



acculube

A regional leader in cost-effective fluid management,
has introduced a Fluid Filtration System
that offers substantial, quantifiable benefits
for users of petroleum-based lubricants



Machine Shop Filtration

Why Effective Filtration is Needed

Oil has 4 functions in manufacturing:

- 1 To clean and protect** internal equipment surfaces, preventing lost production and high repair costs, and preventing sludge and varnish from forming on the parts
- 2 To cool** machinery and move heat to the atmosphere
- 3 To lubricate** machines and mitigate the progressive wear that results from abrasion and fatigue
- 4 To seal** the bridge between surfaces, keeping fluid in, and air and dirt out

To do its job, oil must be clean - free from debris. The universal cleanliness standard today, ISO 4406c, is detailed on the chart shown at right. It shows the count of particles in a milliliter of fluid, which is used to determine the ISO Fluid Cleanliness Code. The code lists scale numbers based on the particle count range at 4, 6 and 14 microns and higher. This code system is used to evaluate contamination control methods, including filter performance.

The Special Needs of Hydraulic Systems

Contamination is introduced each time a ram extends and retracts. Airborne particulate can also land on the cylinder and be drawn into the oil. As debris accumulates, it can bind or stick valves – particularly servo valves. Vane pulps and piston pumps also have elevated sensitivity to contamination. For this reason, hydraulic systems have their own cleanliness standards, as the chart shows.

The Quest for the Perfect Filtration Solution

In a perfect world, one filter would deliver 10 things. It would:

1. be compatible with all fluid-using systems
2. have no pressure drop
3. hold an unlimited volume of contaminants without blinding
4. not allow bypass
5. never cause lost production
6. meet ISO 4406c standards
7. never need to be inventoried or replaced
8. offer a way to reduce the total expense of fluids, and equipment warranty costs
9. have a low cost to purchase and use
10. have a disposal cost of zero

So how close can we get to *achieving* these 10 goals?



ISO 4406c Cleanliness Code Chart		
Numbers of Particles per Milliliter (Counts/mil)		
More Than	Up to and including	Scale Number
250000		>28
130000	250000	28
640000	130000	27
320000	640000	26
160000	320000	25
80000	160000	24
40000	80000	23
20000	40000	22
10000	20000	21
5000	10000	20
2500	5000	19
1300	2500	18
640	1300	17
320	640	16
160	320	15
80	160	14
40	80	13
20	40	12

Example: ISO Code 22/21/18

Between 20000 and 40000 particles 4 µm and greater
 Between 10000 and 20000 particles 6 µm and greater
 Between 1300 and 2500 particles 14 µm and greater

Hydraulic Systems Component Cleanliness Levels								
System Component	Typical Cleanliness Specification							
Servo Valve	●	●	●					
Proportional Valve		●	●	●				
Variable-displacement Pump			●	●	●			
Cartridge Valve				●	●	●		
Fixed-displacement Piston Pump				●	●	●		
Vane Pump					●	●	●	
Pressure or Flow Control Valve					●	●	●	
Solenoid Valve					●	●	●	
ISO Cleanliness Code	14/12/9	15/13/10	16/14/11	17/15/12	18/16/13	19/17/14	20/18/15	

New oil is typically ISO 22/21/18.

Hydraulics, gears and specialized manufacturing equipment such as this injection molding machine, are examples of systems that benefit most, in terms of reduced wear and longer MTBF (Mean Time Between Failure), from Acculube filtration technology.



Introducing the Acculube Filtration System

This is the portable, cost-effective, operator-friendly solution to industry's demand for contaminant-free fluids, and (nearly) maintenance-free filtration.

How It Works

The innovative flow-through filtration system supplied and serviced by Acculube was engineered specifically for manufacturing fluids. It is a multi-element filter that forms a positive barrier to channeling.

The flow of oil carries contaminants deep into the media. Oil is routed from the top and bottom of the filter element, through the media, to the collector, to the center tube, and out the canister. As oil moves through the media, pressure is reduced, while the exterior pressure of the element remains constant. Larger particles are captured at the top and smaller particles are retained in the lower portion of the filter. Oil flow travels through the layers of the elements and into the oil return tube of the filter housing.

This highly efficient filtration technology enables the filter to retain a large volume of contaminants without blinding, and without compromise of filter performance. It has proven to be a superior alternative to conventional surface media filters.

What Size Particles are Filtered?

The human eye can see particulate down to about 40 microns. (For reference, a human hair is about 35-40 microns.) In today's machinery, lubricant film can be as thin as a few microns. If you can see particles in your oil, there's a serious problem that needs immediate attention. The particles we are addressing here are the destructive wear particles that are not visible without magnification.

What's the Impact?

Upgrading from ISO cleanliness code 22/21/18 to ISO Cleanliness Code 16/14/11 can extend the life of a variable displacement pump from 2 to 14 years – and have equally beneficial effects on other equipment as well. *How would this impact your capital budget?*

How It Works in Your Facility

The Acculube Filtration System is ideal for filtering new lubricant as it's put into service. It is also ideal for conditioning lubricants that are in use, and when transferring lubricants from tanks to reservoirs.

This is "lean thinking" ... applied to a critical maintenance task. The Acculube Filtration System provides an efficient, proven alternative to the cost of buying, inventorying, installing, replacing, and managing filtration. This unique rental program brings the best-available fluid filter technology to your facility, for use by the day or week, at a very economical cost. Plans are tailored to the individual facility.



The System

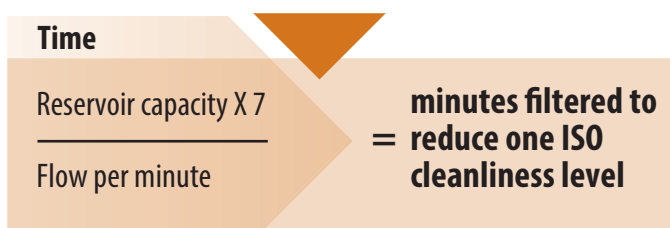
- Removes contaminants down to 1 micron
- Filters virtually all commercial lubricants and manufacturing fluids
- Maintains plant fluids at ISO 4406c standards with a minimum of labor and cost
- Moves easily between equipment – and departments
- Performs passively with no production interference

"The Cost Effective Solution to Machine Shop Filtration"

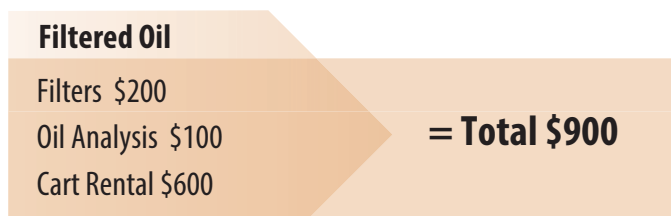


6 Simple Steps

- 1** Using an Oil Thief device, sample and analyze the oil to determine its suitability for continued use.
- 2** Determine if it meets the recommended cleanliness level for the most sensitive component in your system.
- 3** Determine how long the oil filtration process should take:



- 4** Filter the oil in the reservoir for the recommended period of time using the Acculube Portable Filtration system. Keep the system closed, with all caps on and breathers in place.
- 5** Re-sample the oil to determine post-filtration ISO Cleanliness level
- 6** Calculate the savings:



The savings is \$1900, and is achieved without downtime, and with zero disposal costs.



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