USD 300,000 to USD 1.5 million, mostly in low speed engines. Wear is very rapid; for example, if liners are replaced, they could be worn out again in three days. In a technical paper presented at the CIMAC Congress in 2013, cat fines were found in 84% of all the cylinder liner high wear cases investigated.

Contributory changes which would help:

- Sampling and testing of fuel before use
- Improved fuel handling on board
- Improve the quality of bunkers
- Alter the ISO standard
- Charter/bunkering contracts should specify fuel less than 60ppm
- Regular cleaning of filters, frequent drainage
- Clean the settling and service tanks during dry dock
- Check centrifuge capacity on specifications for new buildings
- Ensuring optimized fuel system treatment
- Introducing a new fuel cleaning system layout
- Automatic control of the cleaning flow rate
- Intensified monitoring of the fuel treatment efficiency

IUMI raised the need of more class involvement to ensure that vessels safely can operate on the new fuels required in the future with IACS in January 2011, and attended a meeting with the Machinery Panel in September 2013 to present the insurance industry's concerns. Following this meeting, the IACS Machinery Panel decided to review the members' current requirements on facilities provided for handling the fuel on board to establish a common baseline. The IACS Recommendation for petroleum fuel treatment systems for marine diesel engines was subsequently published in July 2017.

Fuel contamination

Contaminated supplies of biodiesel fuel that were first reported in the US Gulf region in February 2018 have since persisted on an unprecedented scale and may have affected as many as 1,000 vessels.

This contamination has led to a range of technical problems, including blocked fuel filters, fuel pump seizures an even loss of main engine power. The cost of an engine damage could be up to USD 800,000 for an individual vessel. The loss of engine power may lead to serious incidents such as collisions and groundings.

Testing to ISO8217 levels will not necessarily show if the fuel is contaminated or not, as the suitability of biofuels requires gas chromatography and specialised equipment in a

laboratory to determine any contamination. This test will generally take 7 to 10 days, and there are today not enough laboratories to perform the necessary testing. Consequently, vessels are forced to sail with fuel in separate tanks and rely on the ability of the crew and equipment to make the fuel fit for use.

IUMI believes that the current system with the end-user taking all the risk is unacceptable. Rather than the end user, refineries should be compelled to do the testing and confirm the delivery of non-contaminated fuels. In parallel, the ISO review of low-sulphur fuels should also include an amendment of the ISO8217 to deal with biofuels.

Relevant authority / organisations and documents

- **IMO – MEPC & MSC**
  - MARPOL Regulation 14 & Annex VI: "Prevention of Air Pollution from Ships, allowing for special (SOx) Emission Control Areas".
  - MSC93/INF.8: Safety implications arising from the supply of "Out of Specification" Marine Fuels, submitted by ICS and IPTA, 13 March 2014.
  - MEPC70/INF.12: Study on fuel oil quality, submitted by INTERTANKO, 22 July 2016.
  - PPR4/20/3: Justification and scope for a new output on effective implementation of the 0.50% m/m global sulphur limit, submitted by BIMCO, CLIA, ICS, INTERCARGO, INTERTANKO, IPTA and WSC, 25 November 2016.
  - MEPC71/5/3: Report of the correspondence Group on Fuel oil quality, submitted by the United States, 31 March 2017.
  - ISWG-AP1/2/12: Safety implications associated with 2020 fuels and their respective challenges, submitted by Liberia, Marshall Islands, ICS, BIMCO, INTERTANKO, INTERCARGO and WSC, 15 May 2018.
  - MEPC 73/5/17: Joint industry guidance on potential safety and operational issues related to the supply and use of 0.50% maximum sulphur fuels, submitted by ISO, OCIMF, IPIECA, IMarEST, RINA and IBIA, 31 August 2018.
  - MSC100/8/1: Effective implementation of existing provisions for fuel quality and safety in IMO conventions, submitted by Liberia, ICS, INTERTANKO, IPTA and INTERFERRY, 28 September 2018.
  - MSC100/8/2: Safety implications and respective challenges associated with 2020 compliant fuels, submitted by Bahamas, Liberia, Marshall Islands, Panama, BIMCO, INTERCARGO and INTERTANKO, 28 September 2018.
- **EU**
  - Sulphur Directive 1999/32/EC with amendments.
- **CIMAC**
  - Congress 2013, Paper no. 51: "Onboard fuel oil cleaning, the ever-neglected process How to restrain cat-fine damages in two-stroke marine engines". Paper presented by experts from MAN Diesel and

Turbo (Denmark), DNV Petroleum Services (Singapore), NanoNord (Denmark), Alfa Laval Tumba (Sweden).
    - Position Paper 6/2015: New 0.1% sulphur marine (ECA) fuels, June 2015.
    - WG7 Fuels: Guideline - Cold flow properties of marine fuel oils, January 2015.
    - WG7 Fuels: Fuel quality Guide - Ignition and combustion, 2011.
- **UK P&I Club** Risk Focus: Loss of power
- **Joint Hull Committee** information pack: Marine engine damage due to catalytic fines in fuel, joint paper with Braemar (The Salvage Association), 26 September 2013
- **U.S.**
    - Environmental Protection Agency (EPA): North American Emission Control Area: http://www.epa.gov/otaq/oceanvessels.htm#north-american
    - Coast Guard: Safety Alert 10-18: U.S. Gulf Coast bunker contamination, 8 June 2018.
- **Wärtsila** Fuel Oil Requirements (Heavy Fuel Oil).
- **MAN:** Service Letter SL2014-593/DOJA, December 2014.
- **Gard** Loss Prevention Circular No. 01-14: Prevention of engine damage due to catalytic fines, February 2014.
- **IACS Machinery Panel:** No. 151 Recommendation for petroleum fuel treatment systems for marine diesel engines, July 2017.
- **ISO:** 8217:2017 – Specifications of marine fuels, 21 March 2017.
- **U.S. Coast Guard:**
    - Safety Alert 13-15: Ultra Low Sulphur Fuel Oil & Compliance with MARPOL Requirements, 19 November 2015.
- **IUMI:** Position Paper on Catalytic Fines and Engine Damage, 8 March 2016 (https://iumi.com/opinions/position-papers).
- **INTERTANKO** Critical review: Contaminated Bunkers damage hundreds of ships. Do authorities really care?, 10 August 2018.
- **International Chamber of Shipping:** Provisional guidance to shipping companies and crews on preparing for Compliance with the 2020 'Global Sulphur Cap', September 2018.

Timeline / important dates

- **Sulphur limits:**
    - Californian waters: 0.1% sulphur limit as of 1 August 2012.
    - North American Emission Control Area (ECA): 1.0% sulphur limit as of 1 August 2012.
    - European and North American ECAs: 0.1% sulphur limit as of 1 January 2015.
    - MARPOL – outside ECAs: 0.5% sulphur limit as of 1 January 2020.

    - Chinese sulphur control areas: 0.5% sulphur limit as of 31 August 2018 (Yangtze River Delta), 1 January 2019 (Pearl River Delta and the Bohai Sea) and while berthed from 1 September 2017. Implementation in 11 key ports whilst berthed from 1 January 2017.
    - Hong Kong: 0.5% sulphur content in force from 1 January 2019.
- IACS letter to IUMI 23 July 2012. IUMI response 19 November 2012.
- Loss Prevention workshop, IUMI conference London, 15-18 September 2013.
- Meeting with IACS Machinery Panel, 3 September 2013.
- IACS Unified Requirement: 2Q 2016.
- MEPC 73: 22 – 26 October 2018.
- Joint industry guidance (1st edition): Mid-November 2018.
- PPR 6: 18-22 February 2019.
- ISO specification and new standard to be finalized in 2019.

IUMI will:

- Encourage implementation of the new IACS recommendation for petroleum fuel treatment systems for marine diesel engines by all IACS members.
- Increase awareness by presenting available documentation of losses due to cat fines, and warn of the risks involved.
- Monitor developments related to switch-over from heavy fuel to distillates in the ECAs.
- Encourage an amendment of the 60mg/kg limit for cat fines and the inclusion of biofuels in the ISO standard.
- Support a review by MSC of the safety aspects of implementing the 0.5% sulphur limit with effect from 2020.
- Suggest that refineries are compelled to test and confirm the delivery of non-contaminated fuels.