Clean Energy BC's
OPERATIONS WORKSHOP

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Hyatt Regency, Vancouver
www.cleanenergybc.org
Oil Contamination Control and Condition Monitoring
Fluid Problems.  Fact is

70-80% of all failures of hydraulic systems and up to 90% of all bearing failures are caused by contamination of the hydraulic or lubricant fluid.
Types of Contamination

SOLID

LIQUID

GAS
Fluid Problems.

Kinds of contamination

- Gaseous
- Liquid
- Solid

Effect

- Very harmful
- Harmful
- Slightly harmful

Fluid Problems

- Fact is (oil)
- Effects (oil)
- Damages (oil)
- Life Time (oil)
- Kinds (oil)
- Origins (oil)
- Filter Tasks (oil)
- Development (oil)
- Effects (water)

Gaseous
- Air

Liquid
- Water
- Corundum
- Forge
- Rust

Solid
- Iron
- Steel
- Brass
- Bronze
- Aluminium
- Particules from hoses
- Oxidation products
- of the hydraulic fluid
- Particles of rubber
- Fibres from Cloth
- Wear at sealings
How do you measure fluid contamination?

**ISO CODE 4406:1999**

*Which counts the number of dirt particles in a 100 ml sample, larger than these specified sizes: 4µm / 6µm / 14µm*

<table>
<thead>
<tr>
<th>Components</th>
<th>ISO Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Servo control valves</td>
<td>17/14/11</td>
</tr>
<tr>
<td>Proportional valves</td>
<td>18/15/12</td>
</tr>
<tr>
<td>Vane and piston pumps/motors</td>
<td>19/16/13</td>
</tr>
<tr>
<td>Directional &amp; pressure control valves</td>
<td>19/16/13</td>
</tr>
<tr>
<td>Gear pumps/motors</td>
<td>20/17/14</td>
</tr>
<tr>
<td>Flow control valves, cylinders</td>
<td>21/18/15</td>
</tr>
<tr>
<td>New unused fluid</td>
<td>21/18/15</td>
</tr>
</tbody>
</table>
Fluid Condition Monitoring is a tool for:
Optimized maintenance and service planning

Failure rate

preventive

Maintenance management:
crash

Condition based

- unsufficient flushing
- mounting faults
- design faults

early loss
machine life
erosion

Time of maintenance:
Too early
optimum
Too late
Fluid Condition Monitoring Philosophy

- Data recording
  - Oil condition
  - Machine load
- Interpretation
- Process data
- Fluid data
- Operating data
- Data transfer
- Monitoring controlling
- Service
- Maintenance
Advantages for the company are

- Increased machine availability
- Reduction in cost of maintenance personnel
- Optimization of onsite personnel
- Permanent monitoring (Trending)
- Measured value recording and alarm management
- Utilization of the full machine life time

Reduction on LCC/TCO

(LCC = LifeCycleCost, TCO = Total Cost of Ownership)
Fluid Condition Monitoring
Overview

- Bearing wear
- Corrosion
- Component wear
- Water
- Oil aging
- Particle
- Oxidation
Metallic Contamination Sensor

Philosophy

Bearing lubrication film

Metallic particle

Diameter in µm

200

30

75

Fine/coarse particle

Metallic particle

Detecting damage or metal burst

Detecting initial damage

Human hair

Fine/coarse particle
HYDAC Condition Monitoring

Fluid Monitoring MCS1000

CS1000 solid particle counter

Fluid Monitoring Module FCU 1300

Condition Monitoring Units` SMU/CMU

Fluid Dehydrators
Particle Counting

Basic principles
- light blockage -LED
Contamination Sensor Block KIT

(FMM Block kits)

- CS 1000 series (Contamination Sensor)
  + AS 1000 series (Aqua Sensor)
- Measurement of solid contamination and water in hydraulic and lube systems
- Various Block options available depending on the users individual application and needs
Combined heat and power plant
Application engine oil care unit

Caterpillar (MAK) duel fuel engines
for de-central power stations:

- Continuous fine filtration of engine oil for expend oil changing interval
- Increasing oil life time period
- Increasing plant availability

- Flow rate of 15l/min
- MCS1510 for detection of component wear
2. Generation

Electrical connections

- M12x1 plug, 5-pole
  - HMG3000, HMG510
  - Fully functional, via standard HMG cable
- Bluetooth
  - 1.2, class 3 = 10m
  - USB adapter included for PC link
- FluidMonitoring Software (FluMoS Light) as Freeware

Bluetooth is always on
Aqua Sensor AS1000

It measures the water content relative to the saturation concentration and outputs the degree of saturation as a 4-20 mA signal.

Extremely reliable on account of its compact, rugged design.

Monitoring and automation made cost-effective. Also for serial production.
FLUID AQUA MOBILE (FAM)

WATER REMOVAL SYSTEM
The End

Thank You for your time and attention!