



Bypass Filtration System, Hitachi 5500 Excavator : Thiess, Hunter Valley

FTA was approached to install a bypass filtration system on the hydraulics of a 5500 Hitachi Face Shovel being commissioned for Thiess at Liddell Coal in the Hunter Valley.



The shovel has a 6,500 litre hydraulic system so it was decided to install a JQ440 filtration system on board using a spare pump that was available in the hydraulic circuit.



Results indicate that now the system has been running for 1,500 hours the FTA system is doing the job efficiently. The Oil report attached (Sample 192546) indicates after a week's work the oil in the reservoir was at an ISO of 18/14. Sample 192547 indicates the oil returning to the reservoir at ISO of 15/12 after the filters, a 64% reduction. Sample 195995 done at 1,447 hours indicates the oil in the total system and reservoir is now at 15/12.

Element changes are now set at 500 hours and wear metals are well within specification.

The filtergram results underline the importance of using filtergrams to assess the life of the element. A lot of what is being captured is put down to start up wear and assembly. By trapping this material in the FTA system, the life of the OEM filters and the machine's hydraulic components along with the hydraulic oil will be extended now and in the future.

Oil Test

4 Water Street LPO Box 400
Singleton NSW 2330
Phone: (02) 6571-1444
Facsimile: (02) 6571-4633
Web: www.oiltest.com.au

This Report No:

195,995	18-Apr-03	19-Apr-03	4-Jul-03
-	192,546	192,547	195,995
-	0hrs	0hrs	1447hrs
-	-	9	1,447
-	NO	NO	NO

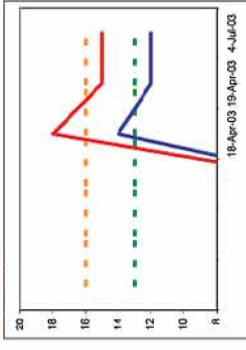
Client: Filter Technology Australia Pty Ltd
Attention To: PHILLIP MARHEINE - 71 Racecourse Road, Rutherford
Machine: LIDDELL1 Liddell Coal
Sample Location: HES55 - Hitachi 5500 - Hydraulic System
Oil Type: HYDRAULIC OIL 46

Particle Analysis

Limit	> 4 um Count	1733
	> 6 um Count	265
	> 10 um Count	61
	> 14 um Count	25
	> 21 um Count	7
	> 25 um Count	4
	> 38 um Count	4
	> 70 um Count	1

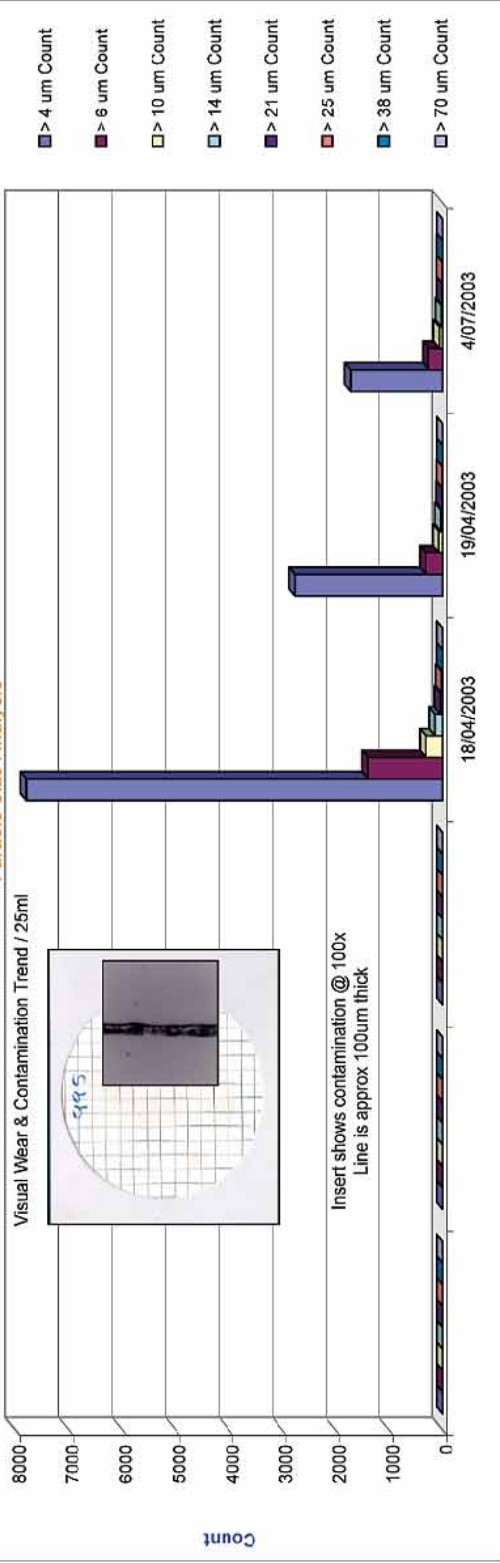
Cleanliness Analysis
 ISO-4406 6um / 14um
 Water Content ppm
 16\13
 89.6 69.2 66.8

ISO 4406 Trend

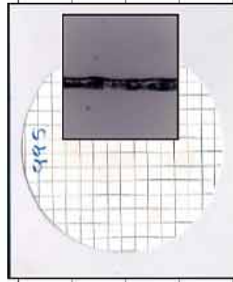


Comment:
 Results within acceptable limits.
 Continue with regular maintenance and monitoring. NOTE: Element was 500hrs old at time of sampling.

Particle Size Analysis



Visual Wear & Contamination Trend / 25ml



Insert shows contamination @ 100x
 Line is approx 100um thick

Site
 Attention To:
 Machine:
 Sample Location:
 Oil Type:

Filter Technology Australia Pty Ltd
 PHILLIP MARHEINE
 LIDDELL1 Liddell Coal
 HE555 - Hitachi 5500 - Hydraulic System
 HYDRAULIC OIL 46

Oil Test

4 Walter Street | PO Box 490
 Singleton NSW 2330
 Phone: (02) 6571-1444
 Facsimile: (02) 6571-4433



Sample Date	18-Apr-03	19-Apr-03	4-Jul-03
Analysis Report No.	-	192,546	192,547
Service Meter Reading	-	Ohrs	1447hrs
Oil Hrs	-	No	1,447
Oil Changed?	-	No	No

Wear Metals	Limit	ppm	ppm	ppm	ppm
lead	20	0	0	0	0
iron	60	1	1	1	3
aluminium	20	0	0	0	0
copper	60	19	19	11	11
chromium	15	0	0	0	0
tin	15	0	0	1	1
nickel	15	0	0	0	0
silver		0	0	0	0
titanium		0	0	0	0

Contaminants	Limit	ppm	ppm	ppm	ppm
silicon	30	1	0	0	0
sodium	60	0	0	0	0
vanadium		0	0	0	0

Oil Additives	Limit	ppm	ppm	ppm	ppm
magnesium		18	16	3	3
zinc		22	24	19	19
molybdenum		0	0	0	0
calcium		3	0.4	3	3
phosphorous		293	291	262	262
boron		0	0	0	0
barium		3	3	0	0

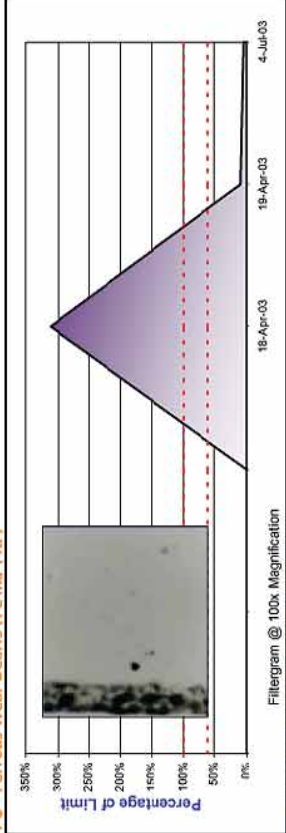
Physical Tests	Limit	ppm	ppm	ppm	ppm
TBN		0	0	0	0
TAN		0.00	0.00	0.00	0.00
fuel dilution %		0	0	0	0
water %		0	0	0	0
viscosity index		141	135	128	128
visc @ 100oC - Cst		7.48	7.37	6.93	6.93
visc @ 40oC - Cst	46	43	43	41	41

FTIR Analysis	Limit	ppm	ppm	ppm	ppm
soot - abs		0	0	0	0
glycol%		0	0	0	0
Water ppm	200	90	69	67	67
oxidation - abs		0	0	0	0
nitration - abs		0	0	0	0
sulphation - abs		0	0	0	0

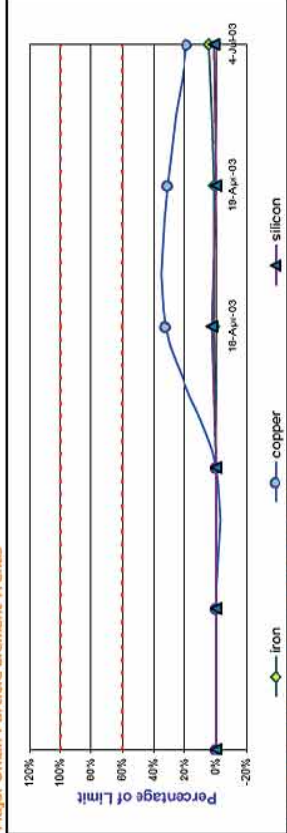
Particle Analysis	Limit	ppm	ppm	ppm	ppm
particle count in 1ml ISO-4406 6um \ 14um	16/13	-/-	7607	1733	1733
PQ90 Fe - mg \ ltr	20	-/-	18/14	15/12	15/12

NOTE: This machine / oil condition report should be used in conjunction with normal maintenance practices. All care will be taken in processing and analysing samples but no express or implied guarantee is offered in regard to the continuing operation or condition.

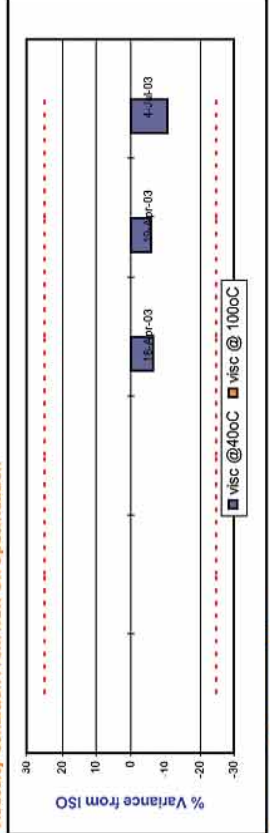
PO - Ferrous Wear Debris (Fe mg \ ltr)



Major Small Particle Element Trends



Viscosity Condition From New Oil Specification



Comments & Recommendation

Results within acceptable limits. Continue with regular maintenance and monitoring. NOTE: Element was 500hrs old at time of sampling.



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 Singleton NSW 2330
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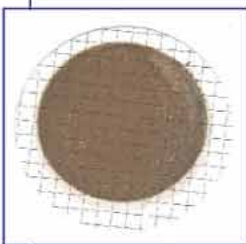
Machine ID: Hitachi 5500 Excavator
 Component Name: Hydraulic Filter
 Manufacturer: Hitachi
 Model: EX5500
 Site: Liddell Coal
 Maintenance Division: Field Equipment

SampleID: OIL-000167
 Date Sampled: 10 July 2003
 Machine Hrs: 1447
 Oil Hrs: 1447
 Filtered Oil Hrs: 1447
 Filter Hrs: 500



Filter elements

Filter : Filter is in good cond and is free from pressure deformation or water damage.



Filter Patch

Filter patch : Debris from filter is washed through a 47mm x 0.8um filter membrane.



Contaminants @ 100x

Overview of wear and contamination viewed through a microscope @ 100x magnification. Contaminants include, dust, ferrous and non ferrous wear metals.



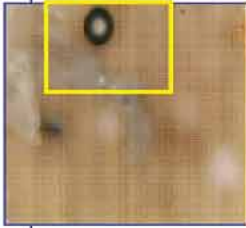
Fatigue @ 100x

Ferrous Fatigue 300um in size. Fatigue Wear. Results when cracks develop in the component surface allowing the generation and removal of particles. Leading causes of fatigue wear include insufficient lubrication, lubricant contamination, and component fatigue.



Non Ferrous @ 500x

Copper Alloy 36um in size. Copper-alloy, depending on component metallurgy could indicate bearing race, thrust washer / spacer or gear wear.



Spheres @ 500x

Sphere 20um in size. Spherical Particles: These particles are generated in the bearing cracks. If generated, their presence gives an improved warning of impending trouble as they are detectable before any actual spalling occurs. Rolling bearing fatigue is not the only source of spherical metallic particles. They are known to be generated by cavitation erosion and more importantly by welding or grinding processes.



Contaminants @ 500x

Dust and wear particles 2um and above. Contamination. The presence of contaminants (air borne dust) can cause increased wear. Filtering out dust particles helps reduce wear and can increase the suitability of the oil for continued use.

Comments

A significant amount of dust contaminants were observed. It appears that the filter is effectively trapping particulates from 2um and above.