DD13 Scuffing Task Force Meeting Minutes
Teleconference
1/21/2014

Attendance:

Bob Campbell –Afton
Greg Braziunas –Detroit
John Cruz – Detroit
Jeremy Dean – Detroit
Mike Alessi –Exxon Mobil
Riccardo Conti – Exxon Mobil
Bob Salgueiro – Infineum
Jim Gutzwiller – Infineum
Pat Fetterman – Infineum
Elisa Santos – Infineum
Brad Carter – Intertek
Jim Matasic – Lubrizol
Dave Duncan – Lubrizol
Kevin O'Malley – Lubrizol
Greg Shank – Volvo
Jim Rutherford – Oronite
Mark Cooper – Oronite
Jerry Wang – Oronite
Jeff Clark – TMC
Sean Moyer – TMC
Mark Sutherland – TEI
Martin Thompson – SwRI
Roger Gault – EMA
Sujay Bagi – PACCAR

John Cruz and Jim Matasic presented an update to the current testing on a third oil DD13-C which was determined to be a field oil that had exhibited signs of scuffing in Daimler field testing. That presentation is attached to these minutes.

Slide 4 – John Cruz reviewed some of the history of Daimler field testing on 4 CJ-4 XW-30 oils for Daimler specification 93K218. This testing was done to validate these 4 oils. Testing showed one engine scuffed with XW-30 candidate #2.

Slide 5,6 & 7 – Test results summary on the 3 oils (DD13-A, DD13-B and DD13-C). Tests on DD13-C at LZ scuffed at 72 and 60 hrs. No operational issues. IAR DD13-C test had coolant temperature control issues and ran 7-20 degs cooler for ~20 hours

Slide 8 - IAR coolant temp plot presented by Brad Carter test started Thursday and noted that engine not up to temp initially reduced process water flow and then determined control valve was faulty and replaced.

Slide 9– CCP plot from LZ showing discrimination between 3 oils (A,B and C)

Slide 10 – Test Plan summary and results summary presented by John Cruz.

John Cruz motioned for task force acceptance.

Mark Cooper asked how many hours were currently on the DD13-C oil test at IAR. Brad Carter said that it had just gone down for the 80hr soak and CCP was still running just below 0.

Roger Galt asked if there was any historical data related to coolant temperature influence on scuffing. Greg Braziunas responded that there was nothing specific from this test procedure but that they have always targeted highest coolant temp possible but added that there was no documentation on actual affect.

Mark Cooper asked whether oil temp in the current test at IAR was also affected the same as the coolant temp. Brad Carter responded that yes oil temp was reduced as well.

Martin Thompson asked how many hours before a scuffing event do you typically see evidence of it. Jim Matasic answered that anywhere between 7-10 hours before hitting the 3 kPA CCP mark CPP will begin to rise.

Pat Fetterman commented that LZ has demonstrated they can run the test and has good repeatability. IAR has one run and no one else has anything else that is true to the procedure. Riccardo commented that Exxon Mobil has the same concerns. The reproducibility data is questionable. Jim Matasic commented that there have been direct reasons behind the lack of reproducibility and that they are not inherent to the test. Pat stated that there is still no proof anyone else can run the test and that this is a criteria for test acceptance. Brad Carter and Martin Thompson disagreed that there is no proof.

Jerry Wang commented that the flipping of oils A & B from the first procedure to the new one is troubling and brings into question if the test is truly meaningful.

There was discussion about test results that were operationally questionable and what use some of that data could have on showing reproducibility. It is known that unscheduled hot shutdowns make results more severe. There is a need to understand the effects of those operational issues on test results.

Bob Campbell reiterated in support of Jerry's comments that it's not clear to him what the test means and whether it's useful tool for keeping poorly performing oils out of the field.

Greg Braziunas indicated that the test has shown that scuffing is formulation dependent. The utility of the test is to be able to determine if the shifts to lower viscosity and a propensity to scuff be offset by additive packages.

Jerry Wang pointed out that oils A and B being 2.9 HTHS and being better than oil C at 3.5 HTHS refutes that claim. Is there any way to more accurately correlate to field test data?

Mark Cooper asked for clarification about oil C from field test data and if scuffing occurred in one cylinder or multiple. Greg Braziunas said that they very closely monitored the tests and that they shutdown the test at first sign of scuffing so it was only in 1 cylinder. Jim Matasic said that the more severe results on C also had more cylinders scuffing than scuffing on oils A & B.

Bob Salgueiro asked about the field test data and if these oils were tested in one fleet with similar conditions or were they spread out over multiple fleets running different applications. Greg Braziunas responded that they were split between a reliability growth fleet and Daimler test cell engines. The trucks in the RG fleet were running specific and similar routes and that the test cell engines ran multiple core Daimler specific test cycles.

Bob Salgueiro asked whether the one scuffing event occurred in a truck or cell? Greg said that it was in a truck. Bob asked about the mileage and Greg responded that it was around 180k miles.

Jerry said that it would be very helpful to run field test and test cell oils 1,3 and 4 from Daimler testing in LZ stand to correlate data. Greg Braziunas said that should be done during the matrix. Jerry said that should have been done in test development. Pat Fetterman agreed and indicated that EMA would select PC-11 type oils to run matrix testing. Mike Alessi concurred.

Bob Campbell asked what the actual test length is supposed to be and of the three oils A, B and C are any of them good? Jim Matasic and Greg Braziunas said that the targeted test length is 200 hrs. Bob responded by asking how can we know that that is an acceptable test length and what is a good result? Are these three oils tested good, bad or don't we know. Greg Braziunas indicated that oil C is probably the acceptance criteria (marginal pass) and that when it is upgraded to PC-11B need to ensure that it is still acceptable since C is currently an accepted oil.

Bob Campbell pointed out that we don't know that if oil C was blended down to 2.9 whether it would perform the same. He also asked: How do we know the other 3 oils behave in this test? What happens if one of those good field oils failed this test at 50 hrs? Are we going to accept a test without knowing what it really means?

The question was asked if there is any endurance testing data on the original good oils A & B. The response was that there is a limited amount of field test data on these oils as well as other 2.9 HTHS formulations. There won't be complete data on these oils until 2016 as part of validation testing for PC11.

Jerry said his concern was that the oil appetite seems to have changed with the HW how do we know that this is the right hardware combination to ensure the test is screening poor oils? How do we know the test doesn't flip with another HW change? Jim Matasic pointed out that at the time there was only one real data point on each A & B and that we really didn't know what it meant at the time.

David Duncan said that ultimately the point here is to show discrimination between oils and that all of the data clearly does that.

MOTION:

John Cruz motioned for task force acceptance of the test going forward to the matrix. Jim Matasic seconded.

VOTE: NEXT PAGE

Afton – NO

Exxon Mobil – NO

Infineum – NO

Intertek – YES

Volvo – YES

Oronite – NO

TMC – WAIVE

TEI – YES

SW – WAIVE

PACCAR - YES

Detroit/Daimler – YES

Lubrizol – YES

Tally: 6 YES 4 NO 2 WAIVE

Roger Galt asked what the timeframe would be to generate the data necessary to change the minds of no votes. Can EMA stomach and additional delay to generate the necessary data to make a final decision?

Jerry indicated that the shorter test length helps DD13 test to generate the data quickly.

Brad brought up the CAT 1Q situation for precedent as a test that went forward but then got dropped from the matrix. Can we take this test forward and then drop it if things don't pan out.

There is still a question about what this test means. It seems to screen chemistry but what does it actually mean.

The question was asked whether the test could start matrix testing later than other tests but finish at the same time due to the shorter test time. Roger Galt said that the MOU could be drafted to incorporate that uncertainty in order to delay the January 30th IN or OUT decision date to allow the test to generate more data. There would need to be a broader discussion within EMA and NCDT as to how to proceed with that.

It was asked whether there would be test task force group acceptance that additional data would be sufficient to move the test into the matrix. There was no consensus on this point.

It was decided that moving forward the test would continue at IAR to generate another data point on oil C. It was initially proposed to seek out another oil (D) that would be used to correlate to Daimler field test data and further segregate oils. It was then decided that IAR would run another test on oil C once the current test completes and SwRI would run tests on oil C as soon as possible to demonstrate reproducibility and that the procedure could be successfully run at other labs. Lubrizol would run tests on the new oil D to further demonstrate discrimination.

The meeting was then adjourned at 12:30 PM EST. No future meeting date was established.

Infineum Negative:

Infineum voted NO on the motion, based on the available data the DD13 test is not ready for matrix testing.

Afton Negative:

Afton voted negative on the 1/21/2014 DD13 task force motion regarding its recommended inclusion into the PC11 matrix for several reasons mentioned below.

~ Reproducibility

While repeatability at one lab appears sufficient, there are no data to indicate other labs can run the test. Data need to be generated indicating multiple labs can run the test correctly and generate comparable results to Lz.

~ Test Length

Test length has not been fully defined. When asked during the most recent call, one answer was "probably 200hrs" and one was "probably 70 hrs". A "run until failure" test duration doesn't seem to fit within the realm of ASTM standardized tests.

~ Field Correlation

The industry have continually asked Detroit about field problems and how to correlate this test to the field. The response has always been "we don't currently have any field problems". However, a commercially available oil was finally brought forward and early DD13 data from one lab indicates a tendency to scuff at ~70hrs. This oil (labeled Oil C) was verbally deemed by Detroit as marginal during the 1/21 call. In the Detroit presentation (see table below),

XW-30 Candidate	#1	#2	#3	#4
Engines Tested	12	12	12	13
Engines Scuffed	0	1*	0	0

results of this oil were shown with data from 3 other candidates that are deemed acceptable. There are currently no data to indicate this test would rank any "acceptable" field oils appropriately. We suggest several other field oils of the same viscosity grade be tested to confirm the correct signal.

~ Poor Oil (DD13A) and Good Oil (DD13B) reversal

Multiple instances that both define these oils and indicate an understanding of the adhesive wear phenomena (and chemistry associated with it) exist in presentations and meeting minutes. Below are some of them…..

9/6/2012 Lz/Daimler panel presentation –"Two oils specifically targeted to be poor performers. One oil was formulated with characteristics of the oils which Daimler (DDC) has seen adhesive wear concerns with when testing certain hardware and engine calibrations. "

3/1/2013 panel minutes – "There was a question to clarify the poor and good 2.9 HTHS oils. The good 2.9 HTHS has improved wear characteristics over the poor 2.9 HTHS oil but does not necessarily represent a passing oil"

5/7/2013 Lz Presentation - "Poor" 2.9 HTHS – An oil based upon a fully formulated CJ-4 DI platform formulated with characteristics of oils which Detroit has seen adhesive wear concerns with certain hardware and engine calibrations in testing.

5/7/2013 Lz Presentation - "Good" 2.9 HTHS –An oil based upon a fully formulated CJ- 4 DI platform and believed to have good scuffing resistance at 2.9 HTHS.

8/28/2013 panel minutes – Bob Campbell asked how we can be sure that this test solves the field issues seen without testing the oils that have performed poorly. Detroit responded that they have plenty of internal data on poor oils that they have run and they are concerned that certain oils have a propensity to scuff. They would like to build margin to protect against warranty issues in the future.

10/2/2013 Daimler presentation to NCDT -- Blend Targets

•"Poor" and "good" are relative terms referring to the level and types of additives in the two oils

- Not necessarily reference oils, but are developed to be demonstration oils

•Both blended to low end of 5W-30 Viscosity Grade with similar viscometrics

- Blended to show additive not viscosity response
- Same base stocks and same viscosity modifier

•Built upon core DI chemistry with CJ-4 experience in SAE 15W-40 viscosity grade

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The most recent data indicating the "poor" oil outperforms the "good" oil seem to clearly contradict these comments and other commentary offered during test development. This could indicate that the adhesive wear phenomena and associated chemistry interactions are more complicated than suspected, hence making the correlation to field performance (and gaining a better understanding of the "poor" and "good" oils field performance) paramount in allowing this test to move forward into matrix testing.

Based on the Detroit comment that Oil C is deemed a "marginal" oil, we believe field data need to be generated on the "poor" and "good" oils to ensure that they are indeed acceptable oils, as indicated by the currently proposed test. Without field validation on these two oils, it is entirely possible that these oils could exhibit adhesive wear problems in the field, yet be deemed acceptable in the DD13 scuffing test.

A comment during the call suggested perhaps Lz got the "poor" and "good" oils wrong. What if they got it right but this test can't screen it?

In conclusion, it must be proven that the procedure can be run in multiple labs with acceptable reproducibility, have a clearly defined procedure (including test length) which can be completed successfully by test oils, and show relativity to field performance. It is not sufficient to have a test that screens chemistry without confirming it fully translates to the field in the same manner.

Oronite Negative:

Below are Oronite's comments for our negative ballot. These are based on the status of the test at the time the vote was taken on January 21. We realize some of these issues are being addressed.

1. switching performance of the originally designated poor and good 2.9 HTHS oils with current procedure and hardware
2. insufficient data showing discrimination and field correlation (need more results on at least one good and one poor oil from the field)
3. insufficient data showing reproducibility
4. not all labs designated to run tests in the matrix have demonstrated the ability to run the test without operational issues

ExxonMobil Negative:

ExxonMobil votes against the inclusion of the DD13 Scuff Test into PC-11, at this time, for the following reasons:

1. While the leading test development laboratory had proven discrimination among different oil chemistries and demonstrated repeatability, reproducibility at the other participating laboratories has not yet been shown. ExxonMobil requests that reproducibility results are obtained at the other participating laboratories using the latest test method.
2. The ability of other labs to successfully run the test remains an open question since only 1 valid test has been completed at an outside laboratory.
3. The ranking of the "Good" and "Bad" oils switched with the new test method and hardware. Since the taskforce was told that the "Good" oil was designed to have improved wear characteristics and now performs worse. This suggest that the test method and hardware do not correlate with the problem being addressed by the test. It appears that additional data is needed to validate the relevance of the test.