August 11, 2017

Caterpillar Surveillance Panel Teleconference Minutes

Teleconference Attendees:
Jim Gutzwiller (Chairman), Elisa Santos, Bob Salgueiro – Infineum
Jim Carroll (Secretary), Jim McCord - SwRI
Hind Abi-Akar – Caterpillar
Alex Ebner, Kevin O'Malley – Lubrizol
Jim Moritz, Tim Griffin – Intertek
Sean Moyer - TMC
Mark Cooper – Chevron-Oronite

Jim Moritz went over the attached presentations of laboratory operational data.

Page 5 Yi over time

McCord: Looks like two labs shifted mild, with the exception of the one point severe of target at lab B.

Pages 12 and 13 Pump controller position vs pressure controller position

McCord: Jim, have you replaced pumps or Research valves? They could be spanned differently.

Moritz: Something is going on (regarding the different controller positions).

Hind: I am wondering about the impact of the filter.

Moritz: Can't see how the filter affects control position.

McCord: It (the filter) affects gallery pressure but not by much.

McCord: We need clarification of when you can change a control valve or pump.

Moritz: Pretty sure we include that in the procedure.

McCord: It's not very clear in the procedure . Example we have changed the heater line during the test.

Moritz and Sean looked through the current procedure for notes on parts replacement.

Jim G: At one time we had to reference when replacing valve, pump, and sensor. Maybe oil pump and filter block.

All agreed it used to be in the procedure, but could not find it in the existing procedure.

Hind: We should make all changes at the same time.

Moritz: Yes, include changes to the note on fittings.

Sean: Section 9.4.4 has a note about modifications.

Moritz: It used to say that anything removed needed re-referencing

McCord: Not sure it these trends in the presentation are because of replacements. To Jim Moritz: Do you know if you have had any replacements.

Moritz: Don't know.

McCord: We are going to remove the 90 degree fitting, and go straight out of the sensor. It should be clearly noted that we should be re referencing with major changes.

Moritz: Our pump has been the same, and we serviced the regulator.

Sean: The April 2015 version of procedure states that if the sensor, research valve, heated line are changed then re-referencing was required. Look likes Terry Bates replaced it with standard wording.

Moritz: The sketch of everything relative to the oil pan gasket was in that one.

McCord: How do we put it back?

Sean: The whole panel has to agree, it is not trivial?

Moritz: We learned, we had a lot of procedure review.

McCord: The 2016 shift may be due to the re-calibration by Emerson. They changed the constants. We had to run multiple references to get Ei back in and approach the right SA. Requirement to send the sensor to Emerson yearly is still in the procedure.

Sean: We need to scrub the procedure.

Moritz showed his comments at the end of the presentation.

Hind: What is your note about reproducibility, and are we still discriminating?

Answer: Only at 2 labs. At Lab B high aeration oil went mild

Alex: With two runs with high aeration oil results were 11.01% and 11.30%. Low aeration oils resulted in 10.82% and 10.68%. i.e. Low is on target and high aeration is low.

Hind: The test has to preserve reproducibility and discrimination.

Sean: We have not discussed the engine age in all of this. Maybe they are not just aerating enough.

Q: Wouldn't we see that across all labs?

A: Yes.

McCord: There is a fairly wide spread in Yi.

Moritz: We may have too high expectations. Plus/minus two sigma may be too tight. So many things have to be controlled to get reproducibility

Hind: This is the only test we are measuring in situ.

Moritz: Basically yes, except for OC. The true aeration is not what we are seeing, since we are at 84kPaA.

McCord: Based on CAT oil runs the results same pretty consistent. I have noticed whenever we made any changes we see a shift. But then it is consistent afterwards. So, we need to put in wording to require notes on changes.

Moritz: But a small change may not need it.

McCord: We need to have some wording about how many references are needed, with enough to have an appropriate SA.

Alex: We have an internal reference oil.

McCord: Is it consistent?

Alex: With the new filter batch it is a little mild.

Hind: Elisa, is this giving you any new ideas or thoughts?

Elisa: I want to spend a little more time with the data.

Moritz: We need to understand what's going on and get that right.

Sean: We need to work on getting the setup standardized, and go on from there.

McCord: We are in agreement that we will move to straight fittings in and out of the sensor.

Hind: Will we reference after the Emerson meeting?

McCord: Don't know what will come out of the meeting. I think they will say that we should control the RTD to the sample temp.

Alex: One of the problems I have is you can change the software to change the RTD temperature.

McCord: The newer software does not use a corrected value. It uses the raw number.

Moritz: The RTD accuracy is plus/minus 1C.

McCord: They (Emerson) say we should be using the fluid temperature. If you raise the surrounding area to get all to temp it will work best.

Alex: I don't think you should do that since you can change the reading.

McCord: You shouldn't be messing with that.

Alex: I think you don’t need the temperature control since they calibrate the density

McCord: I think they should be calibrating the RTD.

Jim G: I sent Emerson the questions and spreadsheet with equipment descriptions.

Moritz: Plan to get educated at Emerson and then a face-to-face to go over the procedure.

Sean: Yes, a face-to-face.

McCord offered to host at SwRI.

Jim G: The Section on aeration measurement needs to be reworked. All should be at 50C.

Sean: Section 6.1.2 includes pressure control valve setup according to an Annex.

Jim G: The picture in the procedure chops off the valve.

Moritz: The middle of the sentence includes the pump in the 50C box.

Hind: We have much experience now on the setup and can redo the wording.

Moritz: Used to have two sections with more details.

Hind: We are all in agreement that we will review and change the writing of the procedure.

Moritz: Note that at lab G the cell is temperature controlled.

Moritz brought up photos of the enclosures.

Alex: The research valve is in the smaller insulated box to keep it below 70C. There might be a 45º fitting going into the cross at Lubrizol. I did not want to remove insulation for the photo.

Lubrizol has a valve at the sump return to keep from losing an oil charge if the tube has to be removed.

Moritz showed Greg Miranda’s photos from 2-3 years ago and photos from Carnot.

Moritz: Way back the procedure said to use SS line, although it probably meant SS braided Teflon line.

Moritz: I think the tubing Ids are all the same.

McCord: When we remove the 90º fitting we will have to move things about. I think the inlet line has a line length limit. 9.2mm ID not to exceed 305mm (12”) in length

McCord: The original reason for the 50C was to control all electronics to the same temperature.

Moritz: Due to a fan coming on during a test affecting density.

Moritz: Emerson states the sensor should not go above 60ºC.

Alex: Yes the electronics need to be relocated. Were there any other differences noted between labs?

Hind: I would think that the oil filter setup should be very similar.

Jim G: We run an external heat exchanger and specify the part number (page 15 of the procedure). Certain models have narrow or wide spaced baffles. Lab B had higher pressure drop. If the part number's last digit is Odd than it has a wide baffle, if even it has a narrow baffle. This will make a pressure drop difference.

Jim G: Fig A4.1 has the blue lines. SwRI has different lines on their COAT.

McCord: That is a pre-purchased part from Taylormade hose. I don't remember if the pressure drop changed when we went to this.

Hind: We talked at some time about how to ID an aging engine. I don't remember what we looked at.

Jim G: Nothing was really set up.

Sean: When we can't pass any reference we will change engines.

Moritz: We may need to look at more operational data.

Next meeting at Emerson in Boulder, CO.