February 6, 2018

Caterpillar Surveillance Panel Teleconference Minutes

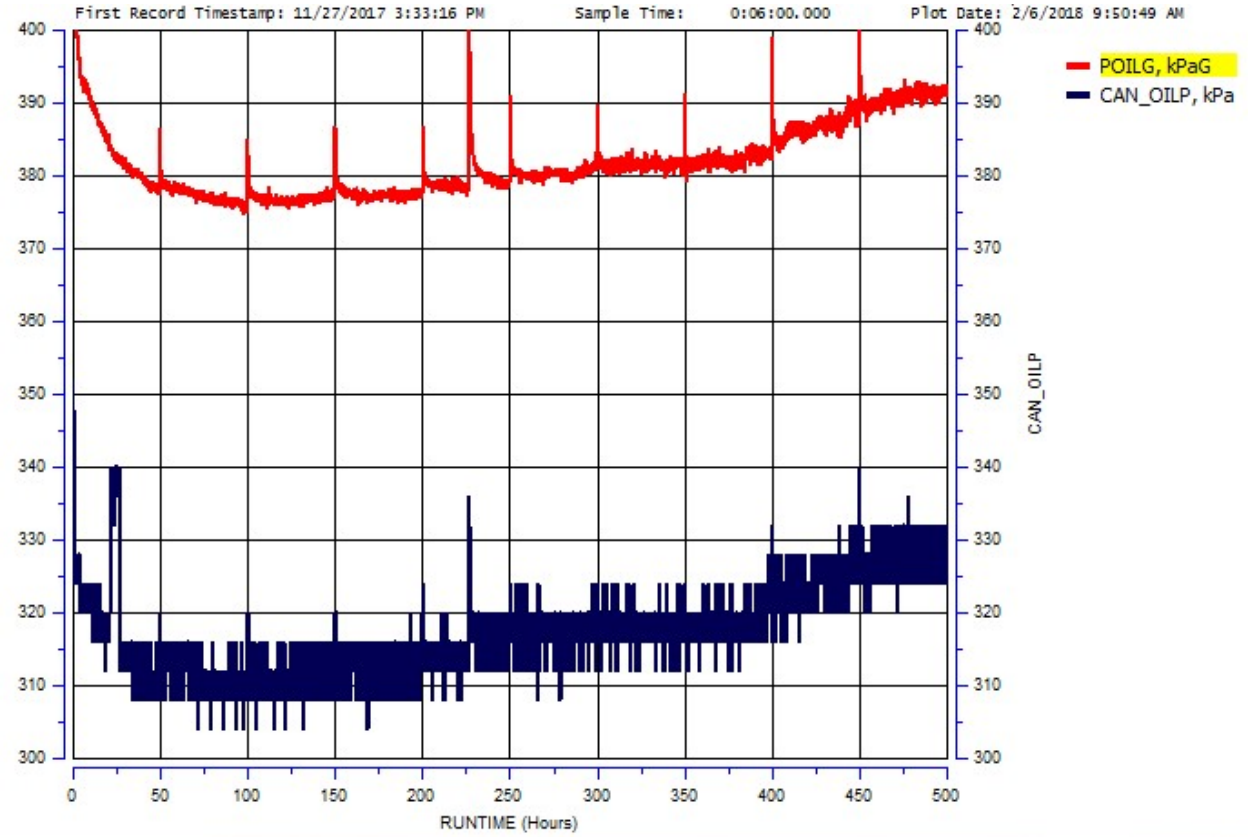
Conference Attendees:
Mark Jarrett, Hind Abi-Akar – Caterpillar
Bhaskar Prabhakar - Exxon-Mobil
Jim Gutzwiller (Chairman) Elisa Santos, Gang Hu – Infineum
Tim Griffin – Intertek
Alex Ebner, Demetrius Lytle - Lubrizol
Jim Carroll (Secretary), Jim McCord, Randy Harmon - SwRI
Sean Moyer - TMC

AGENDA

1) COAT Oil Pressure study ideas: a) run COAT tests with CAT ET to monitor engine oil pressure from engine sensor, status of VVA oil control solenoid and make sure there are no fault codes; b) inspect and replace VVA oil solenoid valve to make sure it is not a leak path for oil, and c) consider adding an oil pressure measurement at the end of the VVA oil gallery.
2) How to get “true” Pre-Filter Pressure measurement
3) Do we try to control OGP with some type of mechanism to preload the spring/spool valve?
4) Any other new business

Jim McCord showed data collected from a C13 tests ECM oil pressure sensor with the Electronic Technician. Shown below. It was plotted against the gallery pressure measured by the test cell transducer. He noted that for the C13 and COAT we measure oil gallery pressure on the right side of the engine close to the oil pump, and the engine monitors oil pressure on the left side of the engine after the oil has passed the piston cooling jets. Oil pressure is thus ~60kPa less as measured by the ECM.

The labs can set up their data acquisition systems to monitor the engine ECM signals. SwRI’s C13 stands already have this capability and will have it for the COAT.



b) and c) Inspect and replace the VVA solenoid valve if leaking.

McCord noted that the VVA system has a pressure sensor on the VVA oil gallery. He does not have the Parameter Group Number (PGN) to query the CAN signal for it.

Carroll: Can we get that?
Mark: Is that an address?
McCord: Yes it's a 7 digit address. If it trips, a code is set that says it has VVA low pressure and derates the engine.
Gutzwiller: The service manual does not show a sensor,
McCord: The solenoid may be both. James Pearce just said it is separate. He has the PN for the sensor it is 2244535. This would require that the labs would have to be able to log the ECM data. Ours is not set up now, but we could do it in a few days. I believe everyone agreed to read the pressure I showed on the screen and we can add the VVA pressure if we have the PGN.

Consider adding an oil pressure measurement at the end of the VVA oil gallery.

Gutzwiller: Has anyone done this?

McCord: We have. You need to put it in the plug at the front of the engine to get a better reading. I will take a picture and send it around.

Gutzwiller showed photos of the VVA solenoid and pressure sensor sent by McCord. He showed where we could put a pressure tap to measure pressure in the IVA channel. These photos will be doctored and sent around to the panel and labs.

Please see the attached PowerPoint presentation - VVA system.ppt.

First Slide: Shows the section on the top of the C13 that houses the VVA solenoid and VVA pressure sensor that the ECM monitors. It also shows the location where we would put a pressure tap to monitor VVA gallery pressure.
Second slide: Shows the locations of the VVA solenoid and pressure taps as they look on the engine.
Third slide: Shows a close up look at the VVA oil pressure tap installed on the engine and to note that the coolant outlet must be removed to gain access to the VVA gallery plug.
Fourth slide: Shows another spring-loaded valve mounted on the VVA gallery. It is not stated in the C13 manual whether this valve functions as high pressure relief or as a pressure control valve.

Gutzwiller went back to photos of C13 VVA. He showed the spring loaded valve in the VVA system. (see PowerPoint presentation)

McCord: Not sure if it is a regulator or over pressure safety. PN is 2396248. It is mounted on the rear of the rocker box.
Mark: I will look it up.
McCord: Its port just drains onto the head.
Gutzwiller: Should we replace this before we start testing. Should we put a life limit on some of these pieces?
Mark: Let me look into this first.
Gutzwiller: We had the pin outs for the trouble code lights sent out by McCord. Could SwRI and Lubrizol run the engine without the aeration system just to see what kind of pressures we get compared to the last runs you ran?
McCord: Shouldn’t be a problem? Replace the IVA regulator and solenoid?
Gutzwiller: No with the new filter bypass plugged and spring.
McCord: On the actual C13 test we have had the solenoid valve stick.
Alex: New pressures springs and baseplate?
Gutzwiller: New contained spring for oil pressure regulator. Two plugs as shown in the procedure, plus the new plug on the bypass.
Gutzwiller: For the gallery in the cylinder head we need to be taking the reading at the front of the engine?

McCord: Yes something interferes with the reading at the other end. For the stock pressure sensor Mark has to get us the PGN. Long term we can setup the ECM monitor at all the labs.

True oil pre-filter pressure

On screen Jim Gutzwiller showed the location where we could put a tap to measure pre-filter.

Gutzwiller: Could we put a tap after the oil cooler?
Tim: I have only one channel left in my DAQ do you want two readings?
Gutzwiller: No just one reading.
Tim: If you use the port we just plugged than all labs will be at the same port for pre-filter pressure.
Gutzwiller: The easiest location is to put the port after the heat exchanger.
Alex: Probably not a huge difference in pressure before and after the hose. The fitting at the heat exchanger is easiest to access.

Update from Tim on the new aeration systems

Tim: 896 test number was Lubrizol's run with the new box. We got 13.21% aeration. But in running with the new filter holder (with plugged bypass) pressures changed by a few psi. (~50 kPa). The 2 previous tests I ran had about the same aeration final results.
Mark: Do you feel you got a good baseline?
Tim: Yes. I did have a few issues. Still tripped the fans and could only get to 86C during the calibration. Saw some minor swings in temperature. The insulation in the box was too good. So I had to remove the insulation at the bottom of the box to keep it at 50C. Finished with all positive QIs. I had to adjust the PID on the oil pressure control a bit because it was jumping a bit.
Tim: Box 2 is built and it is about to be installed. I hope to ship box 1 by Thursday.

Do we try to control OGP with some type of mechanism to preload the spring/spool valve?

NOTE: THIS QUESTION WAS NOT ADDRESSED.