PAC helps the marine industry implement solutions to comply with IMO 2020 standards

APPLICATION

Testing multiple variables, including sulfur content, in marine gas oil.

CHALLENGE

More than 170 countries around the world have committed to following new regulations—a modification of the original MARPOL Convention of 1973—that were adopted in 2016 by the United Nation's International Maritime Organization (IMO). Beginning on January 1, 2020, the IMO will ban shipping vessels that use fuel with a sulfur content higher than 0.5%. The current sulphur cap is at 3.5%.

This new set of standards, commonly referenced as IMO 2020 or MARPOL 2020, will have a far-reaching impact on the shipping industry and the more than 50,000 ships in the global merchant fleet.[1] Ships not in compliance with the new low-sulfur regulations may be impounded by ports in cooperating countries, who are responsible for enforcing the new guidelines.

Because of the high cost of compliance, the shipping industry is not incentivized to take early steps toward implementing the changes necessary to use low-sulfur fuel. The industry, as a whole, is waiting until the last minute to comply with the new marine fuel guidelines.[2] This means that a large number of vessels need a fast, cost-effective solution to achieve compliance by January 1, 2020.

Besides having to stay in compliance with the new sulfur regulations, ship owners will need to stay vigilant on the safety and reliability of these new oils that might prove to be highly unreliable.

APPLICATION SOLUTIONS

Marine gas oil (MGO) is a light distillate fuel that is already used by many shipping vessels in Emission Control Areas (ECAs) while sailing or berthing near certain coastal regions in Europe, North America, and Asia. Because shippers already have experience using MGO, and ships can already use this type of fuel without major modifications, this is the solution with the fewest barriers to implementation.

Despite being the easiest and most feasible solution, there will be challenges with the transition to using marine gas oil as the primary fuel. Operational issues are to be expected. For example, vessels using MGO can experience cold flow issues in frigid waters, which can lead to increased clogged fuel lines and operational disruptions, or even loss of propulsion.

IMO
International Maritime Organization

On January 1, 2020, the International Maritime Organization (IMO) will enforce new emissions standards designed to significantly curb pollution produced by the world's ships.

"It is the biggest change in oil market history," Steve Sawyer, senior analyst at energy consultant Facts Global Energy, as told to CNBC.[3]

Conversely, if MGO is heated to maintain fluidity, it can become too light, which can lead to sealing or leakage problems. Despite these challenges, the right technologies can mitigate the issues, making it the most pragmatic option.

Other fuel options are:

- HSFO: High Sulphur Fuel Oil, for use on ships fitted with scrubbers, which have a high cost and long installation time.
- VLSFO: Very Low Sulphur Fuel Oil, with a max sulphur content of 0.50% mass to be available in 2020.
- LNG: Liquified natural gas, requires a special vessel, engine design and crew.

PARAMETERS FOR MEASURING MARINE FUEL

Sulfur (Sulphur) Content
IMO 2020 is focused on the reduction of sulfur. While most sulfur streams are already low (cf 0.1% sulfur in ECA and other low-sulfur diesels), testing and verifying may be required to achieve compliance.

Viscosity
ISO 8217:2017, requires that MGO operate at a minimum of 2mm^2/s at +40° C. Because engine rooms can be warmer than 40° C, a fuel that just meets spec can quickly become out of spec when heated to warmer temperatures. Shippers need a technology that will let them know at what temperature the fuel will reach 2mm^2/s, so they can make any necessary adjustments to operate without issues.

Density
Density is a standard specification for all types of fuel. It provides assurance that the fuel being used reflects the correct weight-to-volume ratio and associated energy density.

Flash Point
MGO has a higher minimum flash point limit (-60° C) than road diesels, so it is considered safer and it conforms with the minimum flashpoint limit stipulated in SOLAS and MARPOL Annex VI.

Pour Point
A standard cold flow spec for marine fuel oil. Because MGO is seldom heated during storage or even during use, it is susceptible to wax buildup in cold weather. Because of this, ISO 8217 was modified to include cloud point and CFPP requirements, as well as pour point measurement.

Cloud Point/CFPP
When MGO is exposed to cold weather, the result can be clogged fuel lines and filters. Cloud point and CFPP offer a more proactive measure of potential cold-flow issues, which provides extra time to take preventative action.

FAME
The use of renewable FAME in concentrations of up 7% is permitted in MGO to address global environmental and decarb-onization initiatives. Monitoring of FAME is necessary, as there have been sealing, dirt, water, and microbial issues when the concentrations become too high.

Carbon Residue
The amount of carbon residue offers an estimate of the tendency of MGO to form deposits, which, in turn, can affect engine performance.

CONCLUSION

On January 1, 2020, new regulations, known as IMO 2020, will require shipping vessels use fuel with a sulfur content no higher than 0.5%. Because this transition is costly, shippers are not incentivized to implement this change early. This means that many shippers are unprepared for this change.

Industry experts project that many ships will choose to transition to marine gas oil, because there are fewer barriers to implementation — shippers are familiar with this type of fuel and already use it in many of their vessels. However, using marine fuel oil presents some challenges, particularly relating to how MGO behaves in high and low temperature conditions.

PAC offers a wide range of ISO-conforming solutions to support the compliance of IMO 2020 and help mitigate the risk of using unreliable marine oils.

[1] https://www.statista.com/statistics/264024/number-of-merchant-ships-worldwide-by-type/)
[2] 2019 IMO Implications, page 9-10.
[3] https://www.cnbc.com/2019/07/15/oil-imo-2020-marks-the-biggest-change-in-oil-market-history.html

Application Highlight

MEASUREMENT SOLUTIONS

MFA-70Xi

PAC recently released the MFA-70Xi analyzer, the only analyzer that is specifically designed to test four critical properties of marine fuel—viscosity (at +40° C), density, cloud point, and pour point. All in 20 minutes or less!

Simple and easy to use, the MFA-70Xi performs all four tests with the single push of a button. Sample is automatically loaded, without the need of a pipette. An optional 48-position autosampler offers greater throughput and improved automation if desired. The MFA-70Xi is completely self-cleaning; no solvent is required.

The MFA-70Xi was developed to meet the growing needs of the marine fuel industry as they test MGO distillate fuels. This includes DMX, DMA, DMZ, and DMB (also known as DFA, DFZ, DFB).

OptiFPP

A cold-filter plugging point analyzer, OptiFPP accurately and reliably measures CFPP at ultra-low temperatures (down to -70° C) to control cold flow.

OptiFlash SS

Requiring only low-volume samples, OptiFlash SS offers accurate flash point determination. Many traditional flash point testers use a rather large amount of fuel sample. OptiFlash SS uses a small amount of sample (2 mL compared to typically > 50 mL in traditional test methods), which reduces fuel exposure to the user and eases fuel handling and disposal. With an optional built-in fire extinguisher, the instrument is designed to reduce the risk of an incorrectly set flash point.

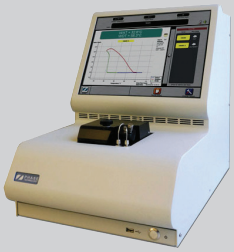
MCRT160

With the benefit of automatically determining the carbon residue, MCRT160 delivers results that are equivalent to the more time-consuming and operator-intensive Conradson Test D189.

OptiFuel

A robust FTIR-based fuel analyzer, OptiFuel determines FAME content. It offers a very fast, two-minute analysis to measure sulphur.

WAT 70Xi



Compatibility of different waxing profiles is measured in 20 to 40 minutes even with the most opaque samples and with a precision of 1.0° C.