

MACK-Volvo Surveillance Panel Meeting Notes

05/22/2024 @ 11:00 A.M. EST

Attendees

SwRI: Bob Warden

Oronite: Josephine Martinez

Afton: Bob Campbell, Amanda Stone, Joseph Hoehn

Infineum: David Brass (Chairman)

Intertek: Garrett White (Secretary), Joshua Ward

Lubrizol: Austin Brininger

CP Chem:

Haltermann:

Exxon Mobil: Steve Jetter

TMC: Sean Moyer

TEI: Derek Grosch

Ford:

Volvo:

Agenda

1. Reference Oil 823-1 Volvo T-13 Testing
2. New Reference Oil Matrix
3. Volvo T-13 Bearings
4. AOB

Action Items and Key Points

- Lubrizol to perform measurements on new T-13 pistons with date codes from September 2022 to April 2023 to compare to the 2019 pistons. Once completed, data will be shared with Volvo.
- David B to provide T-13 piston differences data to Volvo and speak with them about the need for batched parts.
- TEI to begin procurement of batch E liners for the T-13.
- The panel requested that the statisticians review data collected so far on reference oil 823-1 to determine how well the new targets are working and if any changes are necessary.
- Labs are to determine if any T-13 testing has been completed on the red polymer coated connecting rod bearings.
- T-13 procedure to be updated with the current liner part number.

Summary of Discussion

Reference Oil 823-1 Volvo T-13 Testing

- Elevated oil consumption has been seen at most labs on reference oil 823-1.
- Intertek completed a 3-run experiment, each 96 hours in length, with different rings in run 2. Run 2 showed lower oil consumption compared to run 1 and run 3.
- Lab B is currently running a reference with pistons from 2019 with rings with serial numbers above 1,000,000. Average oil consumption through 84 hours is 30.8 g/hr.
 - Based on this information, a combination of older pistons (before September 2022) with new rings appears to lower the oil consumption rate.
 - Piston date code 0922 appears to be the point at which oil consumption across the industry increased.
 - Rings with serial numbers in the upper 900,000 and all 1,000,000 series rings seem to also be influencing oil consumption higher.
- Garrett – How did the starting oil consumption look in the first 24-48 hours of Lab B's reference?
- Austin – It started in the 30-31 g/hr. range and has remained there since.
- Parts are not on hand to replace new pistons (after 0922) with old pistons (before 0922). The same goes for the rings.
- Volvo has been involved and responding to this issue.
 - In the previous meeting, concerns about color differences in the pistons were mentioned. Volvo responded that the manganese phosphate is dark grey/black in color. The forging process can influence the color however this does not have an impact on the function of the piston.
 - Clarity provided by Volvo on the different codes on the pistons:
 - Julian codes, 5 digit codes such as 24922 signify 249th day (249) in the year 2022 (22).
 - 0922 signifies September (09) in the year 2022 (22).
 - The manufacturer recently switched to a P value which dictates week as the date format, followed by the number of the week. An example P14 indicates the 14th week of the year (April 3-9).
 - Liner part number was superseded years ago. The number was updated to 21334768 from 20852790. We will need to update the procedure on the TMC website.
- Garrett – What does the 11441 signify?
David B – I believe it's the site number. I will follow up with Volvo on that.
- 10 tests have completed on reference oil 823-1.
- When oil 823-1 was approved the panel agreed that once 10 tests were completed a review of the data was to be performed.
- David B – I would like to ask that the statisticians review the data and provide their recommendations for any changes, if necessary, by the next meeting.
- We are currently on liner batch D.
- TEI has mostly 1,000,000 or higher series pistons rings.
- There are a limited number of pistons from pre-2022.

- No tests have been completed with piston rings in the 1,040,000 range or higher. Most recent references have been completed on 1,017,000 piston ring sets which produced elevated oil consumption. Not many 960,000 series piston rings have ran.
- David B – Has TEI seen any pistons in their cylinder kit orders with date codes beyond April 2023?
- Derek – Not yet but we just ordered 72 cylinder kits from the dealer.
- David B – Labs are still calibrating with the elevated oil consumption on some of the more recent piston and piston ring hardware. Some references are seeing empty external vessels before 360 hours. The concern is whether tests will be able to complete when running the new reference oil matrix. We have seen 2 tests recently with combinations of newer parts produce oil consumption in the 30-40 g/hr range.
- The only major measurement difference found so far in the hardware is in the 2nd ring. Volvo doesn't think this ring and the magnitude of the difference has a major impact on the oil consumption performance.
- Austin – We did find something worth noting in the piston. Negligible differences were found in the piston rings. We investigated the pistons and found the 4th land on the low oil consumption piston is $\frac{3}{4}$ mm wider compared to the piston with high oil consumption performance. Blue is the reference kit that Derek sent with old pistons. Yellow is from our old high oil consumption reference run. Some differences were also found in the 1st grooves where the overall width is about the same, but the profile of the chamfers is different when comparing the top and bottoms of the grooves.
- Bob C – Have measurements been taken of multiple pistons?
Austin – I will check to see if more measurements were made.
- Bob C – It would be good to place these measurements in front of Volvo to compare them to their prints.
- Austin – We will re-do these same measurements with new pistons rather than used too.
- David B – it would be good to obtain pistons from the September 2022 to April 2023 date range for the comparison.
- David B – Derek, is there any update on access to batch parts for the T-13?
- Derek – Volvo is unwilling to work with us on the batched parts request. The way the process was explained is that the manufacturers each send their parts to an assembly line in Allentown, Pennsylvania where they assemble the cylinder kits. A sales rep at one of the dealerships has a contact who has a high-up position in the parts department for Volvo. This person might be able to help with this and is most likely our last option.
- David B – Is there a way we can obtain a group of parts from Allentown?
- David B – I can try my contacts at Volvo to see if this will help the process of getting batched parts.
- David B – How many more months of liners are remaining?
- Derek – Will need to check. I would say at least 6 months. In the past, new batches of liners have taken anywhere from 1-4 months to receive.
- David B – We will need to start looking into the next batch of liners sooner than later based on that information.
- Derek – How many years' worth of liners should we order?

- David B – We are going into tech demo in 2025. My recommendation is we need to have at least 3 years' worth of parts to make it to the introduction of PC-12. Usage rate will go up in the coming months.

New Reference Oil Matrix

- Results on reference oil 823-1 show to have limited influence on the final test results i.e. peak height oxidation and percent viscosity increase.
- David B - What more does the group want to see or need before considering running the new reference oil? Do we think we still need the new reference oil?
- Bob C – I think we do need the new reference oil since it performs close to the new limits for PC-12.
- David B – How much more testing do we need to do to move on or do we not run the new reference oil because of the parts situation?
- Bob C – Is there any sort of normalization we could do to correct percent viscosity increase or peak height oxidation because of the oil consumption rate? 90 to 130 abs/cm is a big spread in the data.
- David B – I understand the drive to study it, and we probably should investigate it. The high and low range of the oil consumption doesn't seem to correlate with the high and low range of the peak height oxidation. We have also seen this similar range on reference oil 823.
- David B – Lets allow lab B to complete their reference run. I would also like to hand over the 11 runs worth of data on 823-1 to the statistician's group to review any possible needs for target adjustments or even an oil consumption correction factor. Sounds like we are still in a holding pattern on the new reference oil matrix testing.

Volvo T-13 Bearings

- We are no longer able to obtain the original T-13 connecting rod bearings which have no polymer coating. Only the red, polymer coated bearings are available in the dealer network.
- David B – Have any labs run these or performed measurements to find any differences?
- Bob W – We have not tested any in our lab.
- Austin B – We have not either.
- David B – I know Isaac Leer discovered them and brought it to the attention of the panel. Does SwRI happen to know if any additional measurements have been made on these?
- Bob W – We held off on investigating the differences after finding out about the availability of the old connecting rod bearings.

Next Meeting Date/Time

Next meeting date not set

Meeting adjourned 5/22/2024 @ 11:58 EST