

Ship & Offshore

THE INTERNATIONAL PUBLICATION FOR OFFSHORE & MARINE TECHNOLOGY

Intelligent filtration strategies for the shipbuilding industry

HYDAC The shipbuilding industry is subject to constant changes with regard to environmental protection regulations such as the IMO Ballast Water Convention, which will enter into force in September 2017, and MARPOL Annex VI, aimed at reducing sulphur and nitrogen oxide emissions from ships. Germany's HYDAC Process Technology GmbH offers a range of innovative filtration strategies that allow ship systems to be used with greater economic and ecological efficiency. They're described here by Jörn Kaiser, product manager for ballast water filtration, and Stefan Sandberg, head of sales for Marine & Power at HYDAC.

With the International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM Convention) now set to enter into force in September 2017, shipowners must get acquainted with the necessary technologies – be they for newbuildings or as retrofits for existing vessels.

The greater challenge is certainly the installation of filters in existing ships. For one thing, the vessels lack space to accommodate further components. And local conditions may not permit the operation of additional components. The operating pressure plays a special role in filter installation since almost all conventional back-flushing filters are pressure-operated systems. This means a certain operating pressure on the filter side is required as driving power to guarantee effective functioning of the filter. The high operating pressure that's needed often isn't sufficiently provided by retrofits. New ships are a completely different matter; they can be specially adapted to the requirements for ballast water treatment systems and/or the filtration technology used,



HYDAC AutoFilt® RF10

which makes filter installation a lot easier. HYDAC offers both conventional back-flushing filter technologies such as the Au-

toFilt® RF3, and a special technology developed for retrofits, the AutoFilt® RF10. The AutoFilt® RF10 is flexible in terms of inlet and outlet positions and has very compact dimensions – particularly for high flow rates. Furthermore, the filter operates with the lowest operating pressure requirements on the market. A pressure differential from filter unit to back-flush line of only 1 bar is sufficient. This technology obviates the need for supporting components such as suction pumps or the use of a more powerful ballast pump.

The patented AutoFilt® RF10 uses JetFlush technology, a type of hydrodynamic suction effect. Cleaning is carried out in two steps: detachment of contaminant particles and removal of contaminant particles supported by the JetFlush effect. The cleaning process takes place without any interruption of the filtrate flow. Back-flushing is done independently of the pressure on the filter clean side; the filter depends only on the inlet pressure. This makes the AutoFilt® RF10 unique and incomparable with classic candle back-flush filters or other conventional filtration technologies. In the HYDAC Technol- >

ogy and Testing Centre in northern Germany, the AutoFilt® RF10 is evaluated and tested continually. HYDAC plans to present a second-generation AutoFilt® RF10 later this year.

Filtration solutions for scrubber systems

Wet scrubbers for the removal of sulphur oxides from ship exhaust operate in either an open or closed circuit – or even, as so-called hybrid systems, in both. In any case, filtration and cooling is required. Applications include nozzle protection, protection for the cooling circuit or even general reduction of solids to protect components and extend their service life. Automatic back-flushing filters of the AutoFilt® series are used. Alternatively, HYDAC process in-line filters, which have proved to be a valuable addition in wash-water treatment, can be used.

Fluid management in large engines

New exhaust gas standards for shipping call for technical improvements to marine engines. The trend is towards common rail technology and dual-fuel engines. These targets require improvements in engine technology. At charge pressures of up to 2,500 bar, not only diesel (DMA, DMB, DMX, MGO, MDO) but also heavy fuel oil (HFO) is injected into the engine. Given the high pressures, injectors with very small gap sizes are used. This confronts fluid management for large engines with completely new tasks. Oil

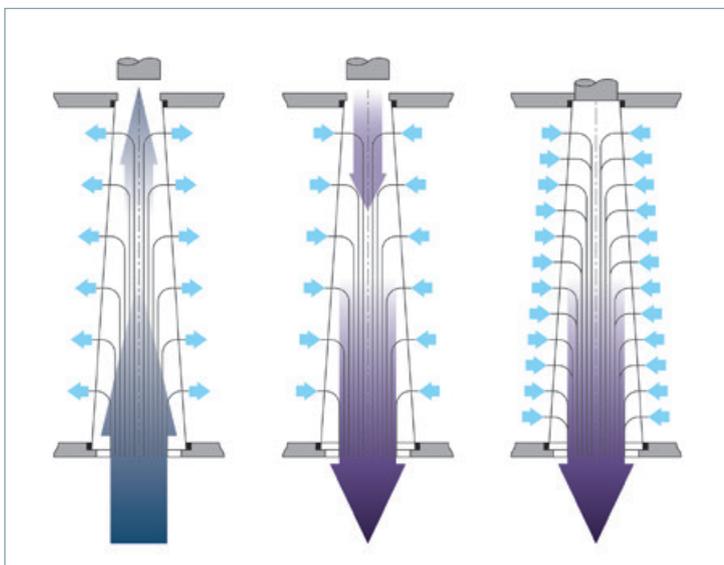
cleanliness classes of up to ISO 12/9/6 are required for the fuels, and dewatering also has a more significant role. Filtration technology plays a key role in developing and optimising heavy-engine technology. The quality of the fuel has a direct effect on engine emissions. The particles are damaging to the improved fuel systems, which were designed to achieve the new emissions standards. HYDAC provides various single and duplex filters as well as automatic back-flushing filters. This filter design and its filter element technology have been specially tailored to the requirements of state-of-the-art technologies. The task behind all of these technologies is identical: to protect the system against wear and to protect the environment. The latest development from HYDAC in this field is the AutoFilt® RF9, a fully automatic back-flushing filter for fuel and lubricating oils. What sets the filter apart is its globally unique, patented hydropneumatic back-flushing technology with secure media separation. Its design permits adaptation to any installation situation of the engine and allows space-saving positioning. The specially developed filter elements can be installed and replaced without tools. Filtration ratings from 1µm offer low flow resistance and high contamination-retention capacities. They also clean without leaving any residue. In the case of maintenance work, the optional bypass line guarantees uninterrupted operation of the filtration system, and consequently permanent protection of the engine against damage

caused by a contaminated medium. An additional external heating system compensates for temperature losses. A faster and continuous use of high-viscosity media, such as heavy fuel, is possible.

In addition to the fully automatic back-flushing filter, HYDAC offers solutions for diesel and pilot-fuel filtration as well as for dewatering systems.

Dual-fuel engines and pilot fuel oil

Newly developed dual-fuel engines can be operated with both fluid and gaseous fuels and changed over without transition during operation. The increasingly complex injection systems of the heavy engines work on the premise that the fuel will be virtually free of contamination particles and water. HYDAC took up the challenge of developing a system to filter the pilot fuel. The successfully implemented solution was a multi-stage filtration concept for the filtration of diesel and pilot fuel for DF engines. The aim was to achieve the cleanliness level of ISO 12/9/6. The HYDAC Optimicron® FuelFine filter element is used in this field. Ultra-fine fibroptic media ensure an efficient and highly effective filtration of the diesel fuel, enabling the required cleanliness classes to be reached. The Optimicron® FuelFine elements are available as single-stage or two-stage versions. In the multi-stage design version, a slightly more open fibreglass mat is additionally installed upstream. This multi-stage filtration ratio achieves a particularly high absorption capacity.



JetFlush technology: hydrodynamic suction effect



AutoFilt® RF9



Optimicron® FuelFine element