Case Study
Filtration Solutions

Proven Filtration Solutions Help 'World's First Green Container Ship' Maximize Reliability and IMO 2050 Progress

BACKGROUND

Industry: Maritime

Site: Container ship by a leading shipping company and shipbuilder in Korea

Location: OEMs in Italy and Denmark

End Product: Methanol

John Crane's Indufil® Replacement Filter Elements

Highlights

- With the International Maritime Organization (IMO)'s 2030, 2040 and 2050 greenhouse gas (GHG) emissions reduction deadlines drawing closer, the industry is accelerating its transition away from diesel and heavy-oil fuel toward renewable fuel sources.
- Beyond liquefied natural gas (LNG), another promising lever for progress is the use of "green" fuels such as methanol and ammonia. These fuels generate zero emissions when produced through environmentally-friendly processes and systems.
- Despite methanol's promise, it also poses challenges — including potential damage to engines and other components through fuel contamination. Innovative filtration solutions are critical to overcoming this challenge and ensuring the safety and effectiveness of methanol as a zero-emissions marine fuel.
- A leading shipping and logistics company was launching the world's first container ship powered by a two-stroke methanol engine, which can operate on both methanol and conventional fuel. The company was seeking an advanced filtration solution for the vessel's flashpoint fuel supply system (LFSS) and fuel valve train (FVT).
- John Crane worked with the OEM and engine manufacturer to engineer a reliable filtration solution that not only satisfied the company's emissions reduction goals but showcased the viability of green methanol-fueled vessels in the new energy era.

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Customer Need

- The shipping company was taking concrete steps to satisfy IMO 2050 regulations while complying with the agency's critical emissions reduction checkpoints. It has committed to only ordering new vessels with a green fuel option, including many that run on methanol.
- To ensure the success of its first methanol-fueled ship, the company required filtration solutions that would deliver optimal fuel cleanliness. This, in turn, would protect the ship's engine and generator's machine, fuel train and engine systems.

Application

- The marine engine used temperature-conditioned methanol at a fixed supply pressure and varied flow based on the engine's load. The methanol LFSS operates similarly to a traditional fuel oil supply system. When dual-fuel operation ends, the fuel pipes are purged of methanol using a pressurized flow of nitrogen.
- The FVT controls the flow of methanol from the LFSS to the engine. A water connection is attached to the valve train, which enables the mixing of methanol with water to meet Tier III nitrous oxide (NOx) reduction levels.
- John Crane has been the leader in double block and bleed (DBB) filter technologies for decades. Well-established in methanol projects worldwide, this technology was central to our solution for the shipbuilder's methanol-engine application.

Solution

- We selected John Crane's Indufil® filter, which utilizes DBB technologies, for the LFSS, as well as a single John Crane Indufil filter for the FVT, which was positioned after the supply system and before the engine. The solution ensures proper engine function by removing harmful particles as small as 10 microns and filtering the supply to protect the engine's moving parts.
- Within the FVT, the solution filters fuel before injection, and provides temperature and pressure monitoring between the supply system and engine.
- Featuring leak-free technology and high-quality design and engineering, John Crane's Indufil filters are designed for peak reliability and durability amid the demands of maritime operations.

Results

- According to industry estimates, switching from diesel to methanol can help reduce carbon emissions by 7%, sulfur oxide (SOx) emissions by up to 99%, and nitrous oxide (NOx) emissions by up to 60% — representing clear progress toward IMO 2050 compliance.
- Beyond these sustainability gains, the filtration solution enhanced the ship's fuel cleanliness, leading to optimal machine, fuel train and engine performance.
- As the customer deploys its wider methanol-fueled fleet, it can draw from the project's best practices to maximize reliability and sustainability.
- By demonstrating the viability of methanol-fueled vessels, the project also strengthens the renewable hydrogen value chain, with implications for increased end-use adoption in the future.