Portable Filtration Systems
Field Performance Report

Lubrication Technologies, Inc.
SEPARATING SURFACES SINCE '76

Harvard Corporation

$10,000.00+ SAVED

The graphic below shows the results of a Harvard filter cart used to ***Clean Up 400 Gallons*** of fire retardant hydraulic oil.

Lubrication Engineers, Inc. — Asset Reliability Solutions
Xamine™ Oil Analysis

Lubricant Analysis Report

North America: +1-800-537-7683

0	1	2	3	4
NORMAL			ABNORMAL	CRITICAL

Overall report severity based on comments.

Account Information	Component Information	Sample Information
Account Number: 593000-0157-0000 Company Name: LUBRICATION TECHNOLOGIES Contact: Address: 120 BOSWORTH STREET WEST SPRINGFIELD, MA 01089 US Phone Number: 413-788-5823	Component ID: Secondary ID: Component Type: AXIAL PISTON HYDRAULIC PUMP Manufacturer: Information Requested Model: Information Requested Application: POWER GENERATION Sump Capacity: 400 gal	Tracking Number: 20051P48149 Lab Number: I-163533 Lab Location: Indianapolis Data Analyst: JDA Sampled: 10-Mar-2020 Submitted: 10-Mar-2020 Received: 16-Mar-2020 Completed: 18-Mar-2020
Filter Information	**Miscellaneous Information**	**Product Information**
Filter Type: Information Requested Micron Rating: 10		Product Manufacturer: CASTROL Product Name: ANVOL SWX FM Viscosity Grade: ISO 68

Comments Suggest that diagnostics, additional testing, or other condition monitoring tools be used to help identify the cause of the abnormal wear condition. Chrome is at a SIGNIFICANT LEVEL; CHROMIUM in hydraulic systems can be from piston/rods, hydraulic motor component, valves, and other chrome-plated surfaces (as applicable). Significantly elevated chromium content with low contamination and low acid number/oxidation can indicate a cavitation issue. Aluminum is at a MODERATE LEVEL; ALUMINUM sources in hydraulic systems include HOUSINGS, FITTINGS, TUBING, VALVES, PISTONS, and/or LUBE COOLERS / HEAT EXCHANGERS (as applicable). Acid Number is MODERATELY HIGH, which may be due to oxidation, contamination with an acidic product, extended drain interval, or lubricant mixing. Zinc is slightly high for this lubricant. Please provide COMPONENT MANUFACTURER and MODEL to compare data to the correct standards for this component. Resample at half interval.

	Wear Metals (ppm)										Contaminant Metals (ppm)			Multi-Source Metals (ppm)					Additive Metals (ppm)				
Sample #	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
2	16	8	0	7	3	3	0	0	0	0	0	12	0	0	0	3	0	0	0	2	5	0	261	37
1	20	12	0	9	1	0	0	0	0	0	1	9	0	0	0	0	0	0	1	1	20	0	261	33

	Sample Information							Contaminants			Fluid Properties					
Sample #	Date Sampled	Date Received	Lube Time	Unit Time	Lube Change	Lube Added	Filter Change	Fuel Dilution	Soot	Water	Viscosity 40°C	Viscosity 100 °C	Acid Number	Base No. D4739	Oxidation	Nitration
			h	h		gal		% Vol	% Vol	% Vol	cSt	cSt	mg KOH/g	mg KOH/g	abs/cm	abs/0.1 mm
2	10-Mar-2020	16-Mar-2020	24100	0	No	0	No				73.3		3.17			
1	03-Mar-2020	16-Mar-2020	24000	0	No	0	Yes				75.6		3.22			

	Particle Count (particles/mL)										Additional Testing
Sample #	ISO Code Based On 4/6/14	> 4 µm	> 6 µm	> 10 µm	> 14 µm	> 21 µm	> 38 µm	> 70 µm	> 100 µm	Test Method	Water by Karl Fischer - mod. 6304C
											ppm
2	19/17/13	3576	1017	228	66	10	0	0	0	ASTM D7647	316
1	24/22/18	141052	33670	6069	1659	262	6	0	0	ASTM D7647	238

Comments are advisory only and are based on the assumption that the sample and data submitted are valid. Missing fluid or component information limits the evaluation. No warranty is expressed or implied. Measurement uncertainty available upon request.

Please check out the ISO 4406 particle count results on the below image.

	Particle Count (particles/mL)										
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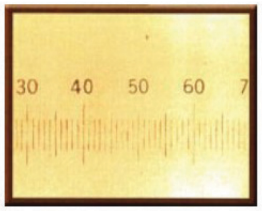
In case you are not familiar, the 3 digit code represents the number of particles greater than 4/6/14 micron in every 100 ml of oil.

The cleanliness code went from 24/22/18 to 19/17/13. Every single digit reduction results in the number of particles being halved. You can see the actual reduction of the 4, 6 and 14 micron particles to the right of the code.

Unclean, new oil viewed by an independent lab.



Clean, new oil viewed after the Harvard filtration process.

RESULTS:

Cleaned oil (new oil is not clean and should be filtered prior to introducing it into a machine) results in longer pump and motor life as well as valve life. *Filtering the new oil is a very critical, proactive maintenance step.* Which would you prefer, assuming or knowing that the new oil is truly clean? The oil filtration process must start with clean oil to positively impact equipment performance. With the expenses, complexities and increasing demands on equipment today one must capitalize on every performance advantage possible. New oil filtering is an easy first step to apply sure bet.

120 Bosworth Street, West Springfield MA 01089
413-788-LUBE (5823)
www.LubeTechnologies.com

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45 Years 1976-2021 — Lubrication Technologies, Inc.
AN UNCOMMON TECHNICAL RESOURCE

Harvard Corporation

Constant Contamination Control

The Filter Makes the Difference:
The Harvard filter is designed as a multiple element filter. The Harvard™ patented non-channeling seal forms a positive barrier to channeling. The flow of oil carries the contaminants into the depths of the filter media with no flow restrictions from surface loading. Each element will remove water from wet oils.

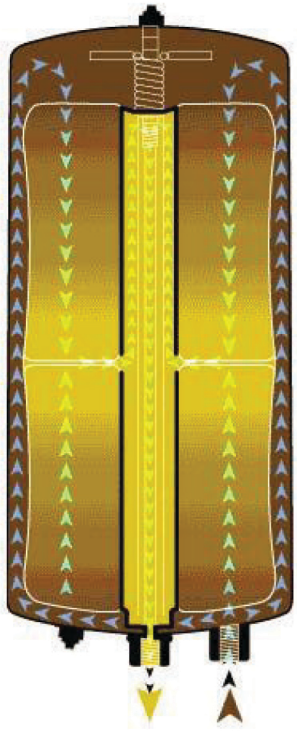
The hydraulic pressure of the oil compresses the layers of filter media against the pat-ented non-channeling seal and toward the center of the element creating a constant pressure to avoid channeling. This compression along with the pressure against the filtering surface of the element causes the elements to become more compact, trapping contaminants as small as one-micron. Oil flow travels through the layers of the elements and into the oil return tube of the filter housing.

Features
- Removes Contaminants as Low as 1-Micron
- Removes Water from Petroleum Base Fluids
- Moves Easily Site-to-Site
- Filters Most Synthetic and Oil Base Fluids
- Operation/Service Manual Included
- Contact Distributor for Additional Information

Increases
- Fluid Life
- Machine Life
- Equipment Life

Decreases
- Downtime
- Hazardous Waste Generated
- Replacement Fluid Costs
- Waste Disposal Costs

Typical Applications:
- Manufacturing
- Machine Shops
- Injection Molding
- OIL EDM Machines
- Gear Oils
- Diesel Fuel
- Hydraulic Oils
- Quench Oils
- Glycerols
- Heat Transfer Fluids
- Turbine Oil
- Compressors



How The System Works

Contaminants from 1 to 40 microns in size are common even in full-flow, filtered lubricants and coolants. Larger contaminants nest into areas around bearings, rings, pumps, etc. and damage component surfaces. Smaller contaminants that cannot be removed by full-flow filters wear the apparatus by a process called silting.

For many years, partial-flow filtration has been used to supplement full-flow filters to remove larger contaminants and control silting. Harvard Corporation did not invent partial-flow filtration, but we significantly improved it. Our patented, non-channeling seals improve partial-flow filtration by forcing oil through a wound, fiber-filter media so fluids cannot bypass the partial-flow filter.

Independent studies conducted by the Center for Hazardous Materials Research at the University of Pittsburgh demonstrated the effectiveness of Harvard Corporation non-channeling, partial-flow filter. The filter removes virtually all remaining 1 to 40 micron contaminants while also removing the vast majority of silting particles. In addition, the filter absorbs water, antifreeze and other extraneous particles.

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