

# MACK-Volvo Surveillance Panel Meeting Notes

## 04/06/2021 @ 10:30 A.M. EST

### Attendees

SwRI: Isaac Leer, Travis Kostan, Bob Warden, Jose Starling, Michael Lochte

Oronite: Josephine Martinez, David Lee

Afton: Bob Campbell, Christian Porter, Cory Koglin, Todd Dvorak, Brent Calcut

Infineum: David Brass (chairman), Elisa Santos, Jim Gutzwiller

Intertek: Garrett White (secretary), Pablo Ramirez, Martin Chadwick, Juan Vega

Lubrizol: Jim Matasic

CP Chem: Jon VanScoyoc

Haltermann: Prasad Tumati

Exxon Mobil: Steve Jetter

TMC: Sean Moyer

TEI: Derek Grosch

Volvo: Patrick Holmes

### Agenda

- Mack T-11/T-12 Parts
  - Update from SwRI on OC Tests
  - Update from IAR on Mack T-11 Reference
  - Piston crown analysis
  - Parts inventories
  - Next steps
  - Further oil consumption measurements
  - Parts segregation
  - Reference testing
- Volvo T-13 blocks
- Volvo T-13 alternative fuel supplier requirements

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#### *Action Items and Key Points*

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- New T-13 blocks in production consist of a change in the location of the locking tabs for the main bearings and larger coolant passages for the liners.
- SwRI oil consumption experiment shows signs of a possible correlation of batch F crowns with serial numbers ending with A and higher oil consumption rates.
- Intertek completed a T-11 reference with E crowns which produced a test average oil consumption of 42 g/hr and met all critical criteria to become a calibrated stand.

- F crowns with serial numbers ending in A will be measured and compared to other piston crowns in the batch for any geometric differences.

## Summary of Discussion

### **T-13 New Blocks and Calibration**

New blocks have been produced that consist of different size coolant passages for the liners and require different main bearings.

- Locking tab location for the main bearings in the new blocks are 180° out from the current blocks being used. The coolant passages are slightly larger than the current blocks in use for the T13.
- David – Are there any concerns about bringing in the new blocks?
- Garrett – Engines with larger coolant passages could change the heat transfer rate and result in a shift in severity, most likely in the mild direction with the larger volume of coolant being supplied to the liners.
- Afton offered to run first reference on new block with different cooling passages, should start within the next week or two. Afton also clarified this reference would run on a new stand and would require 2 reference tests to calibrate the stand.
- Concerns about whether to run the new block in both runs or run 1 with the current block and the other with the new block were mentioned.
- No decisions were made on how to proceed. The discussion was tabled for the next meeting.

### **Mack T-11/T-12 Parts**

Isaac Leer provided an update on SwRI's OC experiments in the T-12.

- SwRI started stage 5 with low oil consumption F crowns and 1 by 1 installed piston crowns from their reference run which produced oil consumption above normal levels.
- With each installment of the F crowns from their reference run the phase 1 oil consumption increased by using the following number of crowns:
  - Low OC crowns = Cylinder 2-6 ; High OC crowns = Cylinder 1 ; Oil consumption = 19.3 g/hr
  - Low OC crowns = Cylinder 3-6 ; High OC crowns = Cylinder 1-2 ; Oil consumption = 23.7 g/hr
  - Low OC crowns = Cylinder 4-6 ; High OC crowns = Cylinder 1-3 ; Oil consumption = 34.1 g/hr
  - Low OC crowns = Cylinder 5-6 ; High OC crowns = Cylinder 1-4 ; Oil consumption = 39.9 g/hr
- Following final run both sets of crowns will be measured to note any geometric differences.

- The common factor with the high OC crowns is the ending letter in the serial number. Crowns with SN's ending with an A have produced high oil consumption rates while others have produced lower rates.

Pablo Ramirez provided an update on Intertek's T-11 reference with the following hardware combination: Liner = W, Top ring = X, 2<sup>nd</sup> ring = X, Oil ring = X, Piston crown = E.

- The previous reference in the stand that conducted the reference with the VXXXF combination hardware produced a test average oil consumption of 40 g/hr.
- The oil consumption rate (42 g/hr.) and the critical parameter result (percent soot at 12 cSt) were close to previous references in the stand.

David shared updated piston crown data and findings.

- The piston crowns have the following labels on the surfaces:
  - Serial numbers – top of crowns
  - Casting date – undercrown (thrust side)
  - Supplier part number – undercrown (anti-thrust side)
  - Supplier date code - pin bore (front side)
  - Mack part number – piston top (front side)
- F crown serial numbers contain groups of different letters used at the end of the numbering ranging from A to E. Some do not have letters.
- Casting date code SSC1 is the most common which were found in crowns with SN's ending with B through E.
- Crowns with SN's ending with no letter or A had various casting numbers. Some examples are SOA1, SOD4, SSA1 and SSB1.
- Supplier part number common across all SN's.
- Supplier date code different across all crowns. TEI clarified that a Julian date code system is used therefore the first 2 numbers are the year and the remaining 3 are the day of that year the crown was machined. (for example, 18261 means the crown was machined in 2018 on the 261<sup>st</sup> day of that year)
- David – The 3 numbers to focus on are the serial number, casting code and supplier date codes as we uncover piston crown differences.

David shared an updated table summarizing all runs so far on the new hardware batches in the T-11 and T-12.

- Piston crown SN's were investigated.
- Crowns with SN's ending in A were mostly ran in the T-12 coordinated references which resulted in high OC and caused the initial concerns.
- C crowns ran in one T-12 reference run at IAR. These produced slightly lower OC (approximately 10 g/hr) compared to T-12 runs at other labs using crowns with SN's ending with A.

- Crown SN's ending with B produced a T-11 reference test average OC of 25 g/hr at IAR but was ended early due to the 2021 winter storm.

#### Parts inventory discussions.

- 287 out of 2682 F crowns contain an A at the end of their serial number.
- 2<sup>nd</sup> rings are currently the part limiting inventory volume to 83 kits.
- David – How should the piston crowns with serial numbers ending with A be handled?
- Garrett – Could we add only 1-2 A's into the kits? 3-4 seems to be the point the OC rises. This will allow us to maintain normal oil consumption rates while still being able to utilize the hardware.
- Bob – It may be better to rid of them since they are a known bad part at this point.
- David – A's could be used when hardware levels become low and only 1 or 2 are placed in a kit to extend the life of the T-11 and T-12 test.
- David - How much more data needs to be produced to feel comfortable running coordinated references at the labs?
- Martin – Have any measurements been completed on the crowns?
- David – SwRI offered but CMM has been occupied. Afton also offered to conduct measurements.
- Christian – We (Afton) need more clarity on how and where to measure the crowns.
- Pablo – Are E crowns ok to use in T11 only?
- David – We will need to discuss that further in the next meeting.

Meeting adjourned @ 12:07 PM EST

#### **Next Meeting Date/Time**

April 22<sup>nd</sup>, 10:00 AM EST to 12:00 PM EST