

Mack/Volvo Surveillance Panel Meeting Notes

12/3/2020

Attendees

SwRI; Bob Warden, Isaac Leer, Travis Kostan
Oronite; Mark Cooper, David Lee, Josephine Martinez
Afton; Christian Porter, Bob Campbell, Todd Dvorak
Infineum; David Brass, Elisa Santos, Jim Gutzwiller
Intertek; Garrett White, Pablo Ramirez, Martin Chadwick
Lubrizol; Jim Matasic
CP Chem; Jon VanScoyoc
Haltermann; Prasad Tumati
Exxon Mobil; Steve Jetter, Paul Rubas
TMC: Sean Moyer
TEI: Derek Grosch
Ford: Mike Deegan

Action Items and Key Points

- Mark Cooper will be retiring and stepping down as the Surveillance Panel Chair. He thanks everyone for their help and support over the years and will miss getting the chance to work with the industry and the lively discussions
- David Brass will take up the Surveillance Panel Chair role
- Derek Grosch to contact Federal Mogul (FM) on if they can rework the liners and what other data is available
- David Brass and Sean Moyer to notify the broader industry of upcoming T12 issues

Summary of Discussion

Mark Cooper informed the group that he would be retiring next week. All wished him well.

Mack T12/T11 Reference Testing

- Parts have been evaluated at 3 of the labs on the T12. (W Liners, X Top Ring, X 2nd Ring, X Oil Ring, F Piston Crown)
 - IAR has run 2 tests. The first was invalidated due to high OC and issue with cylinder head, however the 2nd run showed high OC as well.
 - Afton's run also showed high OC
 - SwRI's run terminated at 93 hours due to hardware failure of connecting rod

- Phase one has been nearly double historic values for oil consumption, 40-60 g/hr seems typical for these runs.
- Phase two values have not been too far out of line with historic values (90-100 g/hr were typical for these runs)
- Pablo noted IAR has run the new liners on a T11 and also saw high OC
 - Run with normal OC: V Liners, X Top Ring, X 2nd Ring, X Oil Ring, F Piston Crown
 - Run with high OC: W Liners, W Top Ring, W 2nd Ring, W Oil Ring, F Piston Crown
 - Increased OC led to high soot levels and missed target window
- Pablo shared a slide showing the W batch liners had reduced peak height and a higher oil retention volume when compared to V batch liners. The average valley depth appears to be the same between batches, but the W liners are smoother in other roughness parameters. The data set was only for 4 sets of liners for each batch, but appears to differentiate the two populations.
- Derek noted the honing spec was the same as the X batch of liners.
- Afton's adder system went dry at ~238hrs and IAR just prior to 250 hours.
- Bob Campbell expressed concern, which was echoed by many others, that the elevated OC on a 15W-40 reference oil points to even more issues on lower viscosity candidate tests. There could be issue with tests not completing due to running the pan dry and aerating the oil. On the reference tests, oil pressure did not indicate that this occurred.
- Jim Matasic asked that the broader set of data that TEI takes on the liners be reviewed to look for trends that show a shift in batch performance.
- Christian believed that this type of comparison was shown in the past for "V" batch liners, Derek to review with Mark Sutherland and try to find this.
- Garrett asked what our potential path forward could be?
 - This is the last set of liners, we don't have options to get more
 - Consumption is not strictly due to one part, there may be something we can do with the other PRL parts to help the issue
- Todd questioned if the OC we are seeing is volatile or mechanical
 - Pablo noted they saw a Ca concentration in their T11
 - Christian noted that this big of a shift is likely a combination with both
- Intertek's first run was invalidated due to signs of oil consumption past the seals and general test severity. After seeing the runs from Afton and IAR's second run, it fits better into the overall picture than originally assumed.
- Bob Campbell cautioned that throwing out the data point right now might be premature.
- Bob Warden wondered if the test could be adjusted for a larger oil charge at the start to help offset the increased phase one consumption. This would be a large undertaking since it would be a departure from the current method.
- Jim Matasic noted that if we can't get something under control for this, it may kill the test.
- Bob Campbell noted that, while we have a correction factor on PB and PB2 for OC, there is a limit to what that ICF can adjust for.
- The question was posed if the liners could be made to look like the older sets. Since we see wider valleys, it may be a case of needing to knock the peaks off to reduce the oil holding volume.

- TEI plans to reach out to FM on the possibility of rehonng a sample set of liners to an updated surface finish specification. Targets will be generated based on older batch data.
- The original spec request for FM was reviewed.
 - 509GC471 but with specifications as follows:-
 - Crosshatch angle = $45^{\circ} \pm 2.5^{\circ}$
 - Rvk = $40 \mu\text{in} \pm 5 \mu\text{in}$
 - Target values of other parameters:-
 - Ra = $14.9 \mu\text{in}$
 - Rk = $37.9 \mu\text{in}$
 - Rpk = $10.6 \mu\text{in}$
 - Rmr1 = 6.1 %
 - Rmr2 = 82.5 %
 - Vo = $3302250 (\mu\text{in} * \mu\text{in})/\text{in}$
- Previously FM noted the Rvk was targeted at 40, and all other parameters were a result of this value.
 - For the data Pablo showed this parameter appeared to be the closest match between the X and W liners
- Todd Dvorak planned to review the data and didn't think it would take long to generate some initial plots and analysis. He thought a week would be adequate time.
- Derek was unsure on FM's current factory status with COVID, but will reach out to his contact to determine;
 - Would they be able to rework the liners?
 - Do they have additional information on the liners from previous batches?
 - Was there a change in the print spec at some point?
- It was noted with all of the upcoming ASTM test meetings that we should communicate out that there is an upcoming issue with the test and the test may become unavailable at some point in the future depending on what can be done with the new liner hardware.
 - Sean will include it in his Sub-B report
 - David will send a note to a broader distribution list to notify them that the test has this issue.
- T11
 - It was noted that the same hardware is used, however for now the T11 may be able to keep going
 - If OC runs in the 50g/hr range, but stays there for an extended time, it may be sustainable.
 - The panel will keeps tabs on this parameter as testing moves forward.

Alternative Fuel Supplier Criteria

- The T12 criteria was put on hold for now based on the current OC issues
- The T8 document was presented for review and stepped through paragraph by paragraph with changes tracked from the approved T-11 wording
 - The 50% shear viscosity parameter was changed to the 100% shear viscosity increase at 4.8% soot to align with the LTMS critical parameter.
 - Zi values to be evaluated for two parameters, not three

- Injection Timing Adjustment – The alternative fuel supplier tests should be treated like a reference for adjustments to the pump
 - This item was tabled for now pending lab data
- Timing or soot drift will be added based on what the labs see.
- Need to adjust lab/stand system in page 5
- Fuel quantity adjusted to 6000gallons from 4500

T13 Bearings

- Afton provided some photos of lower main bearings from a T13 that had a coating flaking off.
- TEI noted they don't go out like this, it's something happening in transit
- No other labs have seen the issue, unsure where it's happening in the process
- A similar issue was noted on some ISB bearings in the past, but for those you could see the coating collected in the paper. That is not the case with this issue.

Next Meeting

- As a first act of kindness under his new reign of leadership, David ended the meeting 20 minutes early.
- December 15, 2-3:30pm EST