IIIH Task Force Conference Call December 18, 2014

Attendees:
Chrysler: Haiying Tang, Jeff Betz
Infineum: Andy Ritchie, Mike McMillan, Gordon Farnsworth
Intertek: Adison Schweitzer, Charlie Leverett, Bill Buscher, Al Lopez
Lubrizol: George Szappanos, Kevin OMalley
Afton: Ed Altman, Dave Glaenzer, Bob Campbell
Ashland: Amol Savant
TMC: Rich Grundza
SwRI: Karin Haumann, Sid Clark, Pat Lang
OHT: Matt Bowden
IMTS: Dave Passmore
Oronite: Jerry Wang, Kaustav, Sinha
Shell: Scot Lindholm
Halterman: Tracy King

Karin opened the call with a review of the previous action items;

1) Induction air filtration specifications still need to be determined.
2) The group still needs to decide on fuel pressure requirements.
3) Lubrizol is running at 4.5kPa exhaust backpressure with the controller operating at about 40%.
4) Intertek reported they can run 4.5kPa at around 25 – 45% controller setting.
5) Karin is putting together exhaust backpressure plots for distribution to the group.
6) Control States have been finalized and agreed upon with the Lubrizol recommendations.
7) Lubrizol fuel flow has been calibrated and is in-line with consumption at the other labs.
8) The group will change to recording Manifold Absolute Pressures.
9) Rich Grundza is changing all forms to be compliant with the latest updates.

Additionally:
The group will discuss oil pressure later in the call.

Lubrizol's OHT oil Pan calibration looks good and they have an equation for calculating oil consumption.

Intertek has yet to use the new OHT Oil Pan on any prove-out runs and are still working with ECM to look at NOx sensor readings.

Lubrizol commented that their work with new O2 Sensors still show an offset in AFR readings between left and right banks. Also, their Wide Band Sensors confirm the same so they feel the offset must be in the ECU Calibration.

Afton will start their next test with the newly located oil temperature thermocouple on Monday and also look at AFR's and NOx sensor data to confirm Lubrizol findings.

Karin will update the procedure to include positioning the line lengths for the fuel line pressure tap at 30mm.

Technical Issues:
Lubrizol's test currently hit 60 hours earlier in the morning and they are controlling the oil gallery temperature set point at 151°C based on the new thermocouple position. George indicated they controlled the set point for the first 20 hours at 150°C based on the original thermocouple location. After the first 20 hours they changed control to the new thermocouple location and changed the set point to 151°C based on mixed oil gallery temperature. George continued to explain a technician opened an outside door that allowed an ambient air temperature change that seemed to correlate with a temperature Delta change in the gallery apparently dependent on the ambient air change around the engine.

Andy Ritchie asked how we record ambient air temperatures in the test cells. The group explained the problem is ambient air temperature measurement points are all different within the test labs.

Action Item #1: Andy suggested the group standardize thermocouple locations within all the test cells desirably locating them closer to the oil pans.

George indicated he felt the engine is running a little higher on the oil gallery temperature with the new thermocouple measurement location.

SwRI is installing a slave engine for additional work this week and will be building he test block for the new thermocouple location next week.

Ed Altman indicated he will set up the same as Lubrizol and be ready to start their engine Monday. The group discussed what set point to run at being 150.5°C or 151°C. Ed would like to wait for a final decision until seeing the result from Lubrizol's test after discussions with George Monday morning. The group discussed ambient test cell temperature control and possible affects the sump temperature might have on the delta temperatures in the oil gallery.

Karin mentioned the fact that the two streams of oil would still be cooled whether they were cooled by the ambient sump temp or the oil cooler. The group discussed the desire to have 100% of the oil flowing through the oil cooler and possible ways to block the built in by-pass around the oil cooler. The group discussed possible design of an external oil cooler filter block to position an external oil cooler outside the valley of the engine. Karin indicated the external cooler brought about a full quart outside the engine and created aeration problems during development.

Jeff Betz joined the call around this time.

The group continued discussion about trying to adapt an external oil cooler to the Pentastar Engine with minimal external volume holding the cooler around the rear of the engine. George explained an external cooler system Lubrizol experimented with however; the external cooler still used the production filter/ cooler adaptor which still allowed the 60/40 by-pass operation.

Karin commented she was not convinced we are not able to control the oil temperatures with the current system even with the designed by-pass as the oil is mixed at the newly recommended control point, adding the oil sees much higher temperature changes through the engine than what it will see at the cooler and mixing gallery. Jeff commented regardless what the oil temperature is in the gallery at the mixing point if it enters the main oil gallery at the controlled temperature what is the major concern. Again the group discussed what happens when oil goes thick and potentially by-passes the cooler. Karin again questioned what the difference is whether the oil flows 100% through the cooler or maintains the 60/40 by-pass design if the inlet temperature to the main oil gallery is running at the set point.

Ed Altman, Amol Savant, Andy Ritchie, Addison Schweitzer, Karin, and discussed temperature gradients and whether we really have an issue when we are only talking about 1.5°C. Again the group continued discussion on this subject with concern about putting 100% of the oil through the oil cooler and what happens when the oil is subjected to higher temperatures within the engine in the bearings and tighter clearances within the engine.

Bill Buscher suggested possibly looking to see if some of the industry statisticians could look at other controlled and uncontrolled parameters that might shed some light on this subject like Sump Temp, Ambient Temperatures, Oil Pressures, and PVIS and WPD.

Kevin OMalley from Lubrizol indicated he has been looking at some of these parameters and would put together some plots to look for some correlations.

Karin reminded the group she wants to make sure this is absolutely necessary before making any more changes than what is currently being proposed and wants to study all the Lubrizol data before making any more changes.

The group next discussed direction for the Afton and SwRI Tests.

Lubrizol Ran 434-1
SwRI will run REO2
Afton will run 434-1

Ed still wants to see the Lubrizol data before starting his test and Bob Campbell commented he really wants to run 100% of the oil through the oil cooler with Intertek agreeing. Intertek asked if they could use one of the adaptors SwRI fabricated to run an external oil cooler.

Conversations switched back and forth between testing with external systems and concerns about the volume of oil that would be outside the engine.

Karin agreed to send the drawing for the adaptor and or the actual adaptor SwRI fabricated to Intertek to see if they could adapt it to the engine for some in-house testing. However, additional comments questioned the design of the adaptor changing the coolant flow into the coolant jackets around the cylinders.

Additional closing statements included discussions about;

External oil system designs.

Oberg oil filter volumes.

Oil Pan volumes and calibrations.

Oil pan levels with thicker gaskets.

IIIH vs IIIG current precision

Charlie Leverett and Bob Campbell don't believe there is enough data to make any conclusions at this time.

Afton indicates they are a big user of this test and want to fix this problem preferring to have 100% flow through the oil cooler.

Bill Buscher suggests all four labs look at this independently.

Afton agreed to start and run their 434-1 run with the new designed temperature control as outlined in the Lubrizol Presentation and current test.

Karin suspects there may have been problems with blowby meter orifice selections contributing to blowby measurement differences.

Finally;
Rich Grundza will hold on all final Form Changes until the group decides on temperature set points.

The call adjourned at 12:10 Eastern

This is a compilation from notes recorded during the call, with comments from member participants during the Draft Review. Certain subjects may not necessarily be in exact order; however, they are believed to represent an accurate account of the call. If anyone feels changes or additional content may be necessary, please contact Sid Clark @ 586-873-1255 or Sidney.Clark@swri.org

Thanks, Sid