

USED RECYCLED OIL IN TURBINES, HYDRAULICS & TRANSFORMERS

UNIVERSAL OIL COMPANY

BENEFITS OF PROPERLY Filtered NEW & USED RECYCLED OILS

Ingressed or environmental contamination gets added into the system during servicing or maintenance (or the lack of maintenance) or is introduced into the system from the surrounding environment, i.e. atmosphere.

Self Generated Contamination:

Self generated contamination is created internally within the system by the moving parts of Turbines and hydraulic components. These contaminants are produced by wear, corrosion, cavitations, decomposition and oxidation of the fluid in the system.

Transformers

The New Oil is "NAS 12." Therefore tremendous amounts of contamination are introduced into the New or Used transformers when filling them up with oil. 1 – 5 micron in New oil are approx. 13 million per 100 ml. As the oil gets older, the contamination increases as it attracts moisture from the atmosphere, thereby increasing moisture and contamination that is adhering to the atmospheric moisture.

Thus Transformer oil increases in moisture and contamination thereby bringing BDV down.

Therefore, before putting oil into the transformer it should be filtered to at least "NAS 8", And then oil filtration unit should be connected to the transformer, and on-line filtration to be done to "NAS 5".

Every other month transformer should be taken off service and online filtered. You will find no increase in moisture, negligible if any, and the BDV will stay like new, and the transformer life will increase.

The above statement is based upon experience with Turbine and Hydraulic oils.

MANAGEMENT OF SYSTEMS TO SUPER CLEAN LEVELS HAS THE FOLLOWING BENEFITS:

ON -LINE IN A BY -PASS MODE:

1. Oil could **last indefinitely** if the contaminants are removed, as oil does not lose its inherent lubricating properties. New oil itself is NAS "12" i.e. over 1,000,000 particles of 5-15 microns per 100 ml.
2. System life is **increased** – at least **Double** if **SILT** is kept under **CONTROL** – **saving large capital investment**.
3. Less maintenance cost – Also, drastically reduce built-in filter replacement.
4. Better production due to **less downtime**.
5. Less oil imported thus **saving foreign exchange** for the country.
6. Oil kept at NAS "5" with **Silt control** – this makes the oil practically **frictionless** and the **life** of the system and the oil will become **indefinite**.
7. **Cut down tremendously on pollution**, this is a direct result of lesser oil changes and thus less dumping of used oil.

SILT

Particles of 1-2 microns are not considered in NAS level determination. However, they are just as dangerous as 5-15 micron particles. **Filtration removes large numbers of 1-2 micron particles**, known as **silt**, which cause **considerable wear** to close tolerance parts and cause **internal leakages**, thereby **lowering system efficiency**. The oil in the system travels at **very high pressure and speed** and the **silt** causes **considerable wear to the valves and seals**. These silt particles act like bullets, causing **Lapping Compound** like action.

Silt in New oil [1-2 micron particles] ,is approximately 13,000,000/100 ml., where as in used oil could be as much as **3 to 7 times more**.

Therefore, used oil even brought to NAS "4" "Would have a wear rate at least **10 times more than New oil**, unless 1 -2 micron particles are **brought down to the level of New oil**.

In early 1970 'S Dupont and International Harvester found that out. But at that time this process was very expensive, and **Not commercially viable**.

Universal Oil Company is capable of removing silt simultaneously while removing contamination particles of 5 microns and above.

Benefits of removing Silt

- 1]The used recycled oil can be used like new oil in any critical application.
- 2]Eliminates of discarding used oil after some time of usage..
- 3]Pollution of, ground, water, and air, due to discarded used oils controlled.
- 4]Less oil is required from the ground. Thereby Saving Energy.
- 5]Atmosphere Heating of Earth will be slowed down, as the transportation vehicles will spew out less fumes, as the wear of engines will slow down. **Lot of Used Recycled Oil is put into the vehicles, as it is cheap.**

The economy of the country will be stabilized due to usage of PROPERLY used recycled oil, as the price of that oil will be stabilized

Following write up is from an engineering journal.

Editors note: Mike Sondalini edits the popular subscription based newsletter called Process & Plant Equipment UPTIME. More information about the newsletter can be found at FeedForward.com.au

HOW CONTAMINATED OIL DESTROYS EQUIPMENT

Dirty oil spells rapid death for hydraulic machinery and lubricated equipment. Fine tolerance equipment can have clearances between parts of 5 to 10 microns (0.005 – 0.01 mm, 0.0002" – 0.0004"). Solid particles larger than the clearance gap will jam into the space. The solid particles will further be broken-up and mangled while ripping out more material from the surfaces. In equipment with larger tolerances the oil film between parts can get as thin as 3 – 5 micron. Solid particles larger than the oil film will be broken up into smaller pieces and produce more solids contamination. Figure No. 1 shows a shaft in a journal bearing lubricated by oil. In the drawing the solid particles are larger than the oil film thickness and when they enter the bearing pressure zone at the bottom of the shaft they will tear into the metal, be broken up and make more particles that cause further wear.

Solids suspended in oil are like grinding paste. They scour and gouge surfaces; block oil passages and makes the oil more viscous. The longer the oil is left dirty the faster the rate of failure

Many original equipment manufacturers have accepted the indisputable evidence from numerous field and laboratory trials that **oil cleanliness has a major effect on wear within their equipment**. Some of them are now specifying how clean must be the oil used in their equipment if warranty claims are to be honored. For example Caterpillar specify new oil to have a particle count of ISO 16/13. If new oil is above this level of contamination they will not warranty their equipment. When new oil from a leading international oil manufacturer was tested before putting it into new Caterpillar equipment the solid particle contamination was found to be 17/14. This was new oil from a never previously opened container. In this case the new oil had to be further filtered to bring it to below the required specification

If you want extremely low wear rates and long equipment life the evidence indicates that oil needs to be filtered down to sub 5 micron size and preferably down to one micron size.

Numerous tests on a range of hydraulic (e.g. piston pump) and oil lubricated equipment (e.g. truck engine) have been conducted that confirmed **filtering oil** and removing particles deliver **exceptionally long equipment life**. The cost of suitable filtration systems is not expensive. For **expensive hydraulic and oil lubricated equipment filtration cost is easily and quickly returned by the large gain in equipment working life and reliability**.

References:

- Leonard Bensch, Pall Corporation 'How the new ISO particle count standard will affect you.'
- Paul W Michael, Benz Oil, Tom S Wanke, Fluid Power Institute, 'Surgically clean hydraulic oil – a case study.'
- International Standard ISO 4406-1999, Hydraulic fluid power – Fluids – Method of coding the level of contamination by solid particles.
- James C. Fitch, Handbook of case studies on contamination control. (1991)

PROBLEMS IN SYSTEM RESERVOIR

Particles from any system tank bottom cause considerable damage to seals and bearings of pumps. Although there are coarse filters before the oil reaches the pump, many finer particles get through, acting like bullets on the seals, valves, bearings etc, and shortening their life.

CONCLUSION

Almost 85% contaminants are in the range of 1 to 5 microns, whereas NAS values are indicative of contaminants above 5 microns only. Current systems require:

1. Removal of contaminants > 5 micron as safeguard against wear and malfunctioning.
2. Removal of contaminants as small as 1-5 micron for longevity of system components, and sudden servo - valve failures - stiction.
3. Removal of moisture from the system fluids for optimum life of both the fluid and the system components.

CUSTOMERS:

TATA GROUP OF COMPANIES IN JAMSHEDPUR	
TATA POWER	MUMBAI
RELIANCE @	JAMNAGAR
ADHUNIK	ROUREKELLA
NTPC LABROTARY	DELHI
HEG	BHOPAL

AND LOTS OF SMALL COMPANIES

IN BUSINESS in INDIA SINCE 1997

CONTAMINATION CHART

NEW
Oil

ISO Code	9/6	10/7	12/9	13/10	14/11	16/13	21/18
National Aerospace Standards (NAS)	0	1	3	4	5	7	12
Size Range (Micron)	Values based per 100 ml						
5-15	250	500	2000	4000	8000	32000	1024000
15-25	22	88	356	712	1425	5700	182400
25-50	4	16	63	126	253	1012	33400
50-100	1	3	11	22	45	180	5760
Over 100	0	1	2	4	8	32	1024

SILT 1-2 micron----- particles in NEW OIL is 13,000,000 / 100 ml. approx.



**Without silt control – wear on spool
(scoring on the spool)**

Figure 1. No Silt Control
Oil is NAS 4 – 5



**With silt control – no wear at all
(no scoring at all – shaft is smooth)**

Figure 2. Silt Control
Oil is NAS 4 – 5

**This Picture Was Magnified
Than the one without the silt control.**

Pictures Provided By Tata Steel After 5 Years Of Once A Month Filtration.
Universal Oil Company has been doing Turbine oil filtration for last 10 years .Following are the customers:

If you want long life of oil and components immersed in oil, then 1 – 5 micron contamination, known as *silt*, have to be controlled and removed, besides removing 5 micron and above contamination particles.

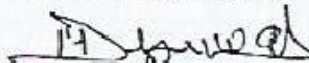
It is a known fact that removing 1 – 2 micron contamination particles does not remove additives or change viscosity.

PROPOSAL FOR SALE OF UOC PORTABLE FILTRATION SYSTEM

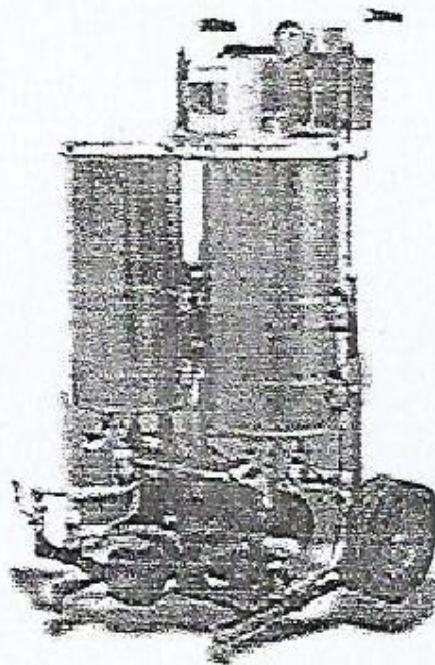
MODEL- UOC 1000

Model –UOC 1000 portable filtration system comprises of 2 filter housing. 1st filter housing consist of cellulose paper filter capable of filtering from 1 micron. 2nd filters consists of 15 micron bag filter. These 2 housing are mounted on trolley and connected with a 1 HP rotary gear pump.

For UNIVERSAL OIL COMPANY



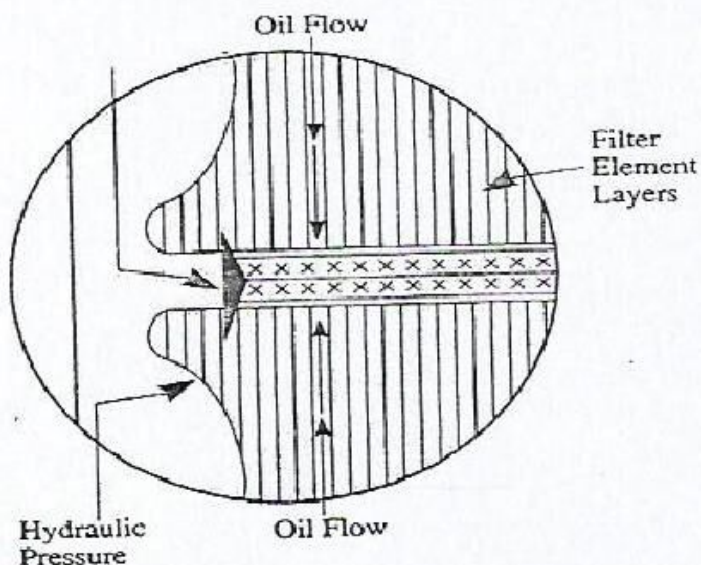
Authorised Signatory



For UNIVERSAL OIL COMPANY

Authorised Signatory

THE FILTER MAKES THE DIFFERENCE



The UOC filter is designed as a multiple filter element. The filter Non channeling seal forms a positive barrier to channeling. The flow of oil carries the contamination into depth of the filter media with no flow restriction from surface loading.

The hydraulic pressure of oil compresses the filter media against the non channeling seal and towards the center of element creating a constant pressure to avoid channeling. The 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 layer of elements and into the oil return tube of the filter housing.

For UNIVERSAL OIL COMPANY

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For UNIVERSAL OIL COMPANY

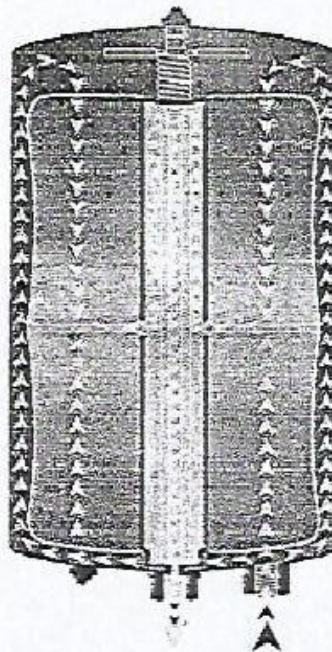
Authorised Signatory

How our system Works

Contaminants from 1 to 40 microns and above 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 (1 to 5 micron particles).

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

The filter removes virtually all remaining 1 to 40 micron and above contaminants while also removing the vast majority of silting particles.



UOC constant contamination control systems are designed to provide the best in fluid filtration.

UOC FILTER IS NOT CAPABLE OF REMOVING MOISTURE. IT REMOVES CONTAMINANTS UP TO 1 MICRON.

IT WILL REMOVE CONTAMINANTS FROM OIL HAVING WATER, WITHOUT AFFECTING THE FILTER. IT WILL CLEAN THE MIXTURE OF OIL AND WATER.

For UNIVERSAL OIL COMPANY

Increases

- Fluid Life
- Life of components immersed in oil i.e. Increase in Equipment life.
- Built in filters life. (OEM)

Decreases

- Downtime
- Wear of Components immersed in oil.
- Waste disposal.
- Replacement fluid cost.
- Change of built in filters. (OEM)
- Maintenance man hours.

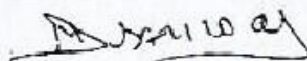
Applications

- Manufacturing
- Machine shops
- Injection molding
- Gear oils
- Hydraulic oils
- Turbine oil
- Compressors

Specifications

- Welded steel Frame.
- Pressure gauge for system pressure and element condition.
- Stainless Steel Housings.
- 1 HP Quick priming, positive displacement rotary gear pump.
- Rubber Hoses for operating at high temperatures.
- 10' suction and return hoses included.

For UNIVERSAL OIL COMPANY



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ZION STEEL LIMITED

VIII: Gohira, P. O.: Kusrumunda, Dist.: Sundargarh-770039, Orissa.
E-mail: steelzion@gmail.com

TO WHOM IT MAY CONCERN

This to certify that M/S Universal oil filtration has been extremely beneficial in our Rolling mill-2

The life of the equipment and availability improved by 20%, from last six months our equipment running smoothly. The equipment breakdown reduced and quality has also been improved.

The details of power packs given below:

Function

- | | |
|-----------------------------------|---|
| ➤ Pusher power packs - | For pushing of billets inside reheating furnace |
| ➤ Babbit metal bearing - | The force lubrication of babbitt metal bearing |
| ➤ Tilting table - | The operation of tilting table movement |
| ➤ Cooling bed brake slide apron - | The up down movement of cooling bed aprons |
| ➤ Twin Channel - | The openings and closing of twin channel flaps |

We satisfy with the results
MANOJ KUMAR TIWARI
AVP (MILLS)



Manoj Kumar Tiwari
05/02/17

For UNIVERSAL OIL COMPANY

Manoj Kumar Tiwari

Authorised Signatory



09/06/2013

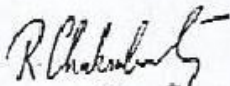
"TO WHOM SO EVER THIS MAY CONCERN"

We are extremely pleased with the results obtained by M/s Universal Oil Company (UOC) Oil Filtration Unit. We attached the unit to our Danielle Press containing approx. 15,000 liters of hydraulic oil.

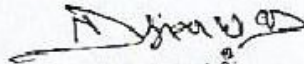
Following are the benefits achieved:

- Replacement of pumps used to cost Rs. 13,00,000/- each year. In 3 years no replacement of pumps, thus savings of Rs. 39,00,000/- (thirty nine lacs)
- Hydraulic directional control valves have not malfunctioned since last three years.
- About 16,000 liters of oil costing about 17,60,000 is in the system in super clean condition, keeping the seals in good condition and keeping the oil from leaking.

For **HEG Limited**


RANADEEP CHAKRABORTY
AVP (HEAD-MAINTENANCE)

For **UNIVERSAL OIL COMPANY**


Authorised

HEG LIMITED

Plant & Regd. Office :
Mandideep (Near Bhopal)
Dist: Raisen - 462 046
(Madhya Pradesh), India

Corporate Office :
Bhilwara Towers, A - 12, Sector - 1
Noida - 201 301 (NCR - Delhi), India
Tel: +91 - 120 - 4390000, 2541810 (EPABX)



मुख्य कार्य कार्ड
Major / Minor Job Card
नं./No. 17-334
दिनांक / Date 7/4/17

IAF JOB CARD
IAFF(T)709

IRK Dubey
जु. या. उ. / ज. या. / ज. या. अ
JWC / JWC

1. Working Unit Gp/Bay: 3BRD

AF MJC No.

Bay/ECRS/RS.D. AT-20 & IV, 2

3BRD, Air Force
Sub JC No. ECRS/120

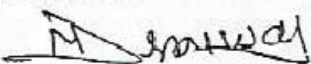
Job Commenced on:

Full Description of Job:- Oil OX-38 loaded for PAMAS
Test. (Before Filter)

Date:- 17 APR 17

Universal oil company

(SK Pandey)
Signature

Description of Work	Name of Tradesmen	Man Hrs	Signature
OX 38 Before Filter	Cost 15		
For UNIVERSAL OIL COMPANY  Authorized Signatory			

Job Completed on:

Total Man Hrs Consumed:

Inspected by:

3BRD

(Signature)
OX 38 : /c Gp/Section
18/4/17

0.2

N.B. - For CLASS 'C' details please Turn Over
A Joshi
18/4/17



SampleID: 0X32/RIG/BF

Sample 1, Meas. 1
2017-03-29 16:11:14
Size : Counts cum. : diff.
2µm : 651813 : 431395
5µm : 228410 : 152344
10µm : 68874 : 43366
15µm : 24708 : 15338
20µm : 9370 : 5331
25µm : 4839 : 3849
50µm : 198 : 173
100µm : 17 : 17
Volume : 100.0ml
ISO:20/18/15
NAS:10(10,9,9,7,7)
FOCT 17216:14
GJB:10(10,10,9,9,7)

Sample ready

Profile ready

B-F



SampleID: 0X32/RIG/AF

Sample 1, Meas. 1
2017-03-29 15:51:26
Size : Counts cum. : diff.
2µm : 48222 : 34525
5µm : 13697 : 9563
10µm : 4134 : 2685
15µm : 1529 : 391
20µm : 628 : 376
25µm : 253 : 243
50µm : 25 : 21
100µm : 4 : 4
Volume : 100.0ml
ISO:16/14/11
NAS:6(6,5,5,4,4)
FOCT 17216:10
GJB:7(7,6,5,5,4)

Sample ready

Profile ready

A-F

3 BR D AIRFORCE

CHADIGARH 160003



SampleID: 0X32/RIG/AF

Sample 1, Meas. 1
2017-03-29 16:26:52
Size : Counts cum. : diff.
2µm : 21688 : 15859
5µm : 6629 : 4679
10µm : 1950 : 1223
15µm : 727 : 410
20µm : 317 : 145
25µm : 172 : 147
50µm : 25 : 14
100µm : 11 : 11
Volume : 100.0ml
ISO:15/13/10
NAS:5(5,4,5,4,6)
FOCT 17216:9
GJB:6(6,5,4,5,4)

Sample ready

Profile ready

AF



SampleID: 0X32/RIG/AF

Sample 1, Meas. 1
2017-03-29 16:42:16
Size : Counts cum. : diff.
2µm : 8897 : 5797
5µm : 2568 : 1885
10µm : 1815 : 555
15µm : 468 : 243
20µm : 211 : 154
25µm : 167 : 92
50µm : 15 : 11
100µm : 4 : 4
Volume : 100.0ml
ISO:14/12/9
NAS:4(4,3,4,3,4)
FOCT 17216:7
GJB:4(4,4,4,4,4)

Sample ready

Profile ready

AF-III

3 BR D

For UNIVERSAL OIL COMPANY

Signature

IAF JOB CARD
IAFF(T)709

QW8, Lab Gp/Bay: 3BRD
Bay(ECRS/.....)
ECRS.....)

AF MJC No.
Sub JC No: ECRS/.....401.....
Job Commenced on: 29 mar 17

Full Description of Job:- OX-38 oil sample is loaded
for PAMAS test.

No of Samples - Two
Universal Oil Company

(S Singh)
Signature

Date:- 29 mar 17

Description of Work	Name of Tradesmen	Man Hrs	Signature
System	Particle Count		
OX-38 Rig			
Before filtration	GOST-14		
After filtration-I	GOST-10		
-II	GOST-7		
Universal Oil Company		03 OX-38 29/03/17	For UNIVERSAL OIL COMPANY Authorised Signatory

Job Completed on: 29/03/17

Total Man Hrs Consumed:

Inspected by:

29/03/17

(Signature)
i/c Gp/Section

For UNIVERSAL OIL COMPANY CLASS 'C' details Please Turn Over

Authorised Signatory