

T13 Task Force Meeting

March 6, 2014

Paulsboro Technical Center

Attendance:

Stand Modification Discussion

Test Prep Document Revision 5 – not sent out yet

Updates from last meeting included the replacement of the thermostat with a sleeve and the inclusion of the OMS unit speed sensor

The compressor block-off plate is a Volvo Penta P/N, not a Mack P/N

Coolant filter, flywheel P/N has changed, superseded

Injector P/N has changed and a graphite paste is to be used for the installation of the injectors.

Fuel gallery, Oil Jet, and Oil Cooler Out T/C insertion depths are defined now. All from the face of the mounting surface. The oil jet depth is very sensitive.

The part numbers are listed for the front end belt system to achieve the correct water pump speed

Fuel Filter Housing, Fuel Water Separator and plastic bowl P/N listed

The running fault code list has not been updated, waiting to see how the use of the non-vision based VGT/EGR control works.

The ambient air temperature sensor listed in the file is to be left disconnected. The P/N will be removed

Oil Pickup Location

Original pickup location was put on the exhaust side of the engine to capture any wave of oil due to the crankshaft rotational direction. It is unknown if there is as big of an impact due to the stiffener plate.

Height measurements from the labs pulling on the exhaust side and intake side are very similar based on the tilt of the engine and width of the pan.

- Measurement from the front of the pan: **6 and 3/16"** from the front of the pan to the centerline of the fitting.
- Measurement from the top of the pan to the bottom of the I.D. of the fitting that screws into the **3/4" NPT** coupling welded onto the pan: **245mm**
- Line size to the pump: **-12 size**
- The oil sump thermocouple location can stay as previously listed

Line size is currently varied between labs, some at -8 and some at -10 all based off a nominal 1/2"

The Viking pump that we are using has both a 1/2 and 3/4 in NPT pickup option. Since we see the bucket go dry towards the end of the test, the possibility of changing pumps to ensure we're getting everything

out of the pan. Drawback to this would be the inclusion of multiple styles of pumps in the lab. We will use the same pump specified for the Mack T-12 with the ½" inlet port.

The oil consumption change may be a good "tell" for the oil break.

The engine oil pickup is about 40mm from the bottom of the pan (shown below, orange spacer is the offset), the delta between our pickup height and the engine pickup is about 19mm (6540grams of solvent to engine pickup, 6783 grams of solvent to the adder pickup). Some photos were shown with a pan tilted on a table and filled with solvent to show the difference. Volvo confirmed that the pickup was the correct for this pan, but is looking if there are longer options available.



Instrumentation Location Discussion:

Modified with the latest set up at ExxonMobil

Inlet air temp and pressure are to have 3 pipe D upstream, 2 pipe D downstream. Labs have various size diameters, IAR and SwRI are at 6", Afton is 5.25", XOM is 5", LZ is 4".

21659720 is the P/N for the turbo intake boot Provided by Afton, this is a 4" to 5" boot without the bypass hole that has to be plugged

Required: 21659720 Boot, 5" tube, 3 pipe diameters upstream of the pressure tap and 2 downstream with 1"-3" inch gap between pressure and temperature tap with temperature tap downstream of pressure tap.

Minimum 10 inches from the face of the boot for the pressure tap (pipe diameter requirement) along the flow path, maximum distance to be defined

Exhaust

XOM, LZ, Afton are not using the piece with the heat shield, SwRI and IAR are.

Required: A 4" pipe for measurement probes. Measurement based off of the back end of the cast diffuser. The insulated piece (21478681) will count as part of the straight section, but a minimum of one pipe diameter following any clamp, weld, or other connection. The pressure probe should be within 12" to 16" from the diffuser. 2 Pipe diameters of straight run must be after the CO2 probe. A 1" to 3" gap must exist between probes. The thermocouple tap is to be mounted 1" to 3" downstream of the CO₂ probe.

SwRI and IAR to measure the deflection of the insulated piece, degrees of change in the pipe prior to the straight section of pipe should be less than this.

Valve cover vent line and crankcase pressure have been standardized since the last meeting; Cylinders 1 and 2 for the vent line, 3 and 4 for the CCP. The ports may have to be offset from the centerline of the engine due to interference with the engine lifting bracket if they run in the middle.

Oil Sump T/C location remains the same on the pan. **Insertion depth of 3" to 5" from the inside wall of the pan.**

EGR Gas Out T/C

XOM moved their T/C to a point further along the crossover pipe. Afton and SwRI are both using the older XOM location. Recommended to measure from the stock temperature location, labs to measure and report on the data.

Parts Update

Chris from Volvo joined to discuss parts topics.

Greg asked for an update on the batched parts:

Bearings: Chris talked to a supplier to clarify a few of the topics including the staked/pressed options. We are currently waiting for the Volvo buyer to get the price quote internally. TEI will put the order in to Grande immediately, then Volvo can put the order in to the supplier. The batches are bi-weekly when produced. TEI will be buying 2520 bearings when they're produced. These bearings are a design that has been updated to help improve oil pressure.

Liners: The US10 liners are going to be phased out of production and aftermarket. Already out of production, will be coming out of aftermarket. The US14 GHG liners have a lower friction surface finish. 21334768 is the Part Number. This is different from what we're currently running on.

It was agreed upon that running the matrix on US10 liners, then switching to US14 liners coming out of it would be an unwarranted risk. Chris confirmed that we can order the US14 liners now; they are available out of Poland (maybe some. TEI will start ordering them.

ExxonMobil is intending to run TMC 821-3 again, may wait until the US14 liners are available to start.

26 Kits available in the Volvo system with the new liners.

Rings: Top two rings will be the same for the next 2-3 years. Oil ring has changed in production, but will remain available in aftermarket.

Timing Gear Cover: The transition from the Aluminum to Plastic timing gear cover occurred about a year ago, it was determined to make the transition as needed by the labs. No requirement to shift all at once.

Cylinder Heads: We may run out of US10 heads. The casting has changed due to GHG, and the US14 heads have different cooling flow paths and valve hardware.

TEI has 26 kits power cylinder kits on-hand.

OMS Unit: There is not an electrical unit available from Volvo.

An electrically driven unit from SwRI was shown. The paddle wheel on the bottom was removed and replaced with a timing gear.

Riccardo and Bob W. are going to look further into the option of a production unit from European applications.

The change in efficiency over a few thousand RPM is very small. 98.8% at 7500 RPM, 99.3% at 9000 RPM.

Vision/CAN

The license will expire at the end of the month. Long term, the solution of sending out flash drives is not good viable. At some point, labs may have to buy their own copy and a permanent license (~7k\$).

Navigator is a standalone application that can be used for fault code pulling. Afton had some issue with the transition between Vision and Navigator derating the engine when changing while online. ExxonMobil will be sending out further instructions on how to use the system.

It was asked why the control of the EGR and VGT can't be done using the same Throttle by Can systems. Since the VGT operation is on a sub-system of the CAN network, it is communicating in a different manner. John Doub is still working on the stand alone application of the VGT and EGR control. Work is continuing on this item, VGT control is working; EGR is not, currently running on revision 13. Labs are having various requirements for the EGR valve actuation; some had no need to move off of the 90% default position.

T13 OC Adjustment Presentation

The comparison of KV40 to OC showed that the higher OC rate tests tended to break a bit earlier.

Notes: IAR79 ran with a boost leak, PTC2 was in a different stand than PTC1 and 2, SwRI 3 and 4 were on the same stand. IAR79 will be used for informational purposes only, not correlation work.

A trend was shown for average OC compared to 20ppm Pb increase and 12 cSt KV40 increase.

Comparing Pb to various parameters showed a similar trend on many items, but not PDSC.

Additional data for discrimination and repeatability was shown along with the 821-3 runs.

The discrimination run shown was to prove a technology could flat line the test.

Jim believes that a connection between oil consumption and other parameters exists in a stronger manner than some other connections that have been made in heavy duty testing.

Since the oil consumption is a combination of build and formulation effects, would establishing an OC correction have an unwanted impact across different viscosity grades and chemistry?

Operational Data

Sean Moyer showed the comparison of operational data. There was an interesting variation in the fuel flow rate that LZ saw.

The issue of coolant inlet temperature was brought up. It was thought that this is likely due to the pulley setup consistency on the front of the engine. The thermostat vs. sleeve was discussed as a possibility as well, but Afton saw minimal change when doing a direct comparison.

For future operational data logs, EGR coolant in and out will be added.

Parameters to maintain a close inspection of in the future include: Oil Jet P, Coolant In Temp, Crank Case P

Matrix Discussion

Estimating start in May.

The stands that are going to be run in the Matrix have already run the reference oil 821-3 and data has been shown.

Oils have been selected by EMA.