

CONTAMINATION CONTROL-SENSORS



Diagnostics

Plant And Mobile Service

Solid Particulates And Water In Oil

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 μ (Microns) in size. In comparison, a human hair is 70 to 80 μ in size. Particles that cause problems in high performing, high pressure hydraulic systems are in the range of approximately 2 μ to 15 μ .

Types of Contamination

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

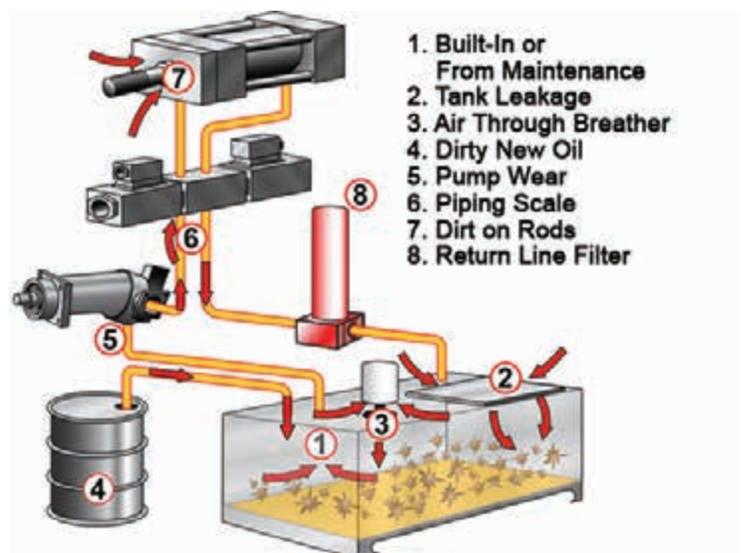
Influence of Contamination

Hydraulic component clearances are critical and require strategic filtration designs 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 contained (by reducing contamination).

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 a predictive (status oriented) one.



Sources of Contamination

The source for particulate contamination is often found related to the tank itself. This includes uncleaned tanks put in use (filled with fluid without cleaning tank), dirt added during maintenance cycles, tank open to the environment and missing or low quality air breathers on tank. New fluid is generally dirtier than what a system, and specific components in the system, would require for proper performance and/or adequate 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.

Diagnostics



- ◆ Available in two versions; HMG2500 and HMG4000
- ◆ Simple, user-friendly operation
- ◆ Practical, robust design
- ◆ Large, full graphics color display
- ◆ Simple, user friendly set up procedures for standard sensors
- ◆ Quick and independent basic setting of the instrument through the use of automatic sensor recognition
- ◆ Various measurement modes: Normal measuring, fast curve recording and long-term measuring



Solid Particles in Oil

- ◆ The TestMate® Contamination Monitor (TCM), shown with the TestMate® Water Sensor (TWS) and Manifold, detects solid particles 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.
- ◆ Compatible with standard mineral based fluids. Optional EPR seals allow use with phosphate ester fluids



Water in Oil

- ◆ The TestMate® Water Sensor-D (TWS-D) series 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



Plant and Mobile Service

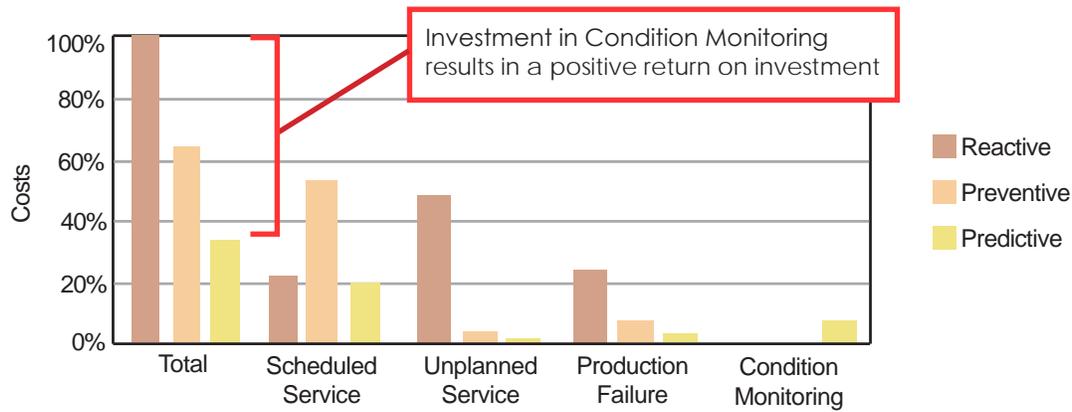
- ◆ The TestMate® Monitoring Unit (TMU) is perfect for mobile in-plant applications and field service
- ◆ Provides ISO code and water concentration in % saturation and the temperature of the fluid quickly and easily
- ◆ Internal memory will store recordings with a time stamp. USB interface can be used to copy all measurements to a USB memory stick, for subsequent evaluation on a PC using our FluMoS software
- ◆ High pressure adapter allows connection to pressure lines up to 5000 psi
- ◆ Integrated pump for the automatic control of oil flow

Benefits of Condition Monitoring:

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

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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 and Lubrication Systems
- ◆ Test Stands
- ◆ and others...

For more information, please contact filtersystemsmanager@schroederindustries.com



580 West Park Road | Leetsdale, PA 15056, USA
724.318.1100 phone | 724.318.1200 fax
www.schroederindustries.com

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