Mainlube Superior Maintenance Lubricants Pty Ltd

14 Underwood, Botany NSW 2019, PO Box 353, Botany NSW 1455. Sydney Australia
Phone (61 - 2) 9700-0880 Fax (61 - 2) – 9700-0881 e-mail: info@mainlube.com.au

A.C.N. 003-602-195

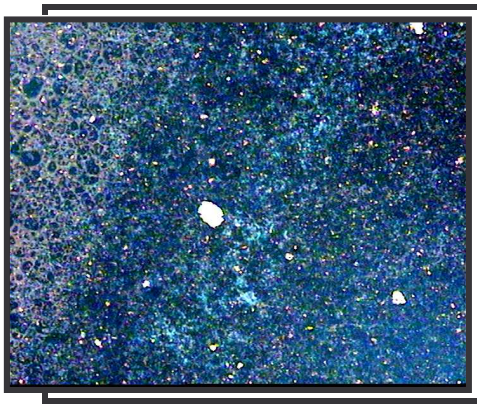
DATE 03/10/05

Wear Metal Analysis No 5088 Sonny – cosmo vyss

Attention; Sonny / James

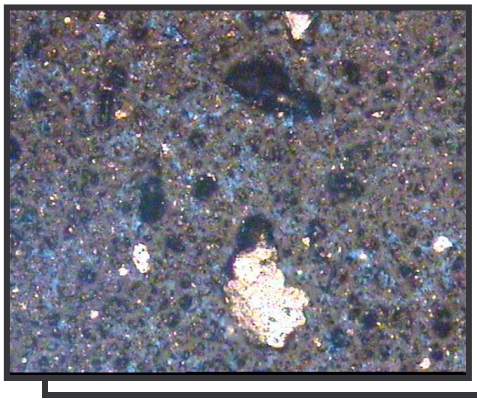
Objective. Check oil for Wear Metal Particles and any possible contamination, Information found used to establish machine condition and future maintenance requirements.

Method. Sample of approx 100 ml received from **cosmo vyss T56 Gearbox .@ 30,000 K's running on ATF.** Sample preparation in accordance with Mainlube standard laboratory practices. One sample processed 1 ml in volume; therefore the amount seen in the video pictures is the actual debris concentration per ml of oil.

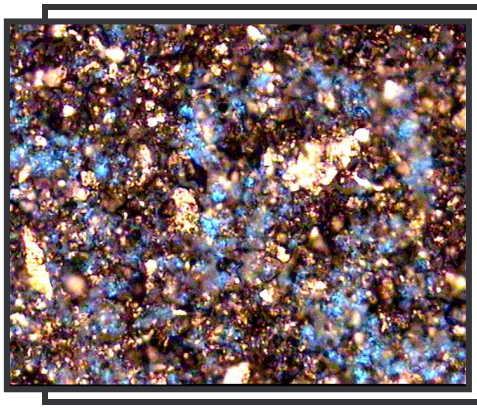


One mil. of the sample oil has been forced through a 13-mm diameter **0.3-micron membrane filter** @ 150 P.S.I. The membrane filter has caught any contaminates present, filters are glass slide mounted for examination.
This image represents a 1-mm diameter circle focused on the top layer of the filter @ **100X**. The green/blue coloured background is the microscopes bottom light shinning up through the glass slide illustrating density level of dirt, metal chunks and debris particles.

This image demonstrates the average debris level for sample No. 5162
To achieve an acceptable life from this application,
this image should be clear, no particles



Overview density of dirt,
Wear Metal Chunks and debris particles @ 200X.



Scuffing Wear Particles "Damaged Surface"

5-25 Microns

"Damaged Surface" Scuffing Wear Particles began when a primary wear mode was generated and not addressed.
The damaged, torn and protruding bearing surfaces, easily penetrate the lubricant film, allowing metal to metal contact, tearing off more metal. This creates excessive wear and eventual machine failure, if not addressed in time.
These spalling metal particles are carried by the oil flow through other load zones, snowballing the effect and further damaging load-bearing surfaces.

Damage will continue to this machine until the contamination is completely removed

Recommendations

This sample is contaminated with Scuffing Wear – “Damaged Surface”, 3 Body Fatigue Wear, Dark Metallo-Oxide and Black Oxide Particles and Laminar Wear Metal particles. and Organic Debris.

Scuffing Wear – “Damaged Surface” Particles began when a primary wear mode was generated and not addressed, Dark Metallo-Oxide and Black Oxide Particles are formed when machine is being over driven beyond the capability of the lubricant, together these wear modes are being forced through the load zone by the lubricant flow causing further damage by generating 3 Body Fatigue wear and finally rolled out flat to form Laminar Wear Metal particles.

This contamination is causing damage to the machine and should be removed at the first opportunity.

If no terminal damage is found then proceed with flushing. If damage re-occurs then Mainlube 151 Solid Boundary E P Gear Oil should be used, or machine strip and replacement of damaged components

Mainlube recommends that the gearbox flushed with Mainlube 245 Flush to assist with the debris removal. If after flushing there is a possibility that wear debris still remains, then repeat the process until they are both clean. The source of any Silica contamination should be established and prevented from recurring with a Mainlube Bladder Vent and Water Drain System.

Replace the lubricant with Mainlube 154 Solid Boundary E P Gear Oil SAE 75e90, run for 10 minutes and take sample for benchmark. Retest every 5000 klms until trends are established.

Steve Simmonds ATCAE
Managing Director