

FUELS,
MARINE ENGINES

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IMO 2020 a paradigm shift

New low sulphur regulation reshapes operations from refinery to vessel



The implementation of the IMO 2020 0.50% sulphur regulation is now less than five months away. John LaRese, Technical Advisor for ExxonMobil Marine Fuels, talks to Steve Benwell, Infineum Global Fuels Key Accounts Manager, about his views on future marine fuels, the far-reaching challenges they may create and how the whole industry needs to prepare for the switch over.

The impending International Maritime Organization sulphur regulation (IMO 2020) will reduce the global sulphur cap on marine fuels from 3.5% to 0.5%. The impact of this huge reduction is being felt right through the supply chain and is also expected to create new challenges for those managing and handling fuels on board ship.

Fuel production challenges

The challenges of the new legislation will clearly impact the refining, bunkering and shipping industries. Starting at the production end, John says that ExxonMobil Research & Engineering has spent over two years working up to IMO 2020. “When we look at today’s residual fuels, it’s not an easy step to reduce the sulphur, it’s a real challenge. Our dedicated team of scientists, engineers and chemists are using patented technology to help formulate our new fuels. What we have found, with these new fuels, is that when one characteristic is changed it can affect other fuel features. The issues we encountered during the development phase are now being discussed in the industry and really need to be worked on to ensure IMO 2020 compliant fuels are fully fit for use.”

Typically new fuels are blended or manufactured to meet the 16 characteristics in Table 2 of the ISO 8217 specification. However, as John explains, problems can occur in ISO 8217 Clause 5, which assesses ‘fit for use’ in areas such as compatibility, combustion quality and waxing. “What we noticed when we started testing the new fuels was some discrepancy between different test methods. For example, there were instances where the combustion measurement using the calculated carbon aromaticity index (CCAI) indicated that the ignition quality was good, but when we ran other combustion tests the results did not measure up. This is likely to be owing to the fact that the CCAI was developed for fuels used in the ‘80s and so, in some cases, may not reflect some of the new fuels being developed today.”

The need for ‘fit for use’ tests

To help fuel providers and fuel users ensure trouble-free operation when using new low sulphur fuels, John sees the need for industry to consider additional requirements, over and above those stated in ISO 8217. “What we have seen recently in the industry is chemical contamination of marine fuels, and it is very difficult to identify the number and volume of potential contaminants. The development of tests to simulate, for example, fuel pump sticking, purifier sludging and filter blocking would be beneficial and could allow us to set performance baselines that fuels must meet. Although this is unlikely to happen quickly, it will be increasingly important as the industry wrestles with a greater number of issues and a growing number of fuel types.”

The future fuels mix is one of the really big unknowns, with one of the only certainties being that it will be more varied. “For the immediate future, we anticipate that about 5% of vessels will adopt scrubbers and this translates to about 10% of the marine fuels mix in 2020. In the longer term, we anticipate that other types of fuels will increase their relative percentage in the marine fuels mix. Specifically to 2040, liquid natural gas (LNG) could account for about 10%, whereas we could see other niche-type fuels accounting for a very small percentage.”

This wide variety means that fuel compatibility is one of the key areas where John sees a real role for fuel additives.

On shore challenges

Shore-side, John sees challenges in the distribution system even before the fuel gets into the ship. “I think in the locations offering both high sulphur fuel and IMO 2020-compliant fuel, there may be concerns about contamination. In the post-2020 low sulphur

environment, where the limit is very, very tight, just a little bit of contamination, potentially, can throw a product off specification. So we need to ensure in the industry that storage tanks, shore-side logistics and bunker barges are all segregated to guarantee that when the product goes on board the vessel it is sulphur compliant.”

The use of hybrid and IMO 2020 compliant fuels may also bring other challenges as they enter the market.

With increasing industry awareness about potential stability and cross-compatibility issues of compliant low sulphur fuels John outlined ExxonMobil’s approach to ensuring that their fuels can be comingled. “The patented technology we use to engineer our fuels ensures their compatibility aligns with our different locations. So if you purchase a fuel in one location from ExxonMobil it will be fully-compatible with a fuel you purchase from us at another location, if you follow our handling guidelines.”

Managing fuel on board

On board the ship, fuel management and fuel segregation are the areas where John suggests issues could arise. “The ease of fuel segregation varies from ship to ship – largely depending on the available storage tanks. There is a global rule of thumb that says to avoid compatibility problems an 80/20 mix should not be exceeded. If you look at current fuels, only about 0.5% of all deliveries have compatibility issues. With all of the new types of fuel we are expecting to come onto the market, we anticipate this number will go up.”

One of the actions John suggests that vessel operators adopt is on board testing to ensure the fuel is fit for purpose and to make sure that there's no contamination, from the logistics, manufacturing, or delivery to the vessel. “In terms of assessing the compatibility of a residual and a distillate fuel, the ASTM D4740 Spot Test can be carried out on board as it gives the vessel personnel a good indication of compatibility issues. In addition, a sediment test will help to determine if there is going to be asphaltene dropout in the fuel, which would cause excess sediment, potentially causing filter blocking and purifier sludging.”

While post-2020 John expects to see a wide variety of different viscosities in the market he is not concerned about viscosity related wear issues. “You might see a residual fuel with 200 to 300 centistoke viscosity that meets the requirements and I think you'll also see very low viscosity fuel, maybe 10 or 30 centistokes. But, while vessel operators need to know what they're actually getting on board so it can be injected at the right viscosity for proper operation, I think fuels with sulphur above 500 ppm should provide sufficient lubrication. However, if fuel sulphur is below 500 ppm then a lubricity additive may be required.”

With the IMO 2020 requirements almost upon us, John has a recommendation for stakeholders as they go into this new era of low sulphur fuels.

John also sees an important role for additives in this new low sulphur marine fuel scenario. “There are a number of concerns, such as compatibility, combustion quality and waxing that additives can help to overcome. Also, suppliers will look for additives to help modify some of these new fuels so that they can make a wider range of fuels available to the end

user. I think additives will play an important role in helping us to find solutions to these and future challenges.”

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