May 25, 2017

Caterpillar Surveillance Panel Teleconference Minutes

Teleconference Attendees:
Jim Gutzwiller (Chairman), Elisa Santos, Bob Salgueiro, Gang Hu – Infineum
Jim McCord, Jim Carroll (Secretary), Travis Kostan– SwRI
Hind Abi-Akar – Caterpillar
Alex Ebner, Kevin O'Malley Andrew Stevens – Lubrizol
Tim Griffin, Jim Moritz – Intertek
Sean Moyer - TMC
Christian Porter - Afton
Jim Rutherford, Mark Cooper – Chevron-Oronite
Barb Goodrich – John Deere

Agenda: Discuss SwRI findings from Full COAT test run with 832 reference oil and Micromotion Sensor's RTD controlled to 90C.

Test	TMM temperature, °C	Aeration, %
60-148	84.68	10.07
60-149	84.49	9.93
60-150-experiment	90.06	11.20
Post 60-150 @ TMM=88.4	88.36	10.65
Post 60-150 @ TMM=84.5	84.50	9.98
D4052 Density	90	0.8267
60-150 Baseline Density	90.22	0.8255
60-150 Percentage of D4052		-0.145%

832 oil Aeration/Temp, %/°C		0.228
	Delta Temp, °C	Adjusted Aeration, %
60-148 adjusted for Delta TMM temp.	5.38	11.30
60-149 adjusted for Delta TMM temp.	5.57	11.20

Lubrizol just re-ran an 832 oil with TMM at ~88.5C and got 10.68%.

Jim McCord presented data on an experiment conducted with control of the Micromotion RTD to 90°C.
McCord: This shows that all tests should run with the TMM controlled to 90C.

Hind: What temperature do the labs run now?
Lubrizol is at ~88.5C, Intertek is at ~85C, SwRI is at ~84.5C.

Tim mentioned that the RTD temperature reading can be affected by the A to D setup of Data Acq.
A concern ws rasied bout the oil pressure transducers at high temperatures.
McCord: Our transducer sits outside the inner box.

Will everyone have to do this build an inner box?
McCord: There are other ways.

Hind: there is a great deal of linearity can we use it?
Sean: we are running tests now near to 90C so go on and do it. This is a SA lever.

Moritz?: This will not bring labs together.
McCord: There are still likely differences between engines. We do not know exactly why. If we control RTD we eliminate that variable.

Hind: It is one variable to control, engine to engine.
Tim: Are we talking about the RTD control
A: Yes

McCord We have 2 boxes for temperature control. One at 50C, and one to 90C for the sensor calibration.

Tim: Can we move the transducers completely outside the box?
McCord: Not in ours.

Alex: This seems to be away from the procedure.

McCord: We can put in programmed corrections for the RTD temp to see 90C. Emerson also recommended getting the whole area to 90C to get all hardware to 90C
Sean: Just bringing the RTD to 90C is the simplest thing to do.

Tim: We will set an alarm if we do this.
Sean and McCord: Wee will have to recalculate and see.

Tim: This is a big change in test results. I would not expect this. If implemented this would be a major change to the procedure.

McCord: How about the other labs doing what we just did?

Q: Was the aeration curve the same.
A: Yes, it was similar.

Tim: The 833 oil will also go up.
McCord: That's what we expect and we will have to re-test

Tim: Will we be separated by oil?

McCord: We could use the Emerson correction equation but we don't have it. From data collection it would take a lot of testing to get the right slope correction from RTD temp differences.

Hind: Knowing this; How do we continue?
McCord: We would need to run 3 references at each lab. 1.5 months timeframe.

Hind: What do the statisticians think?
Elisa this may change our proposal,
Rutherford: We (statisticians) could not get comfortable about the precision of the 9 tests we just ran. Historically we could get data from SwRI and Intertek.

McCord to Rutherford: How many tests would we need to get a good slope correction?
Rutherford: The last nine tests will help. Gong back in time we may be able to correct.

Tim: The 5C temperature should have only increased aeration by less. I know I have oil in my engine and I can restart and run the RTD temp up to 90C.
Sean: Alex, have you drained the oil from you last run?
A: Yes

Tim. I will preheat my box to get to 90C quickly.

Statisticians Presentation

Elisa described the statistician's proposal.
Consensus: Do not apply CF at this time.

Three options.

1. No change to standard deviation
2. Update Standard dev
3. Update standard using just 9 recent tests.

Note: Lab A sets a Zi alarm with all options.

She showed how the Severity Adjustments for each lab would change for each option.

Rutherford: Some thought we should restart LTMS but didn't think this would fly.

McCord: Since there have been changes to Micromotion and calibration why not use the last 9 tests.
Elisa: It is hard to state that we should discard 40 tests based on the latest tests.
Hind: But all these data fit into the data set well
Elisa: Changes are not evident. We should collect more data. We can always make these calculations regardless of data set. Nothing says we should abandon earlier tests.

McCord. Zi an arbitrary range chosen to show repeatability and separation.
Rutherford: The question is how far can you be from target and still say we are measuring the same performance. Using 1.8 is SD fairly arbitrary. It can be different for different tests.

Hind: I think the statisticians would get us to a re-start of the test. But SwRI has shown the effect of the RTD temperature. So do we have to visit the temperature control?
Sean: We should control RTD temp.
Alex: This is not in the procedure.
Sean: Until the RTD temp is controlled I am not comfortable running candidates.

Elisa: We should look at previous data with RTD correction to understand what is going on.
McCord: Elisa you want to correct older data.
McCord: Previous data shows that our old MM corrected a bit differently. This correction is instantaneous. We may only need to send that last 10 hours of data. There is no carryover from earlier times.
Rutherford: I agree to just use the last 10 hours.

McCord We controlled the RTD reading to plus/minus 0.1C.

Tim: You ran further than 50 hours, maybe that is the cause.
McCord: It was run at 90C for 50 hours only.

Alex. I don't see a feasible way to run according to the procedure.
McCord: then why are there differences.
Sean: Then why don't we eliminate the differences.
Alex: This would make all earlier tests invalid.

Hind: Would this invalidate the procedure.
Comment: This is an improvement to the procedure.
Alex: this will cause a shift at every lab.
Sean: But, we can account for this with LTMS.

McCord: Real oil aeration is the same. This is post processed data. It locks our sensor to D4052.

Hind: I hear all this. I think the temperature dependency is critical, and should be addressed.

Cooper: This will make sure all labs will run at the same temperature.
Sean: we need to level the playing field. Cooper agreed.

Tim: My quandary is that my transducer can't handle 90C. I would like to move them outside of the box.

Comment: I would like to gauge the effect of the issue.

McCord I am confused about Lubrizol's comment. They brought it up last year.
Alex: The difference from earlier concerns is that we could make changes in input to compensate. Now we have to change the procedure.

Hind: the control of RTD can be done. Using slightly different ways at different labs.

McCord: Do we put in a forced value, use the OILTEMP, or control the temperature. Emerson recommended controlling the actual temp.

Gutzwiller. Can SwRI send out pictures and description of our new box?
McCord: Yes we can send it out.

Alex: Requested the operational data from this experiment, and post-test data. Wants to compare to previous runs and see if there are other changes.

Tim: How do you control the RTD temperature with a thermocouple (TC)?
McCord: We use 2 TCs, one for the outer box, and one for the inner box. But we use feedback from the RTD to control its temperature.

McCord: Except for the 90C RTD the run would have been a valid

Hind: What is the next step? Can we get electronic communication to look at the data?
Sean: I will send an email once I get the data.
McCord: If everyone is agreeable then all labs should convert to run at RTD of 90C.
Hind: Can we do this now?
Intertek and Lubrizol cannot now..

Hind: What is the feasibility of the labs doing a test like SwRI
Tim: I will run up to 90C.
Alex: I would have to change my box to do this?

Tim: Need to see the SwRI data
Hind: That is not a hurdle.

Alex: What about provisional licensing?
Hind: We told ASTM them we would expect to be done by May.
Alex: Tell them 2 more months.
Alex: We should make a determination that the test is not available.

Kevin: What is the verbiage of the letter sent to API and others?
Gutzwiller: It says we expect to be back up by end of March. Sent January 20. Then Hind gave a update in March. I will talk to Joe about the procedure and get an answer for Wednesday's call. Hind can update the industry at end of June.
Sean: There is revised plan on how to inform industry. I will talk to Frank Farber.
Hind: We need to find out what we need to do.
Moritz: We are in a grey area.

Next COAT meeting will be next Thursday, May 31, at noon CST.

Schedule for another CAT meeting (non-COAT) Friday, June 9, from 9 to 11 CDT, to discuss CAT parts, SCOAT, and C13 tests.

Action: SwRI to send photos of their COAT enclosure and data from the 90C RTD test.