MACK-Volvo Surveillance Panel Meeting Notes
12/15/2020 @ 2:00 P.M. EST

Attendees

SwRI: Isaac Leer, Robert Warden, Travis Kostan, Jose Starling
Oronite: Josephine Martinez
Afton: Christian Porter, Todd Dvorak, Bob Campbell
Infineum: David Brass (Chair), James Gutzwiller, Elisa Santos
Intertek: Garrett White (Secretary), Martin Chadwick, Juan Vega, Pablo Ramirez
Lubrizol: Jim Matasic
CP Chem: Jon VanScoyoc
Haltermann: Prasad Tumati
Exxon Mobil: Paul Rubas, Steve Jetter
TMC: Sean Moyer
TEI: Derek Grosch
Ford: Michael Deegan
Volvo: Patrick Holmes

Agenda

- Mack / Volvo SP Secretary Role
- Mack T-12/T-11 Parts
- Volvo T-13 Parts – Cylinder Head Part Number Change
- Mack T8 Alternate Fuel Supplier Discussions

Action Items and Key Points

- Garrett White to fill role as panel secretary
- David to send Derek at TEI kit numbers used in new batch hardware T-12 references. Oil ring ID's to be checked to determine if rings with wider rails from new batch were used in references
- SwRI to conduct fired engine testing with different combination parts to determine which component is driving the high oil consumption in new T-12 hardware
- Derek Grosch to follow up on Vo target for T-12 liner batches
- Southwest Research Institute to complete T-12 piston crown measurements from batch E and F
- Jim Matasic to forward email chain regarding T-13 cylinder head part number change to Patrick Holmes at Volvo
- Statisticians to discuss using either stand or lab-based system in T8 alternative fuel supplier criteria
- Sean Moyer to send out next meeting invite

Summary of Discussion

Secretary Role

- Garrett White from Intertek Automotive Research to fill position formerly held by David Brass
- Garrett thanked David for the opportunity

Mack T-12/T-11 Parts

- Letter emailed stating T12 will not be available after currently approved hardware batch is diminished

- Currently approved hardware kit quantities by lab:
    - Afton: 0
    - Intertek: 0
    - Lubrizol: Still have kits but quantity needs to be verified
    - Southwest Research Institute: 2-3

- LTMS data shared comparing batch ST, UU, VU, VX, WX, WX-XC hardware combinations and their performance:
    - Stage 2 oil consumption (OC):
        - VU batch combination close to VX batch hardware performance
        - Lab G and D show higher levels of OC in WX runs compared to previous batch runs
        - Christian - Stage 1 OC rates were in the 40 to 50 g/hr range for Lab D
        - Jim Matasic – Normal stage 1 OC is upper 10's to 20's (15-30 g/hr)
        - David - Stage 1 OC is elevated. Stage 2 OC is comparable to batch VU but still on the high side
    - Delta lead at EOT:
        - Both Lab G and D presented higher delta lead at EOT
    - Liner wear step, top ring weight loss and blow by results for both Lab G and D with WX hardware within historical range
    - 100 °C Viscosity at 300 hours:
        - High variance between labs G and D in runs with WX batch parts
        - Values ranged from 22 to 28 cSt
    - TAN at 300 hours:
        - Labs G and D produced elevated TAN values when compared to historical industry results
    - Iron at 300 hours:
        - Labs G and D produced elevated levels around 400 to 450 ppm
        - David – Iron most likely not coming from ring or liner based on top ring weight loss and liner wear step results
        - Bob Campbell – Elevated iron levels could be due to concentration caused by lower oil volume produced by the elevated OC rates
    - Peak Height Oxidation at 300 hours:
        - Lab G higher than historical results within their lab and industry wide
        - Lab D in line with previous runs within their lab and industry wide

- T-12 liner surface finish measurement data comparing batch V to W presented:
    - W batch measurements were closer to target than V batch for the following parameters: Ra, Rk, Rvk, Rpk, MR1 and MR2
    - Derek - Plant that produced the W liners is no longer in operation, there is no means of obtaining the initial measurement files from Federal Mogul
    - Will not be able to obtain new liners due to plant closure
    - 3100 liners of W available
    - V high of target on Rk and Ra
    - Liner batches P, R, and S data showed Ra to be below target
    - Bob Campbell - Specification changed on liners from S to V where Ra was removed, Rk was then the targeted parameter
    - T batch was rejected therefore not included in the analysis
    - U batch was not included
    - Vo measured higher in W than V
    - No target listed for Vo
        - **Derek to follow up on the target value**

- Data comparing batch W and X oil rings presented:
    - Majority of X rings showed higher rail width than W, small group of X's had rail width similar to batch W
    - A group of X rings were found to not be symmetrical in rail width
    - **David to send Derek test kit numbers used in references to determine whether rings with wider rail widths were used**

- 2nd and Oil Ring tension measurements:
    - 2nd rings, X tension slightly lower than W
    - Oil rings, X tension higher than W

- Bob Campbell - Reworking liners no longer an option with the plant closure?
- Derek – Federal Mogul (FM) said even if plant was operational, they would not recommend reworking/re-honing
    - FM Explanation: Applications engineer said reworking liners could not be controlled, this will only knock off peaks and increase bore diameter. Flexi-hone device can be used but is not a well-controlled process.
- Bob Campbell – Can we work with the hardware we have?
- Jim M – Agreed, need to find other options
- Bob Campbell - Could we add more oil at stage change (100 hours)?
- Bob Warden – Another option is to increase the initial charge.
    - Concern was brought up about drastically changing the soot rate in stage 1 and requiring large shift in injection timing
- Sean Moyer - Could we obtain new rings to reduce OC?
    - Concern about shifting top ring weight loss and liner wear was brought up
- Christian - Maybe the piston crowns changed?
- **SwRI offered to conduct crown measurements on batch E and F**
- Intertek ran T11 references with the following combinations:
    - W liner, F crown, W rings (previous batch), still produced high oil consumption

    - V liner, F crown, X rings produced normal OC (37 g/hr)
- David – Driver for elevated OC is either crown or liner at this point. More run data needs to be generated
- SwRI offered to conduct testing of different part combinations, most likely will not begin until mid-late January 2021

Volvo T-13 Parts - Cylinder Heads

- Jim Matasic mentioned current cylinder head part number has been superseded
    - Old part number = 22498402 (kit) and 21995786 (head)
    - New part number = 23491393 (kit) and 23219782 (head)
- Angle on exhaust valve and seats changed to 35°
- Lubrizol could not order old part number head from local dealer. Dealer stated they were unavailable.
- **Jim to forward email chain to Patrick Holmes at Volvo and begin discussions on differences and, if possible, obtaining old part number heads**

Mack T8 Alternate Fuel Supplier Discussions

- Alternative fuel supplier document reviewed
- Intertek T8 reference data added to operational data plots
- Three op parameters to be used: Power, pre-turbo front exhaust temperature and pre-turbo rear exhaust temperature
- Martin concerned about having to reference every stand in a lab since T8 uses a stand based LTMS
- **Statisticians to discuss using either stand or lab-based system in alternative fuel supplier criteria**
- 50% relative viscosity increase added back as a requirement
- Bob Warden to put together wording for soot drift with injection timing requirements

Next Meeting Date/Time

Meeting adjourned at 12/15/2020 @ 3:33 PM EST

Next meeting 1/13/2021 ; 1:30 PM to 3:00 PM EST