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**Subject:** Mack Surveillance Panel Meeting Minutes - February 24, 2017  
**Date:** Friday, February 24, 2017 4:05:13 PM

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Everyone,

The following are the unconfirmed minutes of the Mack Surveillance Panel Meeting held on Friday February 24, 2017. The meeting was conducted by WebEx. Please feel free to let me know if there are any changes or revisions needed. Thanks.

#### Call Participants:

Afton – Bob Campbell, Christian Porter, Abaigeal Ritzenthaler  
ExxonMobil – Mike Alessi  
Infineum – Bob Salgueiro (Secretary), Elisa Santos  
Intertek – Jim Moritz, Juan Vega  
Lubrizol – Nick Secue, John Ahlborn  
Oronite – Mark Cooper (Chairman), Jim Rutherford  
SwRI – Bob Warden, Jim McCord  
TEI – Derek Grosch  
TMC – Sean Moyer  
Volvo – Greg Shank

#### Mack Surveillance Panel Meeting

The Mack Surveillance Panel meeting was called to order at 10:35 AM Eastern, by Mark Cooper, Chairman of the Surveillance Panel. The agenda topics are listed below, with discussions and actions following.

## Agenda Topics:

- **T-11 MRVYS field from numeric to alphanumeric Motion / Second (Sean Moyer / Bob Warden): “Change the MRVYS field from a strictly numeric (type “N”) to an alphanumeric (type “A”) field. Set the allowable alphanumeric string values to be ‘<35’, ‘<’, ‘>’ and ‘NM’ (denoted by the following in the field description [<35, <, >, NM]) along with all numeric data.**  
The motion carried with unanimous approval.
- **Infineum analysis of new batch “X” T-12 top ring**  
Bob Salgueiro presented an analysis by Infineum (securely linked below) of the new T-12 “X” batch top ring. Overall the “X” batch rings are similar to the “S” batch rings with the following exceptions. The barrel rise height of “X” batch was less than the “S” batch ring although similar to the recent “T” and “U” batches. A key difference noted, was that the “X” batch ring has a much higher roughness and increased porosity (pore concentration) than any of the prior analyzed batch of top rings. Also, the “X” batch rings has a different corrosion protection coating on the side and back of the ring, using a Manganese Phosphate coating instead of the Zinc Phosphate coating used in the “T” and “U” batches.  
During the discussion of the analysis, it was brought up that ring face porosity was previously identified as a driver of severity.  
Although a specification was never developed for it, it was believed the ring manufacturer was asked to “pay close attention” to controlling ring porosity.  
MAHLE was asked about the differences between the “X” batch top rings and prior batches. Their response was that there was no specification for ring porosity or roughness.  
It was discussed could MAHLE lap the rings to make them smoother, but that would not affect the porosity of the rings.  
Intertek noted that in their reference test the corrosion on the bottom of the top ring was not as much as in previous runs. A question was raised concerning if Top Ring Weight Loss (TRWL) values maybe have not shifted much because the lower corrosive wear from the bottom of the ring was offset by great wear from the ring face due to the increased roughness and porosity?  
A follow up question was to confirm if the barrel height peak was similar between “X”, “T”, “U”, and “S” batches. This is confirmed. The barrel height peak occurs in the middle of the ring on all the ring batches analyzed.
- **Industry Correction Factor proposals for T-12 with Batch X top rings**  
Jim presented his analysis LTMS data including the latest reference testing results from all 4 labs (securely linked file 01 Mack T12 Industry Correction Factors 20170224). Latest cylinder liner wear values were much higher than in past. Jim analyzed all the T-12 parameters with current

transformations applied and a possible alternative transformation if it seemed to help reduce the RMSE. Jim thinks Ln makes sense to use for cylinder liner wear, but asked if we thought we were still in the same wear regime. If we are outside of where we can correct from then any correction is not really doing what they are supposed to. Only cylinder liner wear really needs change to transformation. Using models for industry correction factors, using the natural log seems appropriate. Data suggests top ring weight loss parameter could benefit from Ln transformation as well. If we corrected liner wear with data based on TMC-821 reference oil which is an SAE 15W-40 would the correction translate to lower viscosity oils correctly? Pb parameters are currently corrected for OC rather than parts batch. Afton noted that the raw TRWL is not far from where it is supposed to be. It may more sense to use simple arithmetic adjustment. Current TRWL correction brings the results back to target (62). It makes more sense to keep current ICF or using the average of the latest round of reference results (73.25). Using this, ICF would be 0.846.

For cylinder liner wear the results are more than double but we don't know if it's going non-linear yet. Are we still in the same regime?

Jim described what the model was doing to cylinder liner wear results. Box Cox takes liner wear and raises to Lambda. Then fits the model and finds residuals and tries to minimize the RMSE vs RMSE with no transform. In the previous model was only oil and lab. The current model includes effect of oil, lab and parts batch. The current model gives a different answer.

Pb with 1/SQRT transform vs Ln was compared. LTMS does not have Pb in transform units, will look at this again after more data is collected.

Pb and Pb (250-300hr) corrections will remain as they are with updated constants based on the latest reference data.

Oil Consumption ICF was updated based on latest references.

**Motion by Greg Shank and seconded by Jim Moritz, to adopt the Mack T-12 batch "X" top rings.**

The motion carried with unanimous approval.

**Motion by Jim Moritz and seconded by Bob Campbell, that the calibration effective date for the reference tests that are in pending status will be Feb 27, 2017.**

The motion carried with unanimous approval.

Labs will work with TEI to resolve any issues around extensions labs will correct reference test reports and re-submit.

**Motion by Bob Campbell, seconded by Greg Shank, for all tests using VXYPD T-12 hardware, will use Industry Correction Factors as defined in the file 02**

**Mack T12 Industry Correction Factors 20170224 SP on slide 1 (securely linked).**

The motion carried with unanimous approval.

The industry correction factors are summarized below as well.

For all tests using VXYPD hardware,

$$\text{If } OC_{100-300} > 65.0 \\ \Delta\text{Lead}_{\text{Final}} = \exp[\ln(\Delta\text{Lead}) + (65.0 - OC_{100-300}) \times 0.03234]$$

$$\text{If } OC_{100-300} > 65.0 \\ \Delta\text{Lead (250-300)}_{\text{Final}} = \exp[\ln(\Delta\text{Lead(250-300)}) + (65.0 - OC_{100-300}) \times 0.04089]$$

	TRNOC	InALW	ATRWL
Predicted	4.422	3.749	73
Target	4.093	2.785	62
<b>ICF</b>	<b>0.926</b>	<b>0.743</b>	<b>0.846</b>

Effective date for Lab Severity Adjustments will be Feb 27, 2017.

- **Mack T-8 LTMS**  
Postponed for future meeting.

**Old/New Business**

- **None**

**Other Business**

- **None**

**Next Meeting**

- **March 7, 2017 at 10:30AM Eastern**

The Mack Surveillance Panel adjourned at 12:37 PM Eastern.

Respectfully submitted,

**Bob Salgueiro**

Industry Liaison Advisor

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## Download Files

Available until: **23 February 2022**

**Download File: 04 Mack T-12 Ring Analysis (X batch) updated 2017 v4.pdf**

2.16 MBytes,

**Download File: 01 Mack T12 Industry Correction Factors 20170224.pptx**

892.79 KBytes,

**Download File: 02 Mack T12 Industry Correction Factors 20170224 SP.pptx**

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