Cefor

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Post-IMO 2020 experiences

On 1 January 2020, a new limit on the sulphur content in the fuel oil used on board ships came into force. Known as 'IMO 2020', the rule limits the sulphur in the fuel oil used on board ships operating outside designated emission control areas to 0.50% - a significant reduction from the previous limit of 3.5%. The regulatory change was part of the increasingly strict air emission limits enforced through MARPOL Annex VI, and had been advertised to the shipping industry for a long time. Nevertheless, the new global sulphur limit was expected to have quite an impact on shipping in terms of technical, operational and financial challenges. Some even predicted an increase in the number of machinery damage claims and incidents if the new very low sulphur fuel oils (VLSFO) were not well managed.

The hard facts

One year on, the International Maritime Organization (IMO) concludes that the new sulphur limit has significantly reduced air pollution from ships[1], and this is of course good news. However, it has also completely changed the marine fuel supply and availability landscape, and although the transition to VLSFOs may have been smoother than many predicted, it has not been without challenges.

In terms of preparations ahead of 1 January 2020, we saw that many of the Cefor member companies' clients had planned well but some were unsure of what actions to take and when. There were also some that just stood idle, believing or hoping that the implementation of the IMO 2020 regulation would be postponed. They all had plenty of concerns: Would enough compliant fuels be available? Would investments be made to enable the refineries to cope? What about the quality of the new fuels and its potential negative effects on existing machinery systems on board? Would the crew be able to cope with the new requirements?

However, 1 January 2020 arrived, and the shipping industry adapted - as it always does.

[1] IMO2020 fuel oil sulphur limit - cleaner air, healthier planet

Does this mean that there were no worries for owners, crew and insurance companies with the IMO 2020 fuels? No: there were incidents, some causing severe damage, and some claims were significant, due both to the cost of repairs and to loss of earnings while awaiting repairs, often because critical spare parts were not available from stock. And quite a few owners have also told us of operational issues and smaller occurrences that did not turn into insurance claims.

The real challenges

Bunkering and handling of marine fuels have always been a complex issue and a source of operational challenges on board ships. And fuel-related machinery damages are not new problems either. Post-IMO 2020, marine fuels have become an even more complex issue. And the complexity has caused challenges, even for the best owners, the best ship managers and the best crew.

Most owners prepared well, both technically and operationally. The fuels delivered have basically been of acceptable quality. With some challenges, most owners have managed to use fuels with the slightly different characteristics in a way that has been acceptable for the engines.

As we saw with the contaminated fuels that originated and later spread from the Houston area in 2018, some engines were unaffected while others were seriously impacted. This has also been seen to some extent with VLSFO, affecting similar engines differently, and affecting different engine types differently. These differences are probably due to the complexity, not only of the fuel itself, but of the way it is handled, the operational condition of the engine using the fuel and the engine design.

For the damages that have occurred, we often see a combination of factors affecting the engines to such an extent that they are found to be damaged, or seriously operationally affected. We did observe more occurrences in the early part of 2020, which indicates a certain amount of learning from experience.

Here are some of the observations we have made:

Tank cleaning

From what we observed, the first significant issue causing problems was the tank cleaning conducted prior to filling the tanks with VLS fuels. This issue relates both to the extent and quality of cleaning (some tanks are huge and poorly accessible), and the method (cleaning with MGO, chemicals, or manually with rags). Questions arose concerning the disposal of the residue in the cleaned tanks; was it disposed of ashore, was it used after treatment in settling tanks and through pretreatment systems, and in such a way (and amount) that the pretreatment system could cope? What about sediments and cat fines? And was the fuel cocktail after this mixture stable or did it cause sludging and operational hassles?

Filtering

Another factor that contributed to damages was the condition of the fuel filters. Makers recommend filters with a fine mesh, typically 10my. This will enable the crew to ‘police’ the amount of sediments and cat fines entering the engine. Having such fine mesh filters installed can also be a challenge to the crew, particularly if the fuel is unstable and/or is prone to sludging. However, on some occasions

we have observed a lack of control and understanding of how to maintain and establish the condition of the filter elements. And only a fuel filter in good condition will have the 'policing' effect which enables the crew to prevent and/or limit the effect of fuels that have not been sufficiently treated through a functional pre-treatment system on board.

Lube oil

A third significant observation was the effect of cylinder lubrication for 2-stroke engines. Scuffing problems were experienced by quite a few owners in the early part of 2020. Why? Correct cylinder lubrication will be a combination of the rate and the residual cylinder oil base number (BN) measurement. And the BN level is chosen according to the sulphur content of the fuel. The lubrication rate must be correct (based on delivery into the cylinder liner space, not the adjusted figure on the operator's panel). Too little is critical, too much is no good. The BN number of the lube oil (LO) gives different properties for the LO, affecting the engine differently. Too low a BN will have a limited cleaning effect on the combustion space, too high a BN will clean well, but will prevent 'required' corrosion in the combustion space, not allowing an 'open graphite structure' required for the LO to have sufficient lubricating effect. Both can cause scuffing, affecting combustion and causing severe wear to the cylinder liners. The type and quality of the piston rings will also have an effect, and when availability of the 'cermet' coated rings recommended for the engine was limited, some of this damage was almost unavoidable.

But who managed this best? Those who had the time and opportunity to inspect the condition of the combustion space, the liner and piston rings – AND had the competence to interpret the findings and adjust the rate and BN of the oil accordingly, and/or managed to carry out maintenance before matters ended with a damage.

Viscosity

The fourth significant issue observed more frequently with the new fuels has been the viscosity. The 'new fuels' have been shown to have a much wider range of densities and viscosities, sometimes as low as 2-3cst/50deg C. The viscosity should typically be 10-15cst into the engine, and adjusting this requires a well-functioning viscosimeter/temperature controller and may in some cases even require the fuel to be cooled prior inlet rather than heated. Experience has been gained in this area.

Stability

The fifth issue that has been generally observed and verified is that the post-IMO 2020 fuels are less stable, less compatible and more affected by long term storage than pre-2020 fuels. This can also be handled, but requires planning, testing, competence and knowledge. And testing of fuels has been, and still is, vital if you are to know what you take on board, and know how to handle what you have on board.

Concluding remarks

Bunkering and the handling of marine fuels remain a complex issue, also post-IMO 2020. Complex issues require all of the stakeholders involved to co-operate, both to limit the number of problems that can be caused and to solve problems when they occur. It may be naïve to expect all the various

stakeholders involved in fuel issues to agree, but when stakeholders do co-operate and communicate, openly and with integrity, the chances of both avoiding and handling situations better have much higher odds.

The maritime industry has done well, but needs to be focused going forward. Until marine fuels are of a quality equal to what we expect from the petrol stations fueling our (fossil-driven) cars, we all need to pay attention to marine fuels. Although claims numbers are not significantly higher, poor fuels and poor handling of fuels do constitute a significant risk for a vessel either on the high seas or in narrow waters.