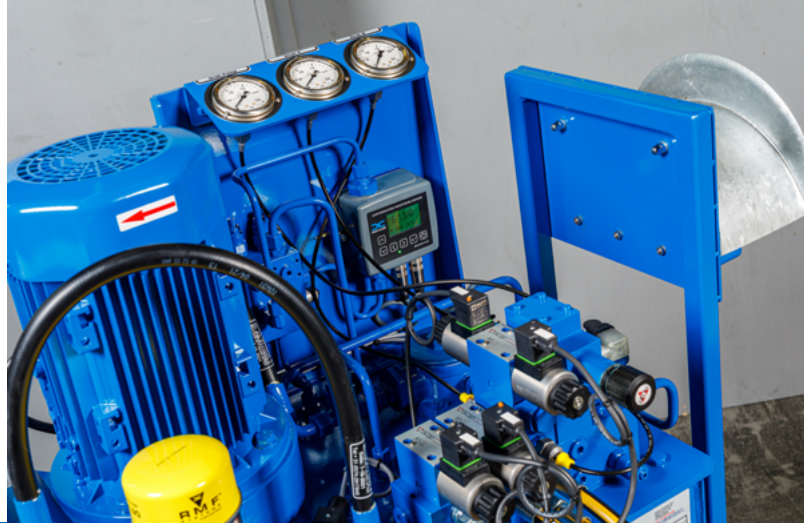




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## Des-Case at work: Flushing System for Hydraulic Actuators

### Introduction

The vessel Jotun FPSO is presently docked in the Norwegian port of Stavanger for a major mid-life overhaul. This overhaul includes refitting work to extend the life expectancy of the ship, including the replacement of dozens of large butterfly valves, which serve as shut-offs in systems such as those for ballast water and firefighting. The ship-builder has set high standards for the cleanliness level of purchased hydraulic components.

Reason enough for contractor Wouter Witzel, responsible for the supply of 80 large butterfly valves plus actuators, to ask Holland Hydraulics to develop a custom automatic flushing unit. Des-Case's RMF Systems took on the filtration and monitoring part of the project, resulting in the supply of a filter unit and particle counter that automatically monitors and records particulate contamination, moisture and temperature levels using a PLC.

### Flushing

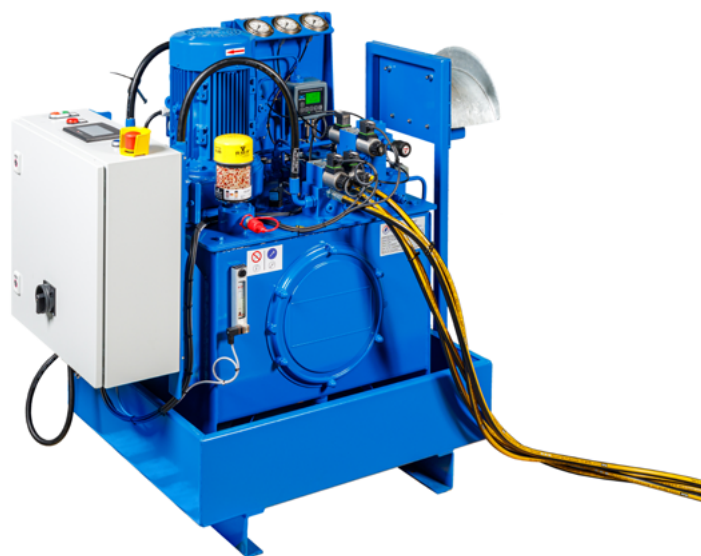
Wouter Witzel supplies the valves, including hydraulic actuators from a third party, and tests the complete combination at acceptance. At all times, the company has to take in to account, the stringent cleanliness requirements set by the shipyard for the supplied components. To be able to guarantee compliance with these high standards, Wouter Witzel engaged Holland Hydraulics to develop an automatic flushing unit.

In essence, this unit pumps low viscosity flushing fluid into the hydraulic actuators and out through a filter unit, while the return fluid is continuously analysed for its level of cleanliness. This process continues until the cleanliness level of the fluid reaches the set point, a sign that the actuators met the specified cleanliness requirement, at which the unit automatically signals 'flushing complete'.

### Importance of Clean Oil

Specifically for the filtration and measurement of fluid cleanliness, Holland Hydraulics called on the expertise of RMF Systems B.V.. Filtration specialist Gijs van Schaik explains: "It is prudent for an end user to specify requirements for the cleanliness level of their components. Components can become contaminated during their production, transport, or storage, ultimately causing contamination in the final assembled system.

This is not simply about visible fouling. Even the tiniest of particles, which are invisible to the naked eye and stay 'suspended' in the oil, can lead to wear and consequent reliability issues, degraded control precision, and higher energy consumption. Thus, it is crucial, to prevent these ultrafine particles from entering the system. It is therefore more efficient to agree to a specific cleanliness level with your component suppliers, rather than to spend days flushing the entire system yourself."



AW2020324-Marine-CMS breathers-EN

## Particle Counter and Filter Unit

For this flushing unit, RMF Systems B.V. proposed a permanently mounted inline sensor of type Condition Monitoring Sensor (CMS). The CMS automatically measures and displays particulate contamination, moisture content and temperature levels, and can be used either as a standalone product or integrated within a complete local or remote monitoring system.

The flushing fluid is cleaned using a pressure filter plus a second filter with a fineness of 3 microns, which is necessary to achieve the ISO 4406 cleanliness level of -/14/10. The flushing system also utilizes a pressure switch that indicates when the filter is fully saturated with contaminants.

Lastly, a desiccant breather on the fluid reservoir prevents dust and water ingress. This is a vital component, given that excessive moisture can cause accelerated degradation of the flushing fluid.



CMS-W-M-K-R-G1-2.0



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### AUTOMATION

In this application, the sensor is connected to a PLC that automatically monitors the cleanliness level. Based on measurements by the particle counter in combination with analytical software, the PLC emits a signal when the target cleanliness level is reached. Gijs van Schaik explains: "Because all the data is logged, we can generate a report for each actuator showing the measured cleanliness level and any other test data that might be required. Besides providing a guarantee for the customer, it also enables Wouter Witzel to detect potential faults in the actuators prior to delivery."

## Final Result

For all three parties, this flushing unit project is a textbook example of efficient collaboration, in which each party has been able to contribute their own essential expertise. The final result is an automated flushing unit that brings the original - manual - flushing time of 2 to 3 hours down to less than 30 minutes per actuator, enabling the shipbuilder to work more efficiently and with components meetings their ISO cleanliness levels.

