

CAT Aeration Test Task Force meeting August 27, 2014

Proveout Matrix Plan

Attendees: Names Highlighted in **Yellow** attended the meeting

Participant	Name	Email	
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Test plan update, 27 Aug 2014

Lab	Test 0	Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	Test 7
A	LZ oil (OS)	HA	1005	HA	1005	LZ oil start Thurs	LAD1	1005/1004?
B	LZ oil (OS)	HA	1005	HA - Start Friday	LZ oil	LAD1		
C	LZ oil (OS) Hi Si	1005	HA	1005-start Thurs	LZ oil	LZ oil*	LAD1	

Done by NCDT meeting

Done since NCDT meeting

*: different batch

Updates:

Martin: LAD1 started (2 hours). Will finish Saturday – results available early next week.
 Tim: HA finished; shutdown during the test; Now at LZ oil repeat (quick shutdown but start within 5 min) and will finish late today. Data will be available by Friday. LAD oil will start Friday.

Greg: finished repeat of 1005 and just started LZ oil; EOT Friday. Instead of starting the LAD1 per earlier plan, a repeat of the LZ oil will be run (note details below).

(Test numbering will follow the Prove-Out Matrix numbering).

Future discussions:

- o Si and engine life impacts
- o Si in sealants and gaskets: options to decrease Si
- o Oil sampling techniques (see below)
- o Spec out a heated line. Current line is fragile (Tim sent our potential replacement; LZ is also looking into alternatives)

Comments: [need to discuss these soon.](#)

[Si-free gaskets appear to be critical due to sensitivity to Si. Cat can consult with Heather \(Navistar\) based on prior experience with EOAT.](#)

Oil sampling:

Sample from the gallery at the same location where the aeration sample is pulled from. [Labs will discuss offline. Sample and purge sizes should also be the same.](#)

Next tests: per the updated table above

[LZ will repeat the LZ oil to try to stabilize the Si level in the engine. Test will run per current procedure.](#) Following this next test, and based on the final Si level, determine if long test and more often oil changes are needed.

Gaskets and sealants use:

Original gaskets were used with hardly any sealant in the build of Intertek's engine.

SWRI use quite a bit of RTV. Analysis is ongoing to determine Si level of the sealants. Lubrizol used no RTV sealant; GM sealant is used. Analysis is ongoing at LZ to determine the Si level in the gasket.

SWRI test results:

Martin showed the results. The engine appears to be at a steady Si level. It is noted that it took more time than expected to reach Si level stability.

It was also noted that prior to the rebuild, most oils showed a plateau. With the new engine, the oils appear to keep some increase in aeration throughout the test. CCP and other new parameters were discussed as possible influence.

Intertek:

Tim reviewed the results of the latest test. Density measurements and oil cooling were discussed.

LZ tests:

- Shut down in LZ shakedown oil due to oil pan gasket change.
- Si level is still high in the latest test.
- Oil aeration level did not follow the gasket change timing. Metals in general are increasing in this test. Discussion of other parameters that may be keeping the Si increase:
 - Hoses, dirt intake (air filter). Fuel lines are stainless? Greg will check the fuel samples and the hoses.
 - Oil filter housing was changed (paper gasket was replaced)
 - ICP carry over?, Gasket kit age?
- Shut down in HA oil due to heated line issue
- Engine hours are similar to Tim's.
- Even with the Si level, the level of aeration is similar to Martin's.

Data analysis, OMalley:

Presented the results of the tests thus far (Excel, averages). Si, engine hours, and average aeration levels were shown.

Data analysis, Santos and Laufer:

Presented the data reported thus far to TMC. Data included prior results and was sorted into labs and parameters. Elisa sent additional plot of the influence of engine hours and Si level. The plot, given below, shows that both parameters seem to correlate with the aeration results.

Additional parameters and discussions

Intertek is providing the warm-up hours in the data. Discussion:

Should these hours be included?

Comment: these may be important for the rest of the test. Shutdowns or other events may impact the rest of the test.

Comment: warm up data can go to a separate file to reduce the confusion when the data is pulled for analysis. Data in a separate file would provide the history of the test.

The table can be updated to reflect new start times

Sean will add another tab for the warm-up. One second data will be provided.

Discussion of the 90 deg density value used for the test: D4052 values are used.

Repeatability of D4052: should all the measured data be used to calculate the 90 deg? Or use the measured 90 deg? If no linearity, it can be easily shown if extrapolation is used.

The difference is noted to be most probably insignificant.

Sean will add one column for the interpolated 90 deg density.

Gather all the data and compare after the matrix.

Discussion: should there be a correction factor for Si?

How long should the engine run? and what should be done to reduce time to Si stabilization in the engine? (reuse gaskets? Soak gaskets in oil?)

Use of old data may require compensating for the Si level.

TF reporting to NCDT:

Preferable: send TF recommendations and data to NCDT members early in the week of Sept 15 to allow ACC to review the data and decide on the acceptance. This also allows NCDT members to review data prior to the NCDT meeting on Sept 25.

Next meeting:

Tuesday, Sep 2, PM. An invite will be sent shortly.

