

November 14, 2013

Cummins Surveillance Panel Conference Call

Attendance:

Intertek – Jim Moritz, Adam Roig

TEI – Zack Bishop

Afton – Bob Campbell

SwRI – Martin Thompson, Jim McCord

Cummins – Dan Nyman

Infineum – Bob Salgueiro, Elisa Santos, Jim Gutzwiller

Lubrizol – Nick Secue, Kevin O’Malley, Chris Castanien

Oronite – Jim Rutherford, Mark Cooper

TMC – Sean Moyer

Business:

New ISM Hardware Batch Reference Runs

Jim Moritz - started discussion. All references now complete. Data has been analyzed by Elisa Santos and Jim Rutherford. There seems to have been a step-change in the Injector Adjusting Screw (IAS) Mass Loss. For this discussion we will try to resolve the crossheads (CWL) first since they are a reference critical part, then we can discuss IAS if time permits. Elisa will start with her presentation.

Elisa – reviewing powerpoint presentation from email. Pink dots on her plots are the new hardware runs, blue points represent old hardware.

Slides 4 & 5 separate the variables by lab. Soot adjustment brings most down IAS due to high soot average.

Slide 6 has the averages

Slide 7 breaks down parameters by cylinder. The averages are not outlier screened. Comments were made that there seems to have been a clear shift upward on IAS. Batch B was used since 6/2005. Batch

C introduced in 2007. This is when the IAS with tooling marks were screened out (they would leave a spiral on the end of the ball. This seemed to level off the severity until 4/2012.

Production screw in 2011 were changed out. No noticeable difference after this change was made.

April 2012 a new batch of injector pushrods were obtained by TEI. Production IAS pushrods. Since these were "non-critical" part, they were just added to the kits. Started with kit 571(?) according to Zack. This could be the root cause of the shift, it lines up with the shift in severity.

Jim R's presentation has graphs by kit #, can discuss then.

Crosshead Mass Loss has a correction factor (CF) of +2.5 mg currently. IAS has CF of +19.1 mg currently. We will look at all parameters, but will focus first on CWL and then IAS. Comment made that we need to change the IAS correction, not add in another adjustment.

Jim Rutherford – reviewing his PPT presentation first, then the two .mht files.

PPT slide 2 – looks at what the soot adjustment does to CWL. Has unadjusted CWL and soot adjusted CWL vs average TGA for each test.

Slide 3 – industry correction factor is applied to graph in slide 2.

Slide 4 – unadjusted CWL vs. time, by lab. Includes new hardware (HW) at right.

Slide 5 – soot adjusted applied to graph from slide 4, no industry CF applied.

Slide 6 – CWL with CF applied, only runs for oil 830-2.

Slide 8 – sludge graph

Slide 9 – Outlier Screened IAS (OSIAS) graph. No soot adjustment of CF

Slide 10 – Soot Adjusted IAS (SAIAS) graph

Slide 11 – SAIAS vs engine kit #. Shows the shift occurred roughly between kits 570 and 580. This also lines up with the pushrod change.

Slide 12 – IAS with CF applied.

Slides 13 to 16 – same plots with lines to connect the runs for each lab. Comment on a "sinusoidal" pattern for one lab.

Question: Were shifts due to CF updates? Not sure at the time, would have to check the dates when CF's were applied, but don't think anything lines up with the CF changes.

CWL.mht – discussion.

Had 3 CF's for CWL, period of 10 tests with no CF in beginning, and the current 6 tests that are “tbd”.

Comment made that baseline should be target, not zero. These use the original data as baseline (actually original 7 tests at 5.1 mg, not 10 tests at 5.4 mg).

The earlier CF's were calculated by Jeff. The data shows significant difference with the CF's, but no significant difference for labs.

Reference targets: 4.8 for 7 tests, 5.4 for 10 tests, 21 tests at 5.1. 5.4 is original 10 test mean, but 5.1 was first 7, more tightly grouped tests (3 tests after were significantly higher and raised average).

Last 3 tests of first 10 were more severe on CWL. Did not affect the CWL CF but IAS had CF applied.

There was some debate as to correcting the target to 5.1 or 5.4? We currently correct to 5.1 (7 test mean).

Current CF is at 2.5. The current set is not statistically significantly different than the tests at 2.5 CF.

The correct CF should have been 3.5 mg, not 2.5. This set of 6 tests suggests a CF of 3.3 mg.

The 2.5 mg CF was been used since 4/30/2011.

Debate on whether we should update to 3.3 because the CF should have been 3.5. We may have gotten it wrong last time by setting it to 2.5? 11 tests have been run at 2.5 CF. However we landed at 2.5, we could leave it at 2.5 to keep it consistent since this data is in line with the last set.

Debate on what date the CF is applied and does it change old tests? No, it would not change old tests.

Kevin O. suggested we shouldn't change the CF due to there being no significant shift. If we do change it, this might suggest we will constantly need to adjust the CF. A comment was made that we shouldn't change the CF if it was right, but did we get it right the first time?

Sean commented there are no “rules” as to how often CF's are revisited.

The current target is 5.1. Question: How simple or complicated do we make it not? It could be discussed every meeting if we decided to handle it that way, but would we want that?

IAS.mht – discussion

Labs are significantly different for IAS wear.

These have 3 different groups, 7 tests with no CF, all tests since have 19.1 mg CF, and the 6 tests “tbd”

This parameter is transformed, then Soot Adjusted, then transformed back and the CF applied.

Question: Should we apply the CF in transformed units?

Question as to whether to pursue the pushtubes (pushrods)? Do we dig into these? If so, what do we do while we wait? Should we move forward with these references?

-6.9 is a very significant change from 19.1.

Is the 1 high test currently skewing the this data set? 5 tests are grouped well, 1 test is high, both in the raw values and with the soot adjustment.

Question from Martin (?): Did all labs have "scratches" on all of these IAS? All look scratched. Satin-like scratching vs. mirror-like on older IAS

We should probably look at a transformation that is appropriate. Statisticians will run tests to find out if it is appropriate.

Do any labs have old pushrods? It looks like the pushrods are the issue. Around kit 580 (earlier Zack stated 571?) was when the new batch of pushrods came in. It lines up with the change in severity, circa April 2012.

Jim R and Elisa can look at the parts change and will also check if it needs a transformation. It may not give the answer, but will look at it.

Panel would like to see both before the soot adjustment and after the soot adjustment due to the large shift.

Sean commented that adding wear gives a very small chance to pass a reference. The soot correction works against labs with low soot.

Looking at CWL to get calibrated as of now. Can we accept this hardware as is? Including the problem with the pushrods.

Action Item: resolve IAS before 8 days (before any tests can EOT).

We will have data next week. Can approve hardware, approve CWL and resolve IAS CF later.

Suggested a call Tuesday afternoon.

Jim R. will send out the data by the end of day Monday.

Tuesday at 2:00PM EST (14:00 EST) will be the call to discuss IAS.

Motions numbered below.

1. Bob C motioned: Approve the hardware with batch E crossheads and batch D injector adjusting screws, starting in kit 673 per Zack Bishop, at this time. Martin seconded.

2. Bob C motioned: To keep the current correction factor of 2.5 mg for crosshead mass loss effective for starts after November 14, 20113 with test kit number 673. We will revisit the injector adjusting screw correction factor next week. Martin seconded.
3. Martin motioned: We set the calibration date for this hardware set as of November 14, 2013. Bob C seconded.

Voting:

Motion 1: No discussion. 0 votes against; TEI and TMC waive. Motion passes.

Motion 2: No discussion. 0 votes against; TEI, TMC and Oronite waive; motion passes.

Motion 3: No discussion. 0 votes against; TEI, TMC and Oronite waive; motion passes.

Next meeting will be a call at 2:00 PM (14:00) EST on November 19, 2013. Topic will focus on Injector Adjusting Screw Correction Factor.

Meeting adjourned ~5:30 PM (17:00) EST.