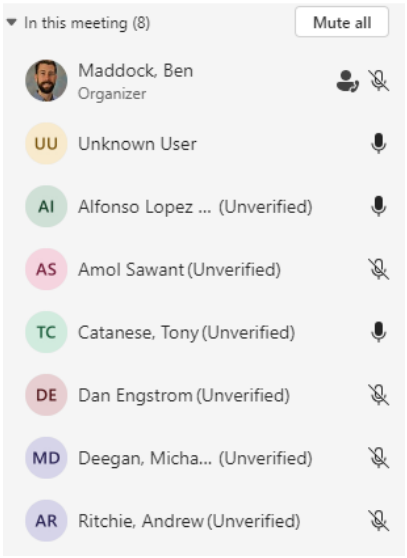
Sequence VH O&H Panel Meeting
April 9th, 2024 3PM EST via Teams

Attendees:



Overview:

1. Fuel Analysis
2. Build Workshop
3. Hardware
4. Operation

Topics:

1. **<u>Fuel Analysis</u>**
    a. 3/28 SP discussion didn't occur. Meeting set for 4/11 to discuss with Supplier
    b. Lubrizol's analysis on gums confirmed their fuel tank/batch has been compromised
    c. Afton pursued an investigation into AO content with indications no detectable AO could be measured from any of the samples. The batches tested include: GI0321NX10-1, N-000010, N-000010-2, N-000010-5, N-000010-8 and N-000010-11
        i. More details to follow in 4/11 SP call

2. **<u>Build Workshop Date</u>**
    a. 1 week out!
    b. Updated draft of build workshop manual
        i. See attached
    c. No concerns from IAR and SwRI
    d. Surface Finish Improvement
        i. Provide details for the following parameters, **by cylinder and including Ra**, from the Precision Matrix:

TESTKEY	LTMSLAB	IND	ENGINE	Surf Analyzer	Rk (µm)	Rpk (µm)	Rvk (µm)	Rz (µm)	Mr2	Top Ring Gap (in)	2nd Ring Gap (in)	Regap Top Ring (in)	Regap 2nd Ring (in)
119150-VH	G	940	VH-14										
119151-VH	G	940	VH-15										
122926-VH	G	1011	VH-19										
123887-VH	G	940	VH-17										
119162-VH	D	1011	170101										
121400-VH	D	1011	160204										
118692-VH	G	1009	VH-18										
118693-VH	G	1009	VH-15										
122929-VH	A	1011	VH18-2										
119141-VH	A	1009	VH19-2										
121398-VH	D	940	170102										
122927-VH	G	1011	VH-19										
119155-VH	G	1009	VH-17										
117777-VH	A	1009	VH9-4										
108997-VH	A	940	VH17-4										
119143-VH	A	1009	VH21-1										
119160-VH	D	1009	170201										
108998-VH	A	940	VH18-3										
119147-VH	A	1011	VH20-2										
118698-VH	A	940	VH19-3										

ii. Ford guidance is possible. Mike looking into current specs available to help ground the PM data with OEM expectations

e. Piston Ring Gaps

i. Ford requests piston ring gaps from the PM builds to help identify normal range

f. Goal: Identify expanded surface parameter targets and include ring gaps in reports.

3. Piston Oil Holes

a. Visual difference

b. Afton Keyence Study

i. Single random piston from a random set per run size

ii.

FIG. A14.11 Piston Rating Grid

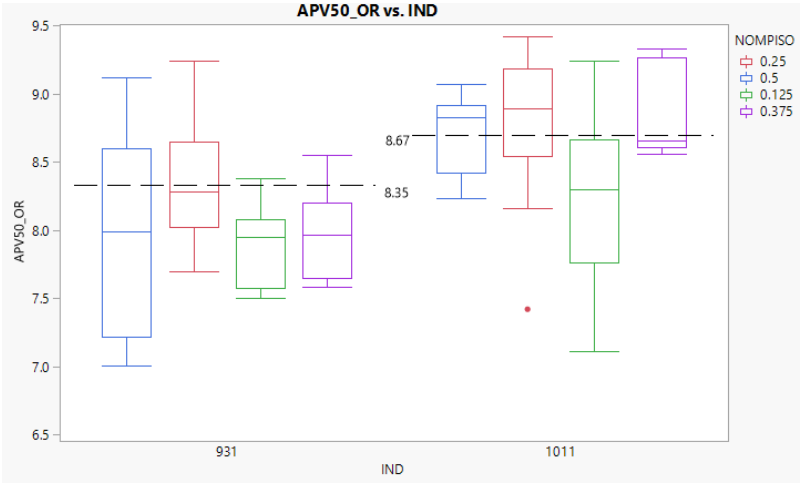
1. APV50 only rates the top two rows of the grid

iii.

	Position around Piston (in2)						
Size	**1**	**2**	**3**	**4**	**5**	**6**	**Total**
0.125	0.0316	0.0174	0.0147	0.0279	0.0307	0.0289	0.1512
0.250	0.0409	0.0263	0.0153	0.023	0.0133	0.0181	0.1369
0.375	0.0296	0.018	0.0097	0.0188	0.0149	0.0137	0.1047
0.500	0.0287	0.0137	0.0122	0.0263	0.0121	0.0272	0.1202

1. *Note: Identical positions weren't maintained when metrology technician measured pistons, please ignore position columns and focus on the total area observed (n=1 per size)*

iv.



c. Ford unable to locate documentation that defines what they should be
d. Without looking at the data with a finer comb, the group agrees that despite apparent differences, APV appears to drift in performance without any significant correlation to run size.
e. TMC to investigate correlations in APV and run size

The GLM Procedure

Dependent Variable: AP50yi yi Value of AVERAGE PISTON SKIRT VARNISH

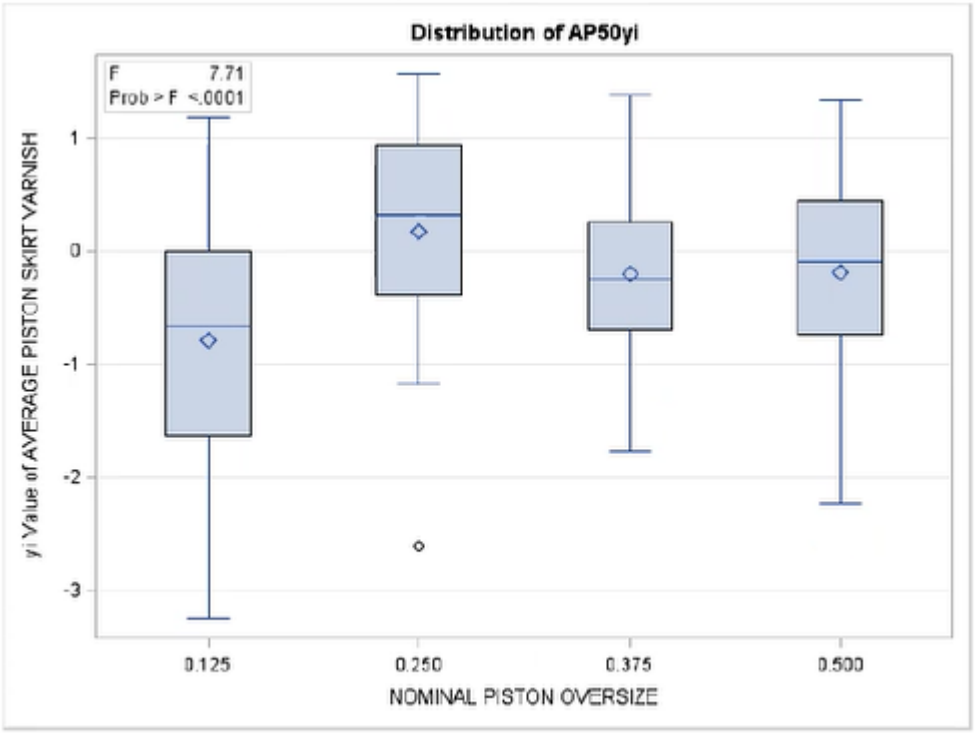
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	19.2246199	6.4082066	7.71	<.0001
Error	158	131.3565307	0.8313704		
Corrected Total	161	150.5811506			

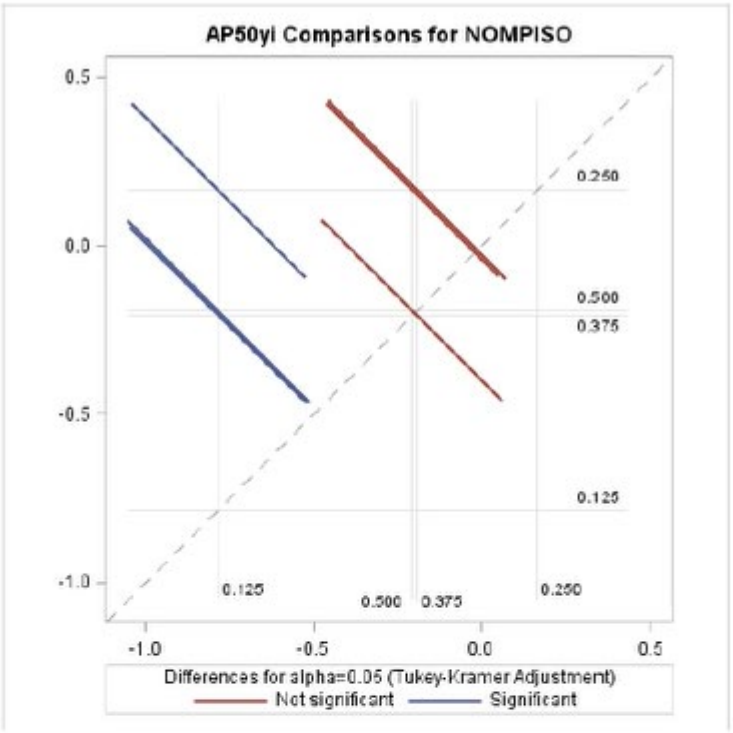
R-Square	Coeff Var	Root MSE	AP50yi Mean
0.127669	-372.3892	0.911795	-0.244850

Source	DF	Type I SS	Mean Square	F Value	Pr > F
NOMPISO	3	19.22461989	6.40820663	7.71	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
NOMPISO	3	19.22461989	6.40820663	7.71	<.0001

i.





NOMPISO	AE50yi LSMEAN	LSMEAN Number
0.125	-0.54455357	1
0.250	0.30619589	2
0.375	-0.21456916	3
0.500	0.00641534	4

Least Squares Means for effect NOMPISO
Pr > |t| for H0: LSMean(i)=LSMean(j)
Dependent Variable: AE50yi

i/j	1	2	3	4
1		0.0030	0.5290	0.1342
2	0.0030		0.1301	0.6209
3	0.5290	0.1301		0.8136
4	0.1342	0.6209	0.8136	

ii.

4. **<u>Hardware</u>**
    a. Valvoline and SwRI FCS-Piston, Ring, Oil Pump & Camshafts values, **targeting completion by Build Workshop**
        i. Small parts order to follow

5. **<u>Operation</u>**
    a. Operational Data Study: N-10-1 approval matrix vs PM

i. Proposed timing: Labs to provide data in the correct format for analysis by 6/21/2024

TESTKEY	LTMSLAB	IND	Op Data?
166515-VH	A	931	
169622-VH	G	1011-1	
172588-VH	G	931	
172259-VH	D	1011-1	
172583-VH	A	1011-1	
172589-VH	G	931	
172587-VH	G	940	
172582-VH	A	940	
172584-VH	A	1011-1	
166686-VH	D	931	
171799-VH	D	931	
172585-VH	A	1011-1	
175648-VH	A	931	
175637-VH	G	1011-1	
175640-VH	G	931	
169623-VH	G	1011-1	
175643-VH	G	940	

ii.