Contamination Control-Sensors

HYDAC

PN#02202690 / 08.18 / FSP1807-2013

Contamination Control - Sensors

Contamination Control

Contamination control is an important part of operating and maintaining hydraulic systems. In hydraulic systems, 70 to 90% of wear and failure is contamination related. Only 10 to 30% can be traced back to misuse, defects or age. Measurement and monitoring of contamination is a critical part of reducing downtime and maintenance costs. Contamination of fluids comes in the form of gas entrainment, water and solid particles.

Types of Contamination

Various types of contamination occur in fluid power systems: gaseous (e.g. air), liquid (e.g. water) and solid contaminants. Solid contamination is subdivided into three groups: extremely hard, hard and soft particles. Preventive measures can reduce the ingress of contaminants in systems.

An often overlooked source for premature fluid degradation and consequent system damage is heat.

An average healthy human eye can see items down to approximately 40 µm (microns) in size. In comparison, a human hair is 70 to 80 µm in size. Particles that cause problems in high performing, high pressure hydraulic systems are in the range of approximately 2 µm to 15 µm.

Types of Contamination

Gaseous	Liquid	Solid	Effects
Air	Water	Emery, Metal Scale, Rust Particles	Extremely Damaging
		Iron, Steel,Brass, Bronze, Auminum	Damaging
		Laminated Fabric, Fibers, Seal Abrasion, Rubber Hose Particles	Minimal Damage

Influence of Contamination

Hydraulic component clearances are critical and require strategic filtration to remove damaging particles. Particulate contaminants circulating in fluid power systems cause surface degradation through general mechanical wear (abrasion, erosion, and surface fatigue). This wear causes increasing numbers of particles to be formed, the result being that wear increases if the “chain reaction of wear” is not properly controlled.

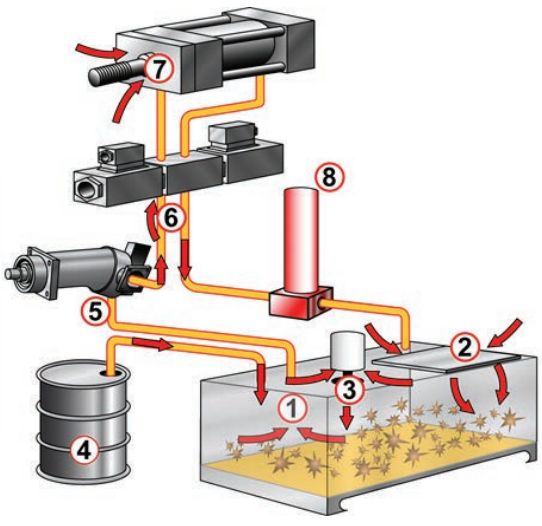
System efficiency can drop by up to 20% before an operator even detects a problem, such as cylinder drift, jerky steering, erratic operation or slower performance. Overall, contamination results in shorter service intervals, higher operating costs and lost productivity.

Real-World Approach to Contamination Control

The real world approach to contamination control involves fluid diagnostics and treatment. The objective of diagnostics, or condition monitoring, is measuring and determining the status of system components and fluid health to prevent failure, optimize maintenance practices and fluid processing and/or replacement intervals.

It allows moving the maintenance procedure in a plant from a reactive (failure oriented) to predictive (status oriented).

1. Built-in or from maintenance
2. Tank leakage
3. Air through breather
4. Dirty new oil
5. Pump wear
6. Piping scale
7. Dirt on rods
8. Return line filter



Sources of Contamination

The source for particulate contamination is often found to be related to the reservoirs itself. This includes uncleaned reservoirs put in use (filled with fluid without cleaning the reservoir), dirt added during maintenance cycles, tank open to the environment and missing or low quality air breathers on the reservoir. New fluid is generally dirtier than what a system, and specific components in the system, would require for proper performance and/or improved life expectancy. Over time, pipe scale (rust), pump wear and dirt on rods/cylinders add contamination to the fluid.

Water in the hydraulic systems can be caused by moisture from ambient air, leakage of cooling systems or process water, leakage of seals and chemical processes such as combustion, oxidation and neutralization.

Design issues in the hydraulic system can contribute to air/gases in hydraulic fluids. Incorrect motor speeds, unprimed pumps, suction lines too small, suction lifts too high and blocked inlets are among other reasons for air contamination over time.

Solid Contamination in Oil

- The CS1220, shown with AS1000 Aqua Sensor and Manifold, detects solid contamination and displays fluid cleanliness as an ISO code.
- It can be placed in-line in hydraulic systems or added to Filter Systems products, such as filter carts, kidney loop systems, dehydrators, etc.

Water in Oil

- The AS3000 Series Aqua Sensor measures the water content in oil in percent saturation
- Ingression of water causes pumps, motors and valves to fail prematurely
- Real time monitoring of water content enables operators to shutdown hydraulic systems before costly repairs and replacements are incurred

Condition Sensor Data Logging and Remote Communication

- The CSI-C-11 captures measured data from two (2) HYDAC SMART sensors and up to four (4) analog sensors (optional).
- Communicates captured data via LAN to FluMoS and via WLAN to FluMoS Mobile

Plant and Mobile Service

- The FCU1310 is perfect for mobile in-plant applications and field service
- It provides ISO code and water concentration in percent saturation quickly and easily

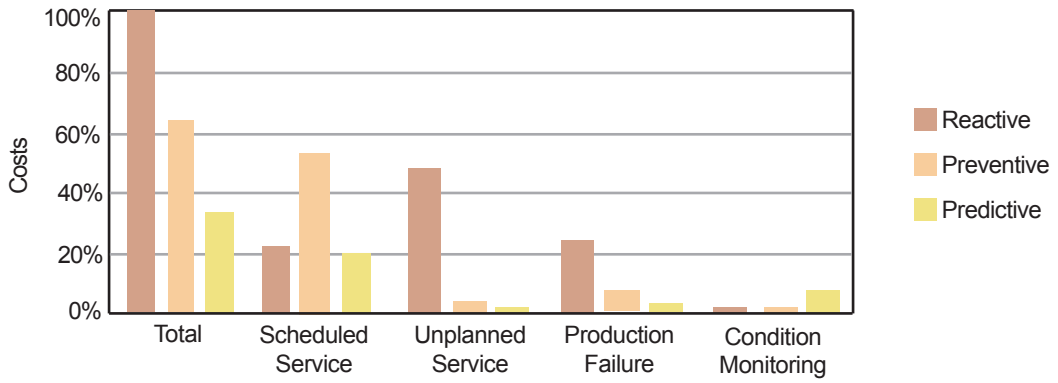
Diagnostics

- The HMG 4000 is a data recorder perfect for aiding service technicians
- Large, full graphics color display - 5.7” touchscreen
- Capable of recording up to 38 sensors at once, 8 analog, 2 digital sensors and 28 HCSI sensors via CAN bus

Benefits of Condition Monitoring:

- Reduced unscheduled downtimes
- Reduced loss of production
- Reduced consequential damage

Contamination Control - Sensors



Applications:

- Steel and Rolling Mills
- Power Industry/Power Generation Plants
- Pulp and Paper Plants
- Plastic Injection Molding
- Metalworking Machinery
- Mobile
- Mining
- Marine
- Wind Power
- Industrial Hydraulic & Lubrication Systems
- Test Stands
- and others...

HYDAC

580 West Park Road | Leetsdale, PA 15056, USA
724.318.1100 phone | www.HYDAC-NA.com

PN#02202690 / 08.18 / FSP1807-2013