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February 24th, 2020

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ASTM D02.B0.03 L-42 Surveillance Panel
Members and Guests:

Attached for your review and comment are the unconfirmed minutes of the:

February 19, 2020 Surveillance Panel Meeting (PRI Headquarters – Warrendale, PA)

Please direct any corrections or comments to my attention.

Very Respectfully,

Matt Sangpeal, Chairman
L-42 Surveillance Panel

L-42 Surveillance Panel Meeting Minutes

PRI Headquarters – Warrendale, PA

February 19, 2020

Attendees: voting members in **bold**, * indicates called in via teleconference

R. Banas (Exxon Mobil)	A. Goyle (BASF)	E. Sattler (Army)
D. Beck (TMC)	D. Horvath (Afton)	R. Slocum (LZ)
D. Bell (Afton)	P. Kanga (Exxon Mobil)	D. Smith (Intertek)
M. Cabaj (Linamar)	J. LaBond (Meritor)	W. Venhoff (LZ)
J. Clark (TMC)	A. Lange (Intertek)	R. Warden (SwRI)
A. Comfort (Army)	T. Muransky (AAM)	A. Zyski (Dana)
K. Drlja (LZ)	M. Sangpeal (Afton/C)	

Call to Order

Review of Agenda

The meeting agenda is attached.

Review of Membership

A motion was made by R. Warden (SwRI) to make the following membership changes:

- Replace D. Rabinowitz (Meritor) with J. LaBond
- Replace D. Smith (Intertek) with A. Lang

The motion was seconded by D. Smith. Unanimous approval, no abstentions.

Approval of Meeting Minutes

Meeting minutes for approval:

- "20191113_L42_SP" → November 13, 2019 – Ann Arbor, MI

Motion to approve by D. Smith (Intertek), second by W. Venhoff (LZ) to approve meeting minutes as presented. Unanimous approval, no abstentions.

L-42-1 Development

M. Sangpeal stated that Afton has not been able to perform more development work due to rig availability. No progress has been made by the other labs.

Drive-by-wire throttle

No progress has been made by any labs in this area.

TMC 113 Dropout / New Discrimination Oil Development

The SP discussed results from acceptance testing of TMC 119. Results are as follows:

testkey	ltmslab	ltmsapp	strun	ltmsdate	ind	pinbat	ringbat	rinit	ecsprate	ecsrrate
142245-L42	G		0356		119	C1L925	P8AD078X	JMR	73	52
142244-L42	G	1	0333	20190730	119	C1L925	P8AD078X	JMR	48	43
142248-L42	B	3	1068	20190509	119	C1L925	P8AD078X	JOBY	38	25
142249-L42	B	3	1070	20190514	119	C1L925	P8AD078X	VADE	62	47
142250-L42	D	3	2141	20190318	119	C1L925	P8AD078X	BK	95	77
142251-L42	D	3	2258	20190903	119	C1L446	P8AD132	DS	75	50
142252-L42	A	2A	0709	20190404	119	C1L925	P8AD078X	BT	58	51
142253-L42	A	2A	0749	20190816	119	C1L925	P8AD078X	BT	68	59

	Stats	
	P	R
Max	95	77
Min	38	25
Range	57	52
Avg	65	51
STD DEV P	16.39	13.67
STD DEV S	17.52	14.62

Results show wide variation at labs B and G with same hardware batch. Labs A, B, and G all ran using the same shock pot settings. Lab D changed hardware batches in between runs, and had to adjust shock pot settings accordingly.

R. Warden (SwRI) mentioned that discrimination oil test results should be compared with current passing reference averages for perspective.

The SP agreed that at least one more data point from each lab is needed before TMC 119 can be approved.

A motion was made by R. Warden (SwRI), Second by A. Comfort (Army), to have all labs run one more test with TMC 119 before the May SP meeting. Labs A and D will run with C1L446/P8AD132 hardware, Labs B and G will run with C1L925/P8AD078X hardware.

These tests will be donated runs that will not count against the calibration period.

Unanimous approval, no abstentions.

M. Sangpeal (Afton) stated that Afton has also developed a new discrimination oil and is willing to supply it if the SP finds it necessary. Afton ran three tests with C1L446/P8AD132 hardware on this new oil. Results are as follows:

Test	EOT Pinion Scoring	EOT Ring Scoring
2217	43	33
2225	47	40
2232	65	55
Max	65	55
Min	43	33
Range	22	22
Avg	52	43
STD DEV P	9.57	9.18
STD DEV S	11.72	11.24

The panel agreed to hold off on discussing this oil option until a later date, as the development of TMC 119 is well under way.

J. Clark (TMC) confirmed that there are 30 USG of TMC 113 remaining. He also mentioned that remaining quantity is not the biggest concern, but the additive drop-out issue is most urgent.

D. Beck (TMC) stated that he will have a detailed comparison of historical data on TMC 113 at the May SP meeting.

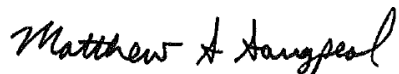
New/Open Issues

No new issues.

Adjournment

Motion by R. Warden (SwRI), second by D. Smith (Intertek). All in favor, meeting adjourned.

Respectfully submitted,



Matt Sangpeal

L-42 Surveillance Panel Chairman



L-42 Surveillance Panel Meeting

PRI Headquarters

Warrendale, PA

February 19, 2020

2:00 pm - 2:15 pm EST

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Agenda

- ▲ **Call to Order**
- ▲ **Agenda**
- ▲ **Membership Review & Update**
- ▲ **Approval of Meeting Minutes**
- ▲ **L-42-1 Development**
- ▲ **Drive-by-Wire Throttle Update**
- ▲ **New/Open Issues**
 - ▲ TMC 113 dropout / New discrimination oil development
- ▲ **Adjournment**

L-42 SP Voting Members

 Rob Banas:	ExxonMobil
 Dylan Beck:	TMC
 Mike Cabaj:	Linamar
 Allen Comfort:	US Army
 Arjun Goyal:	BASF
 Troy Muransky:	AAM
 Daniel Rabinowitz:	Meritor
 Matt Sangpeal:	Afton Chemical (Chair)
 Robert Slocum:	Lubrizol
 Dale Smith:	Intertek
 R. Warden:	SwRI
 Amy Zyski:	Dana

Approval of Meeting Minutes

SP Meeting Minutes

▲ “20191113_L42_SP” → November 13, 2019 – SwRI – Ann Arbor, MI

L-42-1 Development (No Recent Developments)

Summary

- ▲ Electric T-rig (input and outputs)
- ▲ Dana 44 mounted without springs

Goal is to have the rig follow L-42 set points first then use mathematical model for set points

Development to date

- ▲ Data from L-42 run was used to create 100 Hz setpoints for initial L-42-1 testing
- ▲ Initial testing shows good progress, fine tuning still needed to hit exact set points consistently

On hold at Afton for the near future due to rig availability

Drive-by-Wire Throttle (No Recent Developments)

- During the August 2017 meeting, the panel discussed options of a Drive-by-Wire throttle body to replace the current, old design using the Jordan.
- R. Slocum (Lz) found an off the shelf card that controls a drive-by-wire throttle body but no progress yet.
- Updates?

TMC 113 Dropout / New Discrimination Oil Development

August 2017 meeting:

- ▲ Additive dropout was found in latest QC testing
- ▲ Gear oil drums are mixed prior to shipment. Homogenization may be limiting the impact that this has on the performance of the oil.

November 2017 meeting:

- ▲ Not possible to make new drum of TMC 113
 - 52 USG remaining – 104 tests worth
- ▲ Afton and Lubrizol to research possible new discrimination oils

May 2018 meeting:

- ▲ Lubrizol has direction towards potential new discrimination oil
- ▲ The SP clarified that the new oil needs to consistently have double the scoring of the current passing oil

August 2018 meeting:

- ▲ Lubrizol to blend 55 USG drum and send to TMC
- ▲ Each lab will run this oil on a currently referenced test stand and report results

November 2018 meeting:

- ▲ A drum of oil was sent to the TMC the week of 11/5/18
- ▲ D. Beck will let E. Donovan know when the oil is ready to be shipped to labs

TMC 113 Dropout / New Discrimination Oil Development

February 2019 meeting:

- ▲ Acceptance testing for TMC 119
 - 1 test on a currently referenced test stand per lab. Run as 2nd discrimination run in 4 test calibration sequence or any time during a reference period

May 2019 meeting:

- ▲ Updates on TMC 119 runs from each lab
 - Lab D – EOT pinion 95, EOT ring 77
 - Lab G – EOT pinion 48, EOT ring 43
 - Lab B – EOT pinion 38, EOT ring 25; EOT pinion 62, EOT ring 47
 - Lab A – EOT pinion 58, EOT ring 51
 - 35 USG of TMC 113 remain at the TMC

August 2019 meeting:

- ▲ Labs A, D, G agreed to run 1 more test with TMC 119

November 2019 meeting:

- ▲ Results of additional TMC 119 test:
 - Lab D: EOT pinion 75, EOT ring 50
 - Lab A: EOT pinion 68, EOT ring 59
 - Lab G: ?
- ▲ 32 USG of TMC 113 remain at the TMC

TMC 119 Test Results: February 2020

testkey	ltmslab	ltmsapp	strun	ltmsdate	ind	pinbat	ringbat	rinit	ecsprate	ecsrrate	
142245-L42	G		0356		119	C1L925	P8AD078X	JMR	73	52	
142244-L42	G	1	0333	20190730	119	C1L925	P8AD078X	JMR	48	43	
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									Range	57	52
									Avg	65	51
									STD DEV P	16.39	13.67
									STD DEV S	17.52	14.62

📈 Lab G 2nd Repeat Results:

- ▲ EOT Pinion Scoring: 73
- ▲ EOT Ring Scoring: 52

📈 Hardware batch variation?

📈 How much TMC 113 remaining?

📈 How should we proceed?

New Discrimination Oil, Second Candidate

- Afton has also developed a candidate for a new discrimination oil
- If results of TMC 119 are not acceptable to the SP, Afton can and would supply a new oil
- 3 tests run @Afton with current hardware batch (C1L446/P8AD132):

Test	EOT Pinion Scoring	EOT Ring Scoring
2217	43	33
2225	47	40
2232	65	55
Max	65	55
Min	43	33
Range	22	22
Avg	52	43
STD DEV P	9.57	9.18
STD DEV S	11.72	11.24

 Thoughts?



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New Issues



Thanks!



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