ASTM Chain Wear Task Force Conference Call
Thursday 27th, April 2017

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Agenda:

1. Review global spreadsheet.
    a. Confirm participating labs
    b. Coordinate multiple quantity requirements
    c. FCS deadline
2. Piston Update (CW and LSPI)
3. Discuss CW tests results – most current data set
    a. Timeline for outstanding tests
    b. Plan for statistical review

Chain Wear Test Results:

CW Plot 042617.xlsx

- A plot of the most current CW matrix test data is attached. This plot includes some of the additional tests that were requested by the statistics group and an extra test on 271 by Afton.
    - Afton communicated during the call that they completed another test on reference oil 271. The test result is .0762%. This data point is now included in the plot. Afton also ran a 270 oil and a 1011.
    - SWRI reported that they are re-running the test on oil 270 that generated the mild (.04%) result. An additional run on 1011 is plotted for SWRI. An additional 271 is planned per the stats group request.
    - IAR completed two additional tests on 1011. These tests did not repeat the results of the original two matrix tests on this oil.
    - The plot was shown as an update of the testing efforts but this topic was not the main agenda item. Nevertheless some discussion was generated.
        - A concern from Doyle Boise is that there is a shift in severity post matrix as seen clearly in oil 1011.
        - SWRI is still investigating the very mild result on 270 and validity of this test is in question.
        - A review of the complete data set is planned after all testing is complete and validity determined for all tests. Tests outstanding are the re-run of oil 270 and the additional 271 test from SWRI.
        - Another observation was that oil 271 has always generated less chain stretch than the other two oils with the exception of the outlying result from SWRI.

- 2.0L Piston Discussion (FLSPI and Ford Chain Wear Tests)
    - The piston batch that was ordered late 2016 was received by the labs the week of March 27th. The batch of pistons was to be used on both the

LSPI and CW Tests. These pistons had the following observed differences:
    - Crown machining instead of casting. Sharp edges.
    - 2 additional drain holes at the oil ring land
    - Skirt coating thickness was larger causing an interference fit in the bore.
- Valvoline (Amol) noted that the part number of the pistons received was not the same as the piston number ordered.
    - Ordered AG9E-6110-AC2
    - Received DJ5E-6110-AC2
- LZ proposed we run the 2016 engines with the pistons they came with.
- Plan forward with pistons as it applies to the CW and LSPI tests:
    - Run the 2017 (DJ5E-6110-AC2) pistons in the LSPI test as received to observe performance. Intertek offered to run the tests.
    - Run the 2016 engines (DA8E-6006-BB) as received in the LSPI test for observation. SWRI agreed to run scoping tests with the 2016 engines.
    - The chain wear test will need the same level of experimentation with both the 2017 and 2016 pistons. No testing plan for chain wear was discussed.

Hardware Discussion and Order Consolidation

- The first order of business was to confirm which labs would participate in the hardware purchase. APL had concern that they would not be able to procure approved fuel to run the test. As a result of the uncertainty they were not committed to buying parts.
- A discussion of fuel requirements followed with a final agreement that:
    - The EEE fuel COA was an industry standard not owned by any one entity
    - The EEE fuel can be blended in Europe or anywhere in the world and it will meet the requirements as long as the COA meets the EEE standard.
    - APL cannot buy fuel from a US blender in large quantity and have it imported to Germany. European fuel suppliers can blend the fuel to the EEE standard and supply to APL.
    - The test sponsor and the task force members at the meeting agreed that this fuel supply would meet the requirements of the CW procedure.
    - APL agreed to conduct a round robin of testing to show that US EEE and European EEE would produce the same performance levels in the LSPI test using reference oils.
    - APL requested that the minutes of the meeting reflect the discussion and agreement for obtaining approved fuel.
    - The test procedure will be amended to state that EEE fuel can be used from any supplier that meets the specification

- Global spreadsheet consolidation:

- With the approval of the European fuel option, APL announced to the task force that they would participate in the hardware purchase.
- Attached below is the final order quantity spreadsheet. All minimum and multiple quantities were met. The participating labs negotiated quantities to buy to meet the multiple requirements.
- There was a need by Afton and Valvoline to purchase more engines but combined they did not meet the minimum order of 96. APL offered to sell the US labs 48 engines. No additional purchase of 2.0L engines is planned through FCS.

LSPI CW Global 2 0L Final Quantities.xlsx

Next Meeting:

- To be announced.