

This Newsletter is about ...

THE RIGHT WAY OF CONTAMINATION MONITORING IN HYDRAULIC SYSTEMS



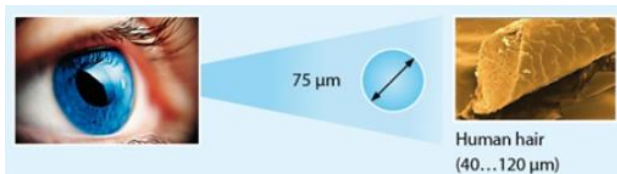
**... AND HOW TO IMPROVE THE RELIABILITY
OF YOUR HYDRAULIC SYSTEMS**

We produce fluid power *solutions*

We all know different types of oil contamination. Some are obvious, due to the appearance or change in colour, others perhaps not quite noticeable.

Some of them are ...

- gas / air (bubbles)
- other fluids (wrong oils, water, ...)
- cross-influence as water drops with air bubbles
- solid particles
 - metals
 - non-metals (dirt, plastics, soot, ...)



Contamination larger than 40 micron are visible to the human eye.

Fine particles are not noticeable and require special equipment.

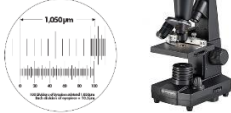
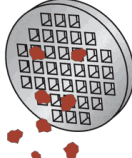
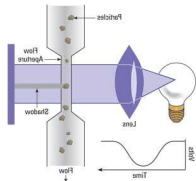
Why do we measure contamination?

- protection of components
- less service
- longer live time
- specifications of manufacturers
- detection of faults in the hydraulic system
- increase of effectiveness and value
-

Beside of supplying degasification solutions and dewatering filter systems,

ARGO-HYTOS is the market leader for oil condition monitoring and detection of contamination by solid particles.

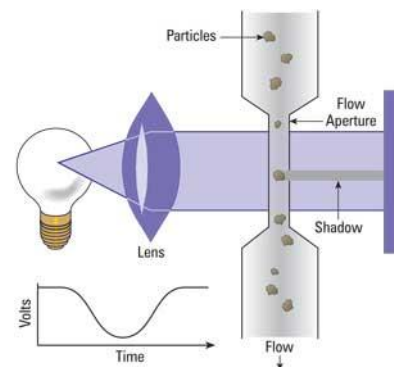
The industry implements various procedures ...

Measurement Methods		
microscopic measurement		❖ old method ❖ high effort ❖ critical sample preparation
mesh blocking principle		❖ high technical effort ❖ limited measurement range
optical measurement light extinction principle ARGO-HYTOS		❖ particles create a shadow on the photocell

The preferred measurement method by ARGO-HYTOS is the *light extinction principle* which offers the most accurate results and the output our customers rely on it.

How does it work?

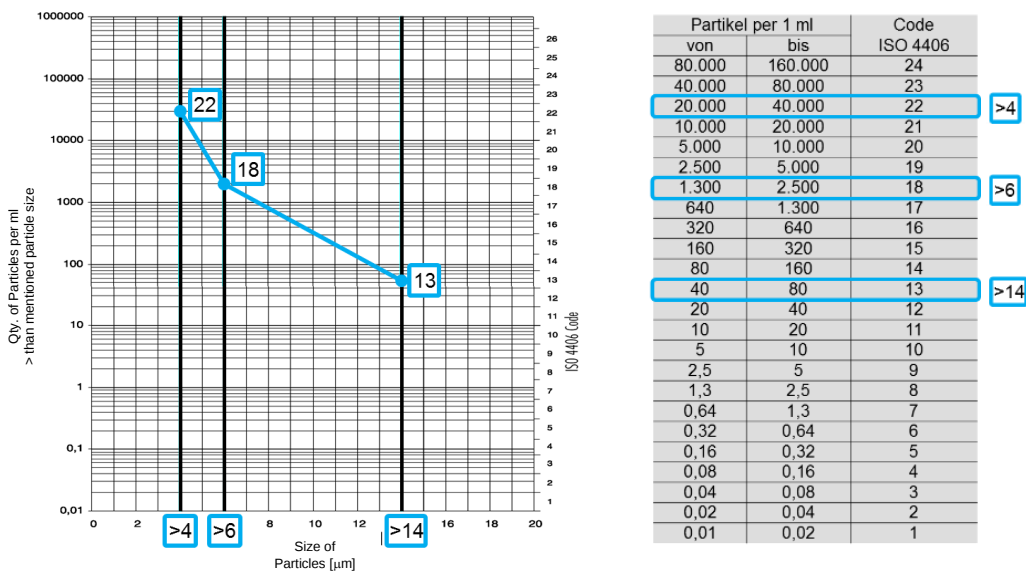
- If there is no particle in the measurement cell, all light will pass through to the photo diode
- If a particle enters the measurement cell a shadow will be created on the photo diode
- The size of the particle can be determined by the light intensity detected at the photo diode
- Measurement standard sizes are 4, 6 and 14 micron
- The flow is calculated by the speed of the particles



How do we classify the contamination?

The most common standard in our geographical market and industry is ISO 4406:1999 which indicates the number of particles per 1 ml with a code.

... for example 22/18/13



Which means particles ...

- > 4 micron between 20,000 and 40,000 particles
- > 6 micron between 1,300 and 2,500 particles
- > 14 micron between 40 and 80 particles

Typical cleanliness requirements

Pumps		
Axial piston pumps	21 / 18 / 15	
Radial piston pumps	21 / 18 / 15	
Gear pumps	21 / 18 / 15	
Vane pumps	20 / 17 / 14	
Motors		
Axial piston motors	21 / 18 / 15	
Radial piston motors	21 / 18 / 15	
Gear motors	21 / 18 / 15	
Vane motors	20 / 17 / 14	
Valves		
Directional control valves (solenoid valves)	21 / 18 / 15	
Pressure valves	21 / 18 / 15	
Flow control valves	21 / 18 / 15	
Check valves	21 / 18 / 15	
Proportional valves	20 / 17 / 14	
Servo valves	17 / 14 / 11	
Cylinders	21 / 18 / 15	

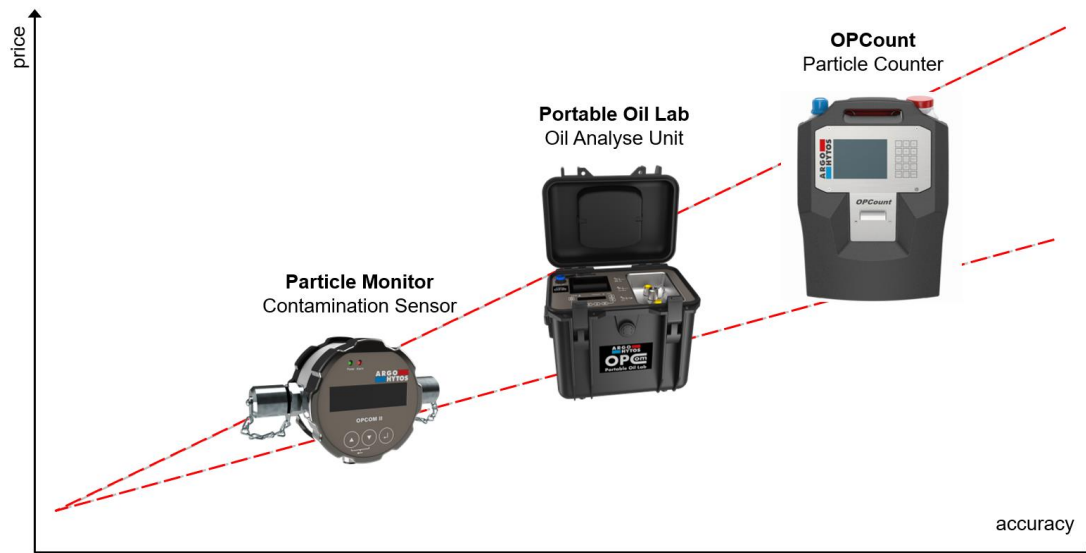
The required oil cleanliness in the system is determined by the most dirt-sensitive component.

If the operating pressure is increased in a system, it is necessary to improve the oil cleanliness to achieve the same wear lifetime for the components.

Operating pressure	Change in oil cleanliness
0 ... 100 bar	3 classes worse
100 ... 160 bar	1 class worse
160 ... 210 bar	none
210 ... 250 bar	1 classe better
250 ... 315 bar	2 classes better
315 ... 420 bar	3 classes better
420 ... 500 bar	4 classes better
500 ... 630 bar	5 classes better

Oil cleanliness levels required for hydraulic components (160...210 bar)

We offer different measuring instruments to improve the reliability of your hydraulic system.



Online Sampling

- No influence of wrong sampling
- Trends can easily be displayed
- Continuous monitoring over long periods

Bottle Sampling

- Samples can be measured at a later time
- Sample can be analysed in the lab
- Samples can be taken at several points parallel

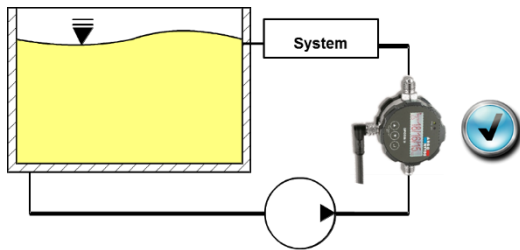


Please also see our Newsletter from December 2019

How to measure contamination online

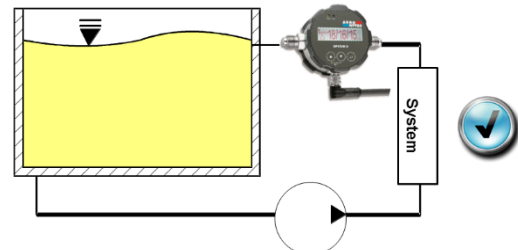
Monitoring of Inlet

*Measurement of contamination
distributed to the system*

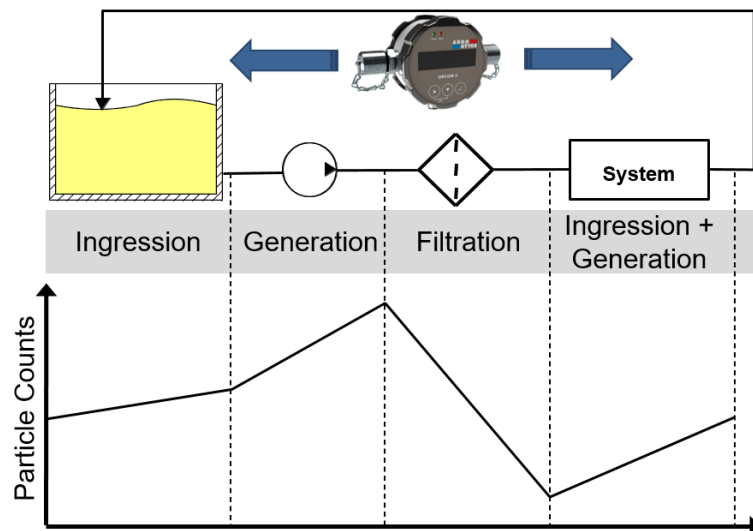


Monitoring of Return

*Measurement of contamination
from the system*

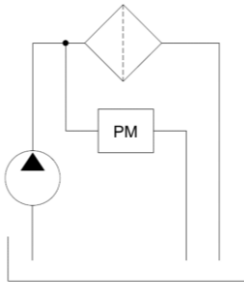


The measurement point has to be chosen according to the monitoring goal

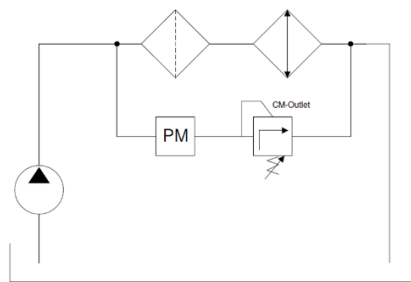


Find the correct place for system representative measurement

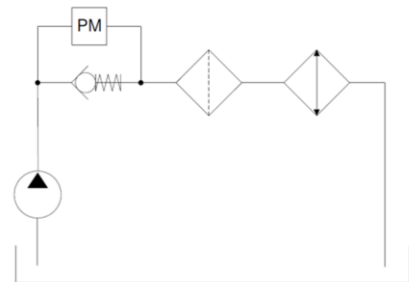
full system
pressure



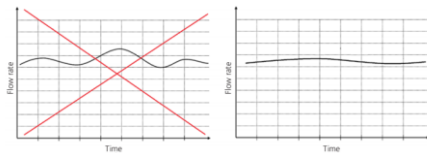
with adjustable
pressure holding valve



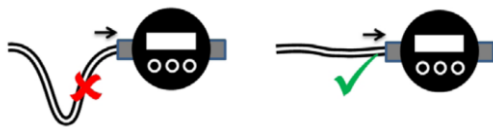
with pressure
holding valve



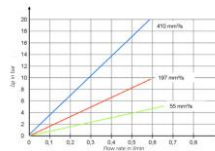
Pay attention to ...



a stable flow velocity within the limits



avoid blind holes in the supply line



the viscosity dependent flow range

***ARGO-HYTOS is the leading company
for condition and contamination monitoring.***

Please contact us for all your enquiries or a quotation:

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Next Newsletter in August ...

Counterbalance (Overcentre) Valves