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WHAT LIES BENEATH?

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IMO 2020: INDUSTRY VIEWPOINTS

Attention to detail

Michael Banning of Innospec highlights the importance of rigorous onboard fuel storage system preparation well in advance of IMO 2020, including tank cleaning and the use of additives

There has been much noise in the industry about the 0.50% sulphur cap which will take effect on 1 January 2020 (also commonly known as IMO 2020), with some rumours about a delay in the implementation date. Following the last Marine Environmental Protection Meeting (MEPC 73) in October, the message was loud and clear; IMO 2020 is happening and will not be delayed. There are, of course, several routes to compliance, and this article is not intended to be yet another which discusses the pros and cons of each route, as each shipowner or operator will have their own chosen compliance strategy (I will quickly state for reference that these are marine gasoil (MGO), very low sulphur fuel oils (VLSFO), scrubbers (in conjunction with heavy fuel oil (HFO), LNG and niche fuels). What is clear, and I am sure that all will agree on this, is that IMO 2020 will be a fundamental shift from the status quo, and ships will have to operate differently than they do today, regardless of compliance option. All ships will have to prepare in the run up to 2020 and at the stroke of midnight on 1 January, all ships must be compliant.

If a ship is to burn a different fuel than it does today, then considerations will have to be made on how best to prepare the fuel storage system for this new fuel, as most ships will have been burning high sulphur heavy fuel oil (HSHFO), a high viscosity aromatic fuel. This preparation includes everything from tank segregation and designation, bunkering arrangements, transfer systems and fuel supply systems (settling/service tanks, purification, heating, injection viscosity etc.).

HSHFO tends to form layers of semi-solid substances containing sediments and asphaltenic sludge over years of use onboard; those that have seen the inside of a fuel tank will know that the various frames, stiffeners and longitudinals leave plenty of places for this sludge to accumulate. When switching to MGO, the paraffinic nature of this fuel will act as a solvent rapidly dislodging all of the sludge, in effect cleaning the tanks quickly. However, it is important to consider where this sludge is going to end up – straight into the settling tank, filters and purifiers, which can be extremely problematic for the crew to deal with. If all of the sludge is not 'flushed' out of the system before 1 January 2020, it could well be the case that the fuel delivered to the engine rail is not compliant.

There have been several suppliers announcing availability of their 2020 fuels (VLSFOs), which are very similar to the residual fuel used today. However, these fuels do not represent the whole market and it is widely anticipated that most compliant fuels for 2020 will be largely paraffinic in nature, similar to MGO and with the same potential issues. To prevent such issues from happening, it is advisable to clean not only the fuel tanks, but also the associated pipework and supply system before loading a compliant fuel.

To assist shipowners and operators, the International Maritime Organization (IMO) has developed a framework of items to consider for the transition into 2020. This is known as the Ship Implementation Plan (SIP), and whilst not a mandatory document it will be actively encouraged by flag States and can help vessels prove compliance. To assist this, the IMO has produced a circular titled, *Guidance on the development of a ship implementation plan for the consistent implementation of the 0.50% sulphur limit under MARPOL Annex VI*. This guidance also includes an annex regarding tank cleaning, giving options and timeframes to consider, which was submitted to the intercessional working group earlier this year by the International Bunker Industry Association (IBIA). IBIA relies on its board members and membership to provide technical information and guidance for all of their submissions via their longstanding working groups, something that Innospec has done for several years as well as being part of CIMAC and ISO. This submission gives essentially three options on how to clean tanks (of course, excluding flushing through with compliant fuel which may cause operability issues):

- Manual cleaning in dock
- Manual cleaning in service
- In service cleaning by specialised additives.

The following guidance with regards to timing and cost has been gathered both through experience and Innospec's close working relationships with major shipping companies.

- **Manual cleaning in dock** – First and foremost it is important to secure dock space, which will be at a premium as most available dock space will have been snapped up already for scrubber installations. In general, it should take around two to four days to clean each tank, dependent on shift pattern. Also, the associated pipework will need to be flushed through, and then compliant fuel can be loaded with minimum risk. Additional consideration needs to be given to the cost of using compliant fuel before the deadline. If we consider a 500 cubic metre (cbm) tank and a minimum of a $200 price differential, that would cost an extra $100,000! Whilst considering cost, the same 500 cbm tank would cost $,6000 to clean in China and, $9,000 to clean in Singapore. It is anticipated that costs in Europe will be higher than the first two examples. It is also worth noting that this cost is only for physically cleaning the tanks – other costs associated with docking and sludge disposal costs have not been considered.
- **Manual cleaning in service** – If tanks are to be cleaned manually during service, safety considerations are paramount; the relevant procedures for entering enclosed spaces must be followed. Time required will vary depending on tank size, the number of tanks and the number of crew available. Tank cleaning can be performed by the ship's crew and/or by employing a riding crew. If the cleaning is done by the crew it would likely take a minimum of four days per tank and if using a riding crew to clean the tanks this could come down to two days.

  All sludge cleaned out of these tanks should be landed ashore using the appropriate reception facilities. At this time, it has not been possible to get an exact cost for employing a riding crew, as this operation would likely be carried out late into 2019; however, current information suggests it would not be too far away from the cost of that in dock.
- **In service cleaning by specialised additives** – It is possible to clean the fuel tanks in service in the run up to 2020 whilst still burning HSHFO, and this can be done by using additives which are dosed into the storage tanks. These additives will work to dislodge the sludge gradually over time and can drastically reduce or potentially completely remove the need for

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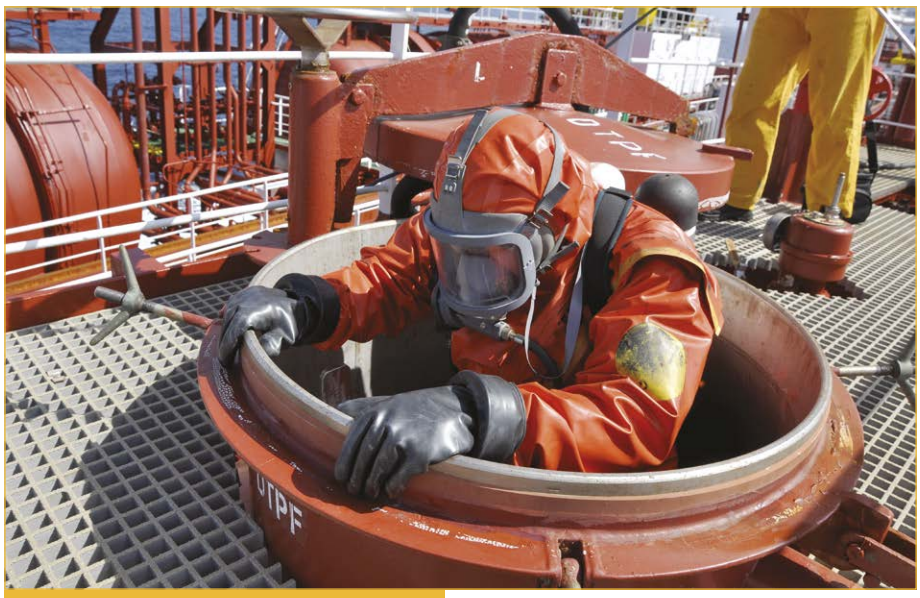
manual tank cleaning. There are numerous chemistries available on the market to clean tanks in service, but the key chemistries are dispersants and stabilisers. Dispersants work to break up sludge agglomerations into more manageable sizes, whereas stabilisers work to keep asphaltenes in suspension and soluble within the fuel matrix. If a neat dispersant is used, it will break up the sludge agglomerations, but used without a stabiliser it will dislodge the sludge from one area within the fuel system to another. So it is therefore critical to have a formulation that contains both.

There are numerous suppliers of additives and each uses their own proprietary chemistry to disperse and or stabilise fuel. Consequently, it is important to understand the chemistry on offer and how it may affect your fuel system by consulting the additive manufacturer. Make sure you fully understand the chemistry of the proposed product on offer and how it can be used in your fuel system.

There is a demonstrable cost-saving element to the use of fuel additives. Innospec's Octamar BT series can clean the same 500 cbm tank at a cost estimated to be less than half that of manual tank cleaning, also there is no need to consider sludge disposal costs, as it is consumed in service. When selecting an additive for use, it is important to know that what you are purchasing has been proven in the field and does not cause any adverse side effect to the ship's operation. Innospec's Octamar BT series was successfully used in the run up to 2015, where tanks were cleaned for the use of a 0.10% sulphur compliant fuel. During the writing of IBIA's submission to the IMO Intercessional, IBIA felt confident with the evidence and testimonials supplied by Innospec to name this product in their submission to the IMO as an effective additive for tank cleaning.

Another important consideration leading up to and post 2020 is the stability and compatibility of the fuel. Fuel stability can be defined as the potential for a fuel to change condition in storage in certain conditions, depending on its resistance to breakdown. Whereas fuel compatibility can be defined as the tendency of fuels to produce deposits or breakdown when mixed with another fuel.

It is the responsibility of a fuel supplier to ensure that the fuel is stable and fit for purpose at the point of delivery. However it is almost impossible for the supplier to guarantee that a fuel will be compatible with fuel already onboard, including the heel within the identified delivery tank.



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In the run up to 2020, and with new fuel formulations set to join the market, IMO has requested the assistance of the ISO 8217 working group. This group has initiated the development of a Publicly Available Specification (PAS), *Considerations for fuel suppliers and users regarding marine fuel quality in view of the implementation of maximum 0.50% S in 2020*, in response to the IMO's request to consider the framework of ISO 8217 with a view to ensuring consistency between the relevant ISO standards on marine fuel oils and the implementation of the 0.50% sulphur limit.

Within the ISO 8217 specifications there is a limit set to predict the stability of fuel, namely total sediment, and to a large extent this parameter provides reasonable protection to the end user. So at this time, no new characteristic is currently being considered for inclusion regarding the stability of fuel oils. There is, however, no characteristic to predict the compatibility of fuels. As a result, the working group is looking at methods to predict the compatibility of fuels and potentially produce some guidance as part of the PAS.

Innospec has a longstanding history of solving fuel-related problems onboard ships, addressing stability and compatibility concerns and in doing so, allowing more flexibility, whilst mitigating operability issues. This became more prevalent when changing between 1.0% Low Sulphur HFO and then later on between HSHFO and 0.10% sulphur fuels. This was done using Octamar BT series products with the same dispersants and stabilisers that can be used to clean the storage tanks. Looking forward to 2020, the ability to improve flexibility onboard will become ever more important and Octamar BT series will enable the ships to do so.

In summary, additives, as they always have, will play an important part in ship operation leading up to and post 2020 implementation. To ensure optimum additive performance, it is also always recommended that owners and operators deal directly with the additive manufacturer, whose knowledge of the product and its application is fully understood.

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