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Subject: Mack Surveillance Panel Meeting Minutes - April 15, 2014
Date: Tuesday, April 22, 2014 9:23:21 AM
Attachments: [Mack T-12 Oil Filter Housing Thermocouple Placement Photos.pdf](#)
[SwRI T12 Issues April 2014.pdf](#)

Good morning everyone,

Please find the minutes below of the April 16th meeting held by the Mack Surveillance Panel. Please feel free to let me know if there are any changes or revisions needed. Thanks.

Mack Surveillance Panel Meeting

Volvo Group Trucks Technology Center, Hagerstown, MD
April 16, 2014

Attendees:

Bob Campbell	Afton
Christian Porter	Afton
Mark Cooper	Chevron Oronite
Jim Rutherford	Chevron Oronite
Mike Alessi	ExxonMobil
Steve Kennedy	ExxonMobil
Jim Gutzwiller	Infineum
Bob Salgueiro	Infineum
Elisa Santos*	Infineum
Jim Moritz	Intertek
Louis Garcia	Intertek
Jim Matasic*	Lubrizol
Kevin O'Malley*	Lubrizol
Bob Warden	SwRI
Mark Sutherland	TEI
Sean Moyer	TMC
Greg Shank	Volvo/Mack
Allison Athey	Volvo/Mack
Chris Cauley	Volvo/Mack
Luke Irvin	Volvo/Mack

*Participated via telecom

The meeting was called to order at 12:30 PM EDT by chair Mark Cooper who reviewed the agenda.

- **Valve Fracture Issue** – Irvin (VLVO) reported that valve supplier Mahle in Gothenburg also

observed the niobium carbides confirming SwRI findings. Carbides have been observed by Mahle in past but were less than 10 um in size, now they are 20 um. However, Mahle believes that the carbides should not have contributed to the cause of the failure. Mahle said where valve is breaking in an unusual spot, and they feel it's possibly valve to piston contact. Parts sent to Argentina were still stuck in customs but their feeling also was that the carbides were not likely a contributing factor in the valve failures. Mahle Gothenburg did not observe any inner valve corrosion. More of both the failed and un-failed valves were needed for analysis. The differences in grain structure observed by SwRI were said to be "normal variation" according to Mahle. Irvin (VLVO) is recording the conditions surrounding failures to see if a common factor can be identified. The first two numbers on valve are month and year followed by a letter "B" which is the part revision. Campbell (AFTN) suggested reusing valves that have not failed and reface them as needed vs. replacing them with these new valves every time.

ACTION: Irvin (VLVO) will try to find out when the last batch of valves was made by MAHLE and if they are available through Mack aftermarket by next week or two.

The issue originated at SwRI in the Mack T-11 and T-12 tests (6 failed valves), IAR experienced 3 failed valves, Afton had 1 failed valve. Lubrizol had a failed valve two years ago and SwRI had one at that time frame as well. SwRI have been reusing valves as long as the guide clearances remained in spec. IAR and Afton have been replacing them with every test.

- **Connecting Rod/Bearing Issues** – Warden (SWRI) shared some pictures of the connecting rod and bearing issues they have been encountering. SwRI have experienced 4 rod bearing failures at break-in and 2 late in test. Failed rod bearings were not found welded to the crank or rod. SwRI have observed a lot of variability in rod bearing crush, and rod bolt hole misalignment. When Lubrizol started to experience rod bearing failures it was traced to the drive shaft coupling to the dyno. SwRI have verified driveline alignment. Campbell (AFTN) suggested looking at the thrust washers as a tell-tale sign of the drive line issue. Sutherland (TEI) if the specifications of the rods can be provided, TEI will screen them as well. IAR have observed that the top rear thrust washer breaks. IAR also observed that the V liners are difficult to remove from the engine after a test. IAR are going to start measuring for roundness differences.
- **Pistons / Rings** - Warden (SWRI) shared with the surveillance panel a T-12 run with old "S" batch top rings "VSXO kit" vs the same oil run on a current "UUXO kit" and saw a significant difference in oil consumption. "S" batch rings were low porosity/higher density rings. Campbell (AFTN) believed the effect observed was real. Sutherland (TEI) received a response from Federal Mogul that the "Seal Power" plasma coating used on the piston rings was proprietary. However, Federal Mogul have their own similar coating that they think they can use that is currently in 70% of the market. Federal Mogul say they can make the rings in a largish batch (3,000). The problem is timing where we are down to about a 6 month supply of piston crowns (250 remain). The surveillance panel felt they may not be able to wait to run both the pistons and new rings together. TEI has almost 3,000 additional pistons that could be used but they have slight variations in piston bowl chamfer and valve clearance. These could be used to carry the industry though until the reduced tolerance piston crowns are available. Sutherland (TEI) asked how many rings to buy, he suggested to get 250 new rings to match up to the 250 new pistons crowns being made. Only the top ring will be remade.

ACTION: Warden (SWRI) will send Sutherland (TEI) an "S" ring.

ACTOIN: Salgueiro (INF) will review prior minutes and send Sutherland (TEI) the data analysis on the "S" rings.

- **Oil Filter/Centrifuge Housing Alternative** – Moritz (IAR) explained that the key issue was where to place the thermocouple. Using an existing threaded boss which was a feed for the turbo, IAR added a cross pipe to enable addition of the thermocouple. Campbell (AFTN) felt there still needed to be a support bracket fitted to the filter housing. Moritz (IAR) said there were bosses that could be used on the exterior of the filter housing to affix it to a bracket off the block. IAR will get more data on the thermocouple in its new location and report back. See attachment of images.
- **Oil System Hose Size** – Moritz (IAR) reviewed the T-12 test procedure to verify oil system hose size and it says that equivalent lines may be used if internal diameter is maintained. But as pointed out, -6, -8 Aeroquip line size is steel over braid and that's not 10 mm and 13 mm inner diameters. -8 is 10 mm I.D. The intent is to move away from brand name and AN size reference and just specify the line and inner diameter. Supply is 13 mm and return is 10mm inner diameter.

MOTION: Sean Moyer (TMC) motioned and Jim Moritz (IAR) seconded to change the wording of the T-12 test procedure to specify the inner diameter of the supply and return lines. The motion will be sent out via e-mail.

- **Severity Adjustments and Correction Factors for the Mack T-12** – Rutherford (ORO) looked at correction factors, plotting both before and after corrected data vs date. In general, things seem to be getting corrected to the same level as in the past. An analysis of uncorrected EOT Pb vs uncorrected oil consumption seemed to correlate and correction factors did not seem to entirely correct for it. Pb in the T-12 is double weighted so impact of getting a high Pb results in very significant impact in Mack merits. Corrections seemed about right for now so the task force decided to wait on severity adjustments for now and revisit with the next reference since new hardware will also be introduced. A discussion started around if any labs are due for referencing in the next few months but we are still several months out from getting the new hardware, so the task force should consider granting extensions to reference period.
- **New Business** – Moritz (ARI) asked if the Task Force can allow a timing change during a T-8 reference test to allow the labs to hit the soot target. Campbell (AFTN) agreed with the intention but thought the adjustment should be limited to some max value and done early in the test. Shank (VLVO) the concern is affecting the soot loading rate to which the T-8 is sensitive. The labs will consider some time and adjustment limits will be considered over a future telecom. Moritz (IAR) will take the lead.
- **TMC1005-4** T-8 reference oil there is about 1000 gallons. Consumption rate is higher than what TMC thought initially partly due to Cat Aeration development consumption. Moyer (TMC) will ask supplier of TMC1005 if a 5th batch can be prepared. Campbell (AFTN) suggested we look at the Mack T-11 at reduced limits as a possible replacement for the T-8.

The Mack Surveillance Panel Meeting adjourned at 2:36 PM EDT.

Respectfully submitted,

Bob Salgueiro

Mack Surveillance Panel - Secretary

Industry Liaison Advisor

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