Daimler Surveillance Panel Meeting Minutes

August 6, 2020
9:30 AM – 11:00 AM CST

Call Participants:
Lubrizol - Andrew Stevens (Chairman), Kris Meekins, Patrick Joyce
Southwest Research Institute – Jose Starling (Secretary), Travis Kostan, Robert Warden
Intertek – Andrew Smith
Daimler - Suzanne Neal
Afton – Bob Campbell, Christian Porter, Cory Koglin
Infineum - David Brass, Elisa Santos
Chevron Oronite – Mark Cooper
TEI – Derek Grosch
TMC – Sean Moyer
Haltermann Solutions – Prasad Tumati

Agenda Items

Alternative Fuel Requirements Discussion – Surveillance Panel

Jose Starling and Travis Kostan presented an initial draft document to start the panel discussion on how to bring in an alternative fuel supplier for this test (see attached).

It was asked if 2 tests on the alternate fuel is sufficient or appropriate. It was discussed that for the Mack T11 tests two tests seemed appropriate since there is only one reference oil. However for the 1P there are two reference oils so three tests were selected for that one.

Bob mentioned that the precision on this test is not so great so that there wouldn't be a lot of meaning behind running two tests that simply fall into the wide reference test acceptance band. It was discussed that the possibility of using a secondary reference oil that runs longer would be helpful to verify to the user that this fuel in reality has no effect. The thought was to use Oil D which during prove out testing consistently ran out to 200 hours without scuffing. This oil was only used during the prove out runs so none of this was ever made available to TMC as it was sent directly to the labs. Suzanne will take the action item to check if she can have more oil D made from the supplier.

Suzanne mentioned Oil D is a CK-4 viscosity range while 864-1 is a FA-4 type oil. It was mentioned that it is just important to acknowledge that there may be a slight shift in operational conditions when using these two oils where it may be helpful to keep the selected target ranges on the wider range. It was asked if Oil D is available then it should be discussed if there is also going to be a reference test run on that oil prior to conducting the alternative fuel tests. It was agreed that it would be a good idea since it has been awhile since that oil has been run, would likely be a new batch and many changes in the engine hardware since then.

Travis mentioned that he can establish some example Yi limits and present at the next meeting for discussion. It was also mentioned that it would beneficial to review the current Ei limits and standard deviation of the test to see if there is any adjustments that need to be made.

Travis mentioned that it is important to understand that for this test the statistical analysis is not going to provide great detail. There is very limited data as is typical for other HD tests. Travis volunteered to

conduct some additional analysis to show to the group what this testing may look like and discuss in the next meeting.

It was asked if this testing would be using the same DD13 engine or different engine as this could play a role. SwRI and Intertek to look into trend among engines and see what the data suggests on this topic. The labs are also to review what Coolant delta across the engine looks like to see if that is another suitable parameter to add to the target list for the alternative fuel supplier.

Next Meeting:

Next meeting is expected to be in two to three weeks, but Andrew will send out a poll to establish exact meeting date.

DD13 Alternate Fuel Acceptance Criteria

- Single test stand

- Conduct 1 calibration test using oil 864-1
  - Test must meet all LTMS calibration acceptance requirements
  - Calculate new Zi value

- Conduct 2 tests on the alternate fuel using oil 864-1
  - Calculate Yi and Ei for these two tests. For both Ei values, use the Zi which was calculated immediate following the calibration test on the current fuel
  - Each test must meet the following criteria
    - For Hours to Scuff parameter, Ei < 1.734
    - Average stage 1 torque should be 800 ± 25 Nm
    - Average stage 2 torque should be 1840 ± 40 Nm
    - Average stage 1 exhaust pipe temp should be 325 ± 15°C
    - Average stage 2 exhaust pipe temp should be 440 ± 15°C
    - Tests must be operationally valid with no negative QIs

Note:

In the gasoline sequence test approval criteria, it has been helpful to view these requirements as the "free pass" requirements, rather than "pass/fail" requirements. If these requirements are met, the Daimler SP is comfortable that no additional review is necessary to approve the fuel. On the other hand, if these criteria are not met, there may be a very good explanation to the reason, unrelated to the fuel. In these cases, the SP may still determine a path forward to approve the fuel, but the requirements will have to be determined on a case by case basis depending on the data.

Additional questions for consideration of every panel:

1) Assuming a new fuel is approved, what will the implementation process look like? Will each lab be able to make its own decision on which approved fuel supplier it wishes to use?
2) If switching to a new fuel, previous Zi values and severity adjustments will be based on calibration data from a different fuel.
   a. Is any additional referencing required?
      i. If not, can switchover happen in the middle of a calibration period?
   b. How will we handle severity adjustments?

3) For a test stand that runs the procedure described in this document, is the stand still calibrated and able to continue candidate testing?

All chartable reference tests data shown below for average load and tailpipe temperature. These are the non-controlled operational parameters that would be interesting to monitor for any significant shifts between fuels.