Case Study

HMA INSTRUMENTATION

OW SERIES OIL/WATER MONITORS CONTAMINANT DETECTION IN LUBRICATION SYSTEMS

Industrial lubrication systems require close monitoring of the lubricating fluid to detect contaminants and prevent the resultant degradation of the fluid. Contaminants such as water and metallic fines are commonly monitored manually, requiring routine sampling and laboratory analysis. AGAR OW-300 Series Oil/Water Monitors can be installed to automatically and continuously monitor the quality of lubricating fluids - providing real-time contaminant measurement and alarms without operator involvement.

Engines and machines have a multitude of bearing surfaces that depend on the oil to form a very thin film. This micron- thick layer of oil is the only thing that prevents direct metal-to-metal contact and reduces friction to a level that allows for years of service.

The oil is forced into the bearings under pressure to keep the layer of oil replenished, and to carry off heat and metal particles that wear off the bearing surfaces. The oil is collected by a pump from the oil pan or sump, and forces through a filter to remove metal particles. It is then fed through a cooler and recirculated through the engine.

After a period of operation, the oil and filter must be replaced because it is contaminated with metal particles, dirt, water, process fluid, and residues resulting from fuel combustion.

The most common use of lubricant monitoring can be found in large-scale motors and engines and other reciprocating equipment utilizing closed loop oils for lubrication or cooling. The industries include:

- Marine Transportation
- Power Generation
- Rail Transporation
- Refining
- Pumping/Compressor Stations
- Steel Manufacturing

Most of the heat generated by engines is carried off by a coolant. The most common coolant is a combination of water and glycol. As engines operate at different temperature ranges, expansion and contraction of the engine's metal parts are a common cause of leaks. Corrosion, gasket failure, overheating, and uneven head bolt torque are some of the other common causes of leaks.

Equipment is supplied with several systems designed to detect abnormal operating conditions. A pressure transducer monitors the oil pressure, and temperature transducers monitor both the oil and coolant. These are often tied in with alarms or shut-down devices that stop the machine before damage is done.

If a large amount of coolant is lost due to a leak, a temperature transducer detects it. However, if coolant is slowly leaking into the lubrication oil, it will usually remain undeteced by the on-line temperature and pressure instruments. Usually it takes a catastrophic failure for these instruments to detect a water leak or contamination. Oil pressure or temperature instruments will not detect the lubricating oil contamination becuase not enough coolant has leaked out to affect the coolant of oil temperatures. The lubricant system pressure is not significantly affected by low levels of contamination that is still sufficient to adversely affect lubrication.

Water in the lubrication oil systems causes a thin ragged layer of oil on the bearings instead of the thin uniform layer that is needed. This ragged film does not adequately protect against metal-to-metal friction. Metal-to-Metal friction causes heat to build up and rapid wear of the main rod bearings and the crankshaft.

The OW-300 Oil/Water Monitor works on the principle of energy absorption. See specification sheet for OW-300.

Oil has very low absorption properties, while water, on the other hand, has higher absorption properties. If a small quantity of water is entrained with the oil, the instrument would detect the difference in absorption and trigger an alarm. Metal particles, with absorption properties much higher than water, are also detected.

The OW-300 is ranged 0 to 5% water in oil for this application, and is repeatable to within +- 0.05%. The OW-300 can be supplied with an adjustable set point relay, indicating lights, and/or and analog 4 to 20 mA linear output that corresponds to the water content. Any combination of these outputs is available, including digital display and HART.

The power supply and signal conditioner unit can be supplied in NEMA 4 (weatherproof) or NEMA 4/7 (explosion proof), with IECEx, ATEX or UL/C approvals.

INS-CS-0031. SEPT 2018

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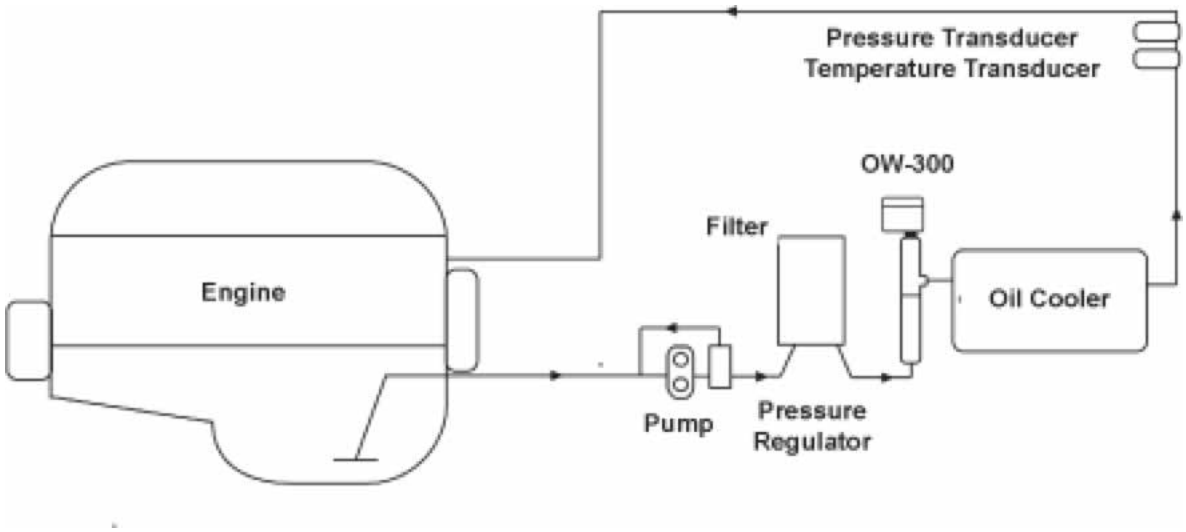

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