



## Mainlube Superior Maintenance Lubricants Pty Ltd

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A.C.N. 003-602-195

DATE 10/08/06

### Wear Metal Analysis No 6047 Drew T56

Attention; Andrew

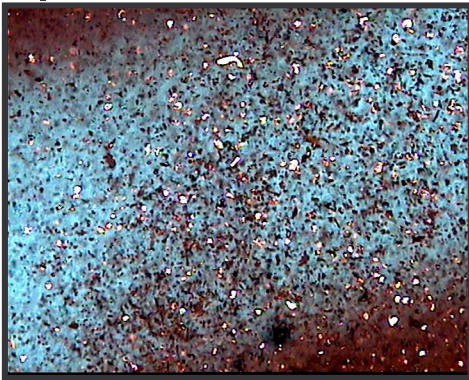
**Objective.** Check oil for Wear Metal Particles and any possible contamination, Information found used to establish machine condition and future maintenance requirements.

**Method.** Sample of approx 100 ml received from **T56 Gearbox @ 30,000 klms, 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.

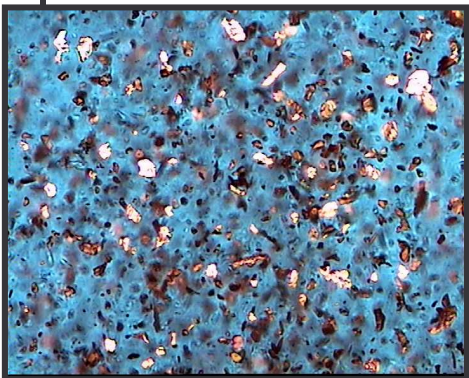


**One mil.** of the sample oil has been forced through a 13-mm diameter **0.3-micron membrane filter @ 150 P.S.I.** The membrane filter has caught any contaminates present, filters are glass slide mounted for examination. This image represents a 1-mm diameter circle focused on the top layer of the filter **@ 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. 6047**  
*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.**



**Overview density of dirt,  
Wear Metal Chunks and debris particles @ 500X.**

## Recommendations

This sample is contaminated with 2 Body Fatigue Wear, Scuffing, Scuffing Wear – “Damaged Surface”, 3 Body Fatigue Wear.

Scuffing Wear – “Damaged Surface” Particles began when a primary wear mode was generated and not addressed, 2 Body Fatigue chunks occur when the machines cyclic application of the stress, is in excess of the design value, 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. Friction Polymers are formed when the lubricant is heavily stressed.

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

Although this report shows many wear modes present, the amount of each mode is quite low indicating extensive damage has not yet happened. You can see this by the lack of metal in the background.

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 Synthetic Solid Boundary E P Gear Oil SAE 75w90, run for 10 minutes and take sample for benchmark.

Retest every 5000 klms until trends are established.

*This analysis is intended as an aid in predicting mechanical wear, and should be used in conjunction with (and not as a replacement for) your normal maintenance routine for the care of your machinery. The user will take all care in the processing of samples but no guarantee, express or implied, is made against failure of this piece of equipment or a component part hereof.*

Steve Simmonds ATCAE  
Managing Director