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Committee D02 on PETROLEUM PRODUCTS AND LUBRICANTS

January 18, 2005

Reply to:
Donald T. Bartlett
The Lubrizol Corporation
29400 Lakeland Blvd.
Wickliffe, OH 44092
(440) 347-2388
(440) 347-2878 (FAX)

ASTM D02.B0.03 L-37 Surveillance Panel
Members and Guests:

Attached for your review and comment are the unconfirmed minutes of the January 4th, 2006 L-37 Surveillance Panel Teleconference Meeting. Please direct any corrections or comments to my attention.

Sincerely,

Donald T. Bartlett

Donald T. Bartlett, Chairman
L-37 Surveillance Panel
Attachments

Report of Conference Call
L-37 Surveillance Panel
January 4, 2006, 2:00 EST

The teleconference meeting was brought to order at 2:00 p.m. EST.

I. **Attendees:**

ASTM TMC:	Don Lind	Ethyl Corp:	Cory Koglin
Ethyl Corp:	Kevin Layton	Ethyl Corp:	Robert Burrows
Lubrizol Corp:	Don Bartlett	Lubrizol Corp:	Chris Schenkenberger
Lubrizol Corp:	Jerry Gropp	SwRI:	Brian Koehler
Exxon/Mobil:	Bill Sullivan	DA Stuart:	Paula Vettel
Lubrizol:	Denise Vermilya		

II. **Agenda:**

- Update on trip to the Dana Ft. Wayne facility by the Hardware TF November 29, 2005.
- Update on trip to the Dana Lugoff facility by the Hardware TF December 8, 2005.
- Revalidate the previously approved 44-test non-hardware matrix by the panel.
- TMC 151-3 Reference oil supply update.
- Review the information from the SP request for 7-teeth rating completed by the GRTF.
- Confirmation of need for a lubrited hardware order in 2006.
- T758A/L247lubrited testing update by Exxon/Mobil work/concern.

III. **Summary of Panel Discussion, Consensus Actions, and Motions:**

2005 Non-lubrited hardware P4L792/VL417 discussion:

The chairman provided a summary recap of the two hardware TF visits to the Dana, Ft. Wayne and Lugoff facilities in November and December. Hardware task force minutes documenting the November and December facility visits will be released to the TMC website.

There was an approximate 5 percent shortage of actual hardware produced due to processes within Dana. During the Lugoff facility visit, the labs agreed/instructed Dana to ship/distribute axles on a percentage of axles that the labs actually ordered. The final count of hardware actually produced and shipped is as follows:

Action Item from August 24 meeting - 7-tooth Pinion Rating Analysis:

The specific pinions used in this rating experiment were taken from the L-37 Rater Calibration Monitoring System (L-37 RCMS). The summary is of 6 pinions and high volume raters rating all 7-pinion teeth (there are 42 ratings on a given tooth).

The initial summary did not include the LTMS distress target and the TMC was asked to add that to the summary and redistribute. ***Attachment # 3*** is the corrected summary provided by the TMC. The LTMS Target represents the consensus rating of a respective pinion tooth that was initially established by the raters for each distress. The LTMS target tooth is represented as tooth # 1 for all 6 gears in the date for this study.

The desired goal was to determine if we get a better read of the "true" distress and at the same time bring all the raters together. This is desirable because the rating precision is not where The panel believes or desires it to be.

General comments:

- Three raters never saw a difference from tooth to tooth accept for spitting distress.
- Rater G saw a difference on four of the six pinions.
- No surprise with the pitting/spalling differences varying from tooth to tooth.
- Did all the raters rate the teeth with the same clarification/intent in mind?

The group was asked to review the data for future discussion.

Mr. Sullivan Discussion on Lubrited Gear Batch T758A/L247:

Mr. Sullivan shared data suggesting lubrited gear batch T758A/L247 is showing itself to be specifically problematic to synthetic fluids. This is true even for what could be called the industry's best synthetic fluid on the market today; an OEM approved SAE 75W-140. ***Attachment # 4*** details three standard L-37 tests on that fluid that have been conducted at PARC. Mr. Sullivan's proposal is to run some TMC 152/153 tests as a first step towards better defining this problem.

Chairman's note: *If you recall, the panel chose to only qualify this batch on TMC 128 and 153-1 because it was a somewhat smaller industry batch order. The batch is currently approved for standard testing only. We are currently in the process (Phase 6) of running some low temperature tests on TMC 152 and 153. Two labs have completed their commitment of 6 tests and one lab has one more test to conduct. The panel is to review and discuss options for possible correction factors.*

2006 Lubrited Axle Order:

A consensus of the labs was that there is a definite desire/need to place a hardware order in the 1st quarter of 2008. The labs were asked to bring an initial projection of lubrited hardware needs to the February 8th panel meeting.

Action Item 2: The chairman will send a letter to Mr. Kreinbring requesting that Dana prepare a lubrited axle quote for further review at the February meeting. We are estimating 800 to 1400 axles needed. Chairman note after this meeting, See ***Attachment 2.***

After review and discussion at the February panel meeting, the labs are required to tender binding PO's by March 1st. We anticipate possibly 6-9 months for delivery once binding PO's are issued.

TMC 151-3 Reference oil Supply:

TMC 151-3 is a category reference oil used in L-33-1, L-37, and Cyclic Durability reference approvals. The low supply of oil for testing is of great concern. The TMC reports that in September 2004 they had 150 gallons in inventory. In June 2005, they had 80 gallons. In January 2006 they have 20 gallons.

Current inventory in the labs was reviewed and determined to be at least acceptable for 2006.

TMC reported that the re-blend of TMC 151-3 was different in that the base stocks were no longer available and a different base stock was used. TMC has decided to identify the new category reference oil as TMC 155.

Action Item 3: At the February panel meeting, the Panel must define a matrix to develop targets for TMC 155 (Re-blend of TMC 151-3) for use in L-33-1, L-37, and Cyclic Durability approvals at the February 2006 panel meeting.

Action Item 4: ASTM meetings will be Tuesday, February 7th (starting at 1:00 p. m.) and Wednesday, February 8th, (starting at 8:00 a.m.). Mr. Sullivan will co-ordinate with PRI and the respective panel chairs for L-33-1, L-37, L-44/L-42-1, L-60-1, Cyclic, and OST meeting times to address pertinent issues.

	Ordered	Shipped
Afton	450	427
Lubrizol	400	380
Parc	220	209
SwRI	300	286
Total	1470	1302

The 44-test matrix originally approved by the panel was re-validated with no change and a timeline for completion. See ***Attachment # 1.***

The axles were serialized (a unique GUSA number on a sticker placed on each axle cover) and axle assembly/palletization for shipping was alternated (1 to each lab using a 4-lab pallet rotation and alternated for the full axle build out). The labs were directed to:

- Randomly pull 1 axle for the 44-test hardware approval matrix from different pallets shipped/received at each lab. This will provide a representative evaluation of the entire axle batch.
- Pull axles from the top rows.
- Axles pulled throughout the received lot should be representative to the ranges for break/turns and backlash recordings provided/painted on the axle housing.
- The majority of the axles were produced to have a contact pattern of L2FO which is also painted on the housing. There will be some/few F+1 and F-1 values interspersed as well.

The labs agreed to:

- Complete their commitment for the first test on TMC 127 in the time frame of **January 8 through January 20th**. Upon completion of the four tests, Mr. Lind will notify the chairman and an immediate Panel teleconference call will be convened to review the data on the four tests.
- If the TMC 127 results are deemed acceptable, the labs agreed to complete their commitment for the first test on TMC 151-3 in time for the panel to review all data on both oils at the **February 2006** SP meeting in Warrendale, PA.
- At the February panel meeting we will determine if the remaining approval matrix can commence. The four labs agreed that an acceptable timeline for completion of the remaining 9 tests in each of the labs would be to target April 1st. 2006. The chairman will call a meeting to review the data within the first two weeks of April.

Action Item 1: Mr. Bartlett was tasked to research past L-37 minutes to document the changes in hardware metallurgy, production, carrier machining, heat treating, etc. Mr. Lind will update the current TMC website hardware document so that we have all the details from the respective hardware batch codes documented in one place for future reference

Other comments:

- Mr. Sullivan requested that the one lab complete the one remaining low temperature test in time for the TMC to put the data together for discussion and review at the February Panel meeting.

- Mr. Sullivan requested permission to ask the TMC to assign a couple of oils for the PARC lab to run further L-37 standard tests on lubrited gear batch T758A/L247.

- Several questioned/commented that maybe this was an interaction to the luberizing process.

- Mr. Gropp commented that if anyone wants to run some testing on any of the reference oils, let them do it. The data must/will be reported to the TMC so the data would be shared and available for review. He also commented that TMC 152 and 153 are OEM oils and , by definition, have acceptable field performance and should pass the L-37 test most of the time.

The Mr. Follis comment about correction factors is included as ***Attachment # 5***.

The teleconference meeting was adjourned on a motion by Mr. Lind/second by Mr Koglin at 3:58 p.m.

Respectfully submitted,

Donald T. Bartlett,
L-37 Surveillance Panel Chairman

2005 Non-Lubrited Hardware Order and Status

Each of the 4 labs will equally participate in a 44-test matrix to evaluate the 2005 non-lubrited hardware batch.

- 4-test on TMC 127 (standard)
  - TMC will assign each lab one test on TMC 127 and stop to review results (to insure that this oil has performed as expected). Targeted completion date is TBD. → JAN 8 → ~~JAN~~ 20
- 8-tests on TMC 151-3 (standard)
  - TMC will assign each lab one test on TMC 151-3 and stop to review results (to insure that this oil has performed as expected). Targeted completion date is TBD. → By Feb 4.
- 8-tests on TMC 152 (standard)
- 8-tests on TMC 153 (standard)
- 8-tests on TMC 152 (Canadian)
- 8-tests on TMC 153 (Canadian)

Attachment 5 of August 2005 SP Meeting Minutes
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Reference L-37

Attachment 1
Page 1 of 1
Reference L-37

Bartlett, Donald

From: Bartlett, Donald
Sent: Thursday, January 05, 2006 5:40 AM
To: don.kreinbring@dana.com
Cc: Koglin, Cory; bkoehler@swri.edu; Dale Smith CBW-Pittsburgh PARC; dml@astmtmc.cmu.edu; william.t.sullivan@exxonmobil.com; Gropp, Jerrold; Schenkenberger, Chris; Kampe, Peter; Bartlett, Donald
Subject: Next Industry Lubrited Hardware Order.

Don

FYI update:

We had our L-37 teleconference call yesterday and are proceeding into the approval matrix for the just received non-lubrited hardware. We appreciate all the quick work this last month or so to get us to this point.

Another outcome of our panel teleconference is to let Dana know that we are preparing to place an industry LUBRITED hardware order sometime the end of February/March timeframe.

Can you start the process with the respective people within Dana to work up a formal quote. Best guess at this time would be 800-1400 axles. The general feeling is that we would like to move thourgh production and assembly pretty quick, but we presume procuring the steel, again, is the driver?

Your quote, delievery timing, and actual amouts to be ordered will initially be discussed at our February 8th panel meeting in Warrendale, PA with follow up binding PO's some time in March. We also request that you consider attending this meeting as we will have more information/results on the matrix that is also moving forward. It would be a good meeting for you to consider attending to add input as well.

I will call you next week. Have a great weekend.

Best regards,

Donald T. Bartlett
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Attachment 2
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Reference L-37

Rater Calibration LTMS Targets were established by rating tooth number 1 only

Pinion #	Rater #	Distress	Tooth Number							MIN	MAX	AVG	STD	LTMS Target
			1	2	3	4	5	6	7					
1	A	Wear	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	5.9
1	A	Ridg	5	5	5	5	5	5	5	5.0	5.0	5.00	0.000	5.4
1	A	Ripp	8	8	8	8	8	8	8	8.0	8.0	8.00	0.000	7.8
1	A	Spit	9.9	9.9	9.9	9.3	9.5	9	9.4	9.0	9.9	9.56	0.355	9.91
1	B	Wear	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	
1	B	Ridg	5	5	5	5	5	5	5	5.0	5.0	5.00	0.000	
1	B	Ripp	8	8	8	8	8	8	8	8.0	8.0	8.00	0.000	
1	B	Spit	9.9	9.9	9.8	8.0	9.5	8	9.7	8.0	9.9	9.26	0.870	
1	C	Wear	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	
1	C	Ridg	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	
1	C	Ripp	8	8	8	8	8	8	8	8.0	8.0	8.00	0.000	
1	C	Spit	10	9.9	9.8	8	9.3	8	9.5	8.0	10.0	9.21	0.863	
1	D	Wear	5	5	5	5	5	5	5	5.0	5.0	5.00	0.000	
1	D	Ridg	5	5	5	5	5	5	5	5.0	5.0	5.00	0.000	
1	D	Ripp	7	7	7	7	7	7	7	7.0	7.0	7.00	0.000	
1	D	Spit	9.9	9.9	9.8	8	9	8	9	8.0	9.9	9.09	0.838	
1	E	Wear	5	5	4	5	5	5	5	4.0	5.0	4.86	0.378	
1	E	Ridg	5	5	5	5	5	5	5	5.0	5.0	5.00	0.000	
1	E	Ripp	7	7	7	7	7	7	7	7.0	7.0	7.00	0.000	
1	E	Spit	9.9	9.8	9.8	8	9	8	9	8.0	9.9	9.07	0.822	
1	F	Wear	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	
1	F	Ridg	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	
1	F	Ripp	8	8	8	8	8	8	8	8.0	8.0	8.00	0.000	
1	F	Spit	9.9	9.9	9.9	9.5	9.6	9	9.6	9.0	9.9	9.63	0.325	
1	G	Wear	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	
1	G	Ridg	6	5	5	5	5	6	6	5.0	6.0	5.43	0.535	
1	G	Ripp	8	8	8	8	8	8	8	8.0	8.0	8.00	0.000	
1	G	Spit	9.9	9.9	9.8	9	9.5	8	9.7	8.0	9.9	9.40	0.693	
1	H	Wear	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	
1	H	Ridg	5	5	5	5	5	5	5	5.0	5.0	5.00	0.000	
1	H	Ripp	7	7	7	7	7	7	7	7.0	7.0	7.00	0.000	
1	H	Spit	9.9	9.9	9.8	9.4	9.5	9	9.7	9.0	9.9	9.60	0.327	

NOTE: TOOTH #1 IN ALL CASES IS THE L-37 RCMS TOOTH USED FOR LTMS TARGETS.

Attachment 3
Page 1 of 6
Reference L-37

Pinion #	Rater #	Distress	Tooth Number							MIN	MAX	AVG	STD	LTMS Target
			1	2	3	4	5	6	7					
6	A	Wear	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	6.2
6	A	Ridg	7	7	7	7	7	7	7	7.0	7.0	7.00	0.000	6.1
6	A	Ripp	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	7.1
6	A	Spit	9.9	8	9.4	9.4	9.3	9	9.6	8.0	9.9	9.23	0.607	9.91
6	B	Wear	6	6	6	6	5	6	6	5.0	6.0	5.86	0.378	
6	B	Ridg	7	7	7	7	7	7	7	7.0	7.0	7.00	0.000	
6	B	Ripp	7	8	7	8	8	8	7	7.0	8.0	7.57	0.535	
6	B	Spit	9.9	8.0	9.6	9.0	9.0	9.4	9.7	8.0	9.9	9.23	0.640	
6	C	Wear	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	
6	C	Ridg	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	
6	C	Ripp	7	7	7	7	7	7	7	7.0	7.0	7.00	0.000	
6	C	Spit	10	9	9.6	9.7	9.5	9	9.5	9.0	10.0	9.47	0.364	
6	D	Wear	5	5	5	5	5	5	5	5.0	5.0	5.00	0.000	
6	D	Ridg	5	5	5	5	5	5	5	5.0	5.0	5.00	0.000	
6	D	Ripp	7	7	7	7	7	7	7	7.0	7.0	7.00	0.000	
6	D	Spit	9.9	8	8	9.4	9.4	9	9.5	8.0	9.9	9.03	0.750	
6	E	Wear	5	5	5	5	5	5	5	5.0	5.0	5.00	0.000	
6	E	Ridg	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	
6	E	Ripp	6	7	7	6	7	7	7	6.0	7.0	6.71	0.488	
6	E	Spit	9.9	8	9	9.3	9.3	8	9.3	8.0	9.9	8.97	0.716	
6	F	Wear	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	
6	F	Ridg	7	7	6	7	6	6	7	6.0	7.0	6.57	0.535	
6	F	Ripp	7	7	7	7	7	7	7	7.0	7.0	7.00	0.000	
6	F	Spit	9.9	8	9.6	9.5	9.5	9	9.6	8.0	9.9	9.30	0.632	
6	G	Wear	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	
6	G	Ridg	6	5	5	5	6	5	6	5.0	6.0	5.43	0.535	
6	G	Ripp	7	8	7	8	8	8	8	7.0	8.0	7.71	0.488	
6	G	Spit	9.9	8	9.4	9	9.3	9	9.3	8.0	9.9	9.13	0.582	
6	H	Wear	6	5	6	5	5	5	5	5.0	6.0	5.29	0.488	
6	H	Ridg	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	
6	H	Ripp	7	7	7	7	7	7	7	7.0	7.0	7.00	0.000	
6	H	Spit	9.9	9.6	9.8	9.7	9.5	9.3	9.8	9.3	9.9	9.66	0.207	

Attachment 3
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Reference L-37

Pinion #	Rater #	Distress	Tooth Number							MIN	MAX	AVG	STD	LTMS Target
			1	2	3	4	5	6	7					
7	A	Wear	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	7.8
7	A	Ridg	9	9	9	9	9	9	9	9.0	9.0	9.00	0.000	9.2
7	A	Ripp	9	9	9	9	9	9	9	9.0	9.0	9.00	0.000	8.6
7	A	Spit	9.9	9.8	9.9	9.9	9.9	9.8	9.9	9.8	9.9	9.87	0.049	9.87
7	B	Wear	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	
7	B	Ridg	9	9	9	9	9	9	9	9.0	9.0	9.00	0.000	
7	B	Ripp	9	9	9	9	9	9	9	9.0	9.0	9.00	0.000	
7	B	Spit	9.9	9.9	9.9	9.8	9.9	9.8	9.9	9.8	9.9	9.87	0.049	
7	C	Wear	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	
7	C	Ridg	9	9	9	9	9	9	9	9.0	9.0	9.00	0.000	
7	C	Ripp	9	9	9	9	9	9	9	9.0	9.0	9.00	0.000	
7	C	Spit	9.9	9.8	9.9	9.9	9.9	9.8	9.9	9.8	9.9	9.87	0.049	
7	D	Wear	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	
7	D	Ridg	9	9	9	9	9	9	9	9.0	9.0	9.00	0.000	
7	D	Ripp	10	10	10	10	10	10	10	10.0	10.0	10.00	0.000	
7	D	Spit	9.9	9.8	9.8	9.8	9.9	9.8	9.9	9.8	9.9	9.84	0.053	
7	E	Wear	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	
7	E	Ridg	9	9	9	9	9	9	9	9.0	9.0	9.00	0.000	
7	E	Ripp	9	9	9	9	9	9	9	9.0	9.0	9.00	0.000	
7	E	Spit	9.9	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.9	9.81	0.038	
7	F	Wear	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	
7	F	Ridg	9	9	9	9	9	9	9	9.0	9.0	9.00	0.000	
7	F	Ripp	8	8	8	8	8	8	8	8.0	8.0	8.00	0.000	
7	F	Spit	9.9	9.8	9.9	9.8	9.8	9.8	9.9	9.8	9.9	9.84	0.053	
7	G	Wear	7	6	6	6	6	6	6	6.0	7.0	6.14	0.378	
7	G	Ridg	9	9	9	9	9	9	9	9.0	9.0	9.00	0.000	
7	G	Ripp	9	9	9	9	9	9	9	9.0	9.0	9.00	0.000	
7	G	Spit	9.9	9.8	9.9	9.8	9.8	9.8	9.9	9.8	9.9	9.84	0.053	
7	H	Wear	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	
7	H	Ridg	9	8	8	9	8	8	8	8.0	9.0	8.29	0.488	
7	H	Ripp	8	8	8	8	8	8	8	8.0	8.0	8.00	0.000	
7	H	Spit	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.90	0.000	

Attachment 3
Page 3 of 6
Reference L-37

Pinion #	Rater #	Distress	Tooth Number							MIN	MAX	AVG	STD	LTMS Target
			1	2	3	4	5	6	7					
8	A	Wear	7	7	7	7	7	7	7	7.0	7.0	7.00	0.000	7.7
8	A	Ridg	9	9	9	9	9	9	9	9.0	9.0	9.00	0.000	7.9
8	A	Ripp	7	7	7	7	7	7	7	7.0	7.0	7.00	0.000	7.6
8	A	Spit	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.90	0.000	9.91
8	B	Wear	7	7	7	7	7	7	7	7.0	7.0	7.00	0.000	
8	B	Ridg	8	8	8	8	8	8	8	8.0	8.0	8.00	0.000	
8	B	Ripp	8	7	7	7	7	7	7	7.0	8.0	7.14	0.378	
8	B	Spit	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.90	0.000	
8	C	Wear	7	7	7	7	7	7	7	7.0	7.0	7.00	0.000	
8	C	Ridg	8	8	8	8	8	8	8	8.0	8.0	8.00	0.000	
8	C	Ripp	8	8	8	8	8	8	8	8.0	8.0	8.00	0.000	
8	C	Spit	9.9	9.9	9.9	9.9	9.9	9.9	9.8	9.8	9.9	9.89	0.038	
8	D	Wear	7	7	7	7	7	7	7	7.0	7.0	7.00	0.000	
8	D	Ridg	8	8	8	8	8	8	8	8.0	8.0	8.00	0.000	
8	D	Ripp	8	8	8	8	8	8	8	8.0	8.0	8.00	0.000	
8	D	Spit	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.90	0.000	
8	E	Wear	7	7	7	7	7	7	7	7.0	7.0	7.00	0.000	
8	E	Ridg	8	8	8	8	8	8	8	8.0	8.0	8.00	0.000	
8	E	Ripp	8	8	8	8	8	8	8	8.0	8.0	8.00	0.000	
8	E	Spit	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.90	0.000	
8	F	Wear	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	
8	F	Ridg	8	8	8	8	8	8	8	8.0	8.0	8.00	0.000	
8	F	Ripp	7	7	7	7	7	7	7	7.0	7.0	7.00	0.000	
8	F	Spit	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.90	0.000	
8	G	Wear	8	7	7	8	8	8	8	7.0	8.0	7.71	0.488	
8	G	Ridg	7	7	7	7	7	7	7	7.0	7.0	7.00	0.000	
8	G	Ripp	8	8	8	8	8	7	7	7.0	8.0	7.71	0.488	
8	G	Spit	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.90	0.000	
8	H	Wear	7	7	7	7	7	7	7	7.0	7.0	7.00	0.000	
8	H	Ridg	7	7	7	7	7	7	7	7.0	7.0	7.00	0.000	
8	H	Ripp	7	7	7	7	7	7	7	7.0	7.0	7.00	0.000	
8	H	Spit	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.90	0.000	

Attachment 3
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Reference L-37

Pinion #	Rater #	Distress	Tooth Number							MIN	MAX	AVG	STD	LTMS Target
			1	2	3	4	5	6	7					
34	A	Wear	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	6.3
34	A	Ridg	9	9	9	9	9	9	9	9.0	9.0	9.00	0.000	8.0
34	A	Ripp	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	6.7
34	A	Spit	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.90	0.000	9.93
34	B	Wear	6	6	6	7	7	7	7	6.0	7.0	6.57	0.535	
34	B	Ridg	8	8	8	8	8	8	8	8.0	8.0	8.00	0.000	
34	B	Ripp	7	7	7	7	7	7	7	7.0	7.0	7.00	0.000	
34	B	Spit	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.90	0.000	
34	C	Wear	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	
34	C	Ridg	7	7	7	7	7	7	7	7.0	7.0	7.00	0.000	
34	C	Ripp	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	
34	C	Spit	10	10	9.9	9.9	10	10	10	9.9	10.0	9.97	0.049	
34	D	Wear	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	
34	D	Ridg	8	8	8	8	8	8	8	8.0	8.0	8.00	0.000	
34	D	Ripp	7	7	7	7	7	7	7	7.0	7.0	7.00	0.000	
34	D	Spit	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.90	0.000	
34	E	Wear	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	
34	E	Ridg	8	8	8	8	8	8	8	8.0	8.0	8.00	0.000	
34	E	Ripp	7	7	7	7	7	7	7	7.0	7.0	7.00	0.000	
34	E	Spit	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.90	0.000	
34	F	Wear	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	
34	F	Ridg	9	8	9	8	8	9	9	8.0	9.0	8.57	0.535	
34	F	Ripp	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	
34	F	Spit	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.90	0.000	
34	G	Wear	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	
34	G	Ridg	7	7	7	7	7	7	7	7.0	7.0	7.00	0.000	
34	G	Ripp	7	7	7	7	7	7	7	7.0	7.0	7.00	0.000	
34	G	Spit	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.90	0.000	
34	H	Wear	7	7	7	7	7	7	7	7.0	7.0	7.00	0.000	
34	H	Ridg	7	7	7	7	7	7	7	7.0	7.0	7.00	0.000	
34	H	Ripp	7	7	7	7	7	7	7	7.0	7.0	7.00	0.000	
34	H	Spit	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.90	0.000	

Attachment 3
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Reference L-37

Pinion #	Rater #	Distress	Tooth Number							MIN	MAX	AVG	STD	LTMS Target
			1	2	3	4	5	6	7					
42	A	Wear	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	6
42	A	Ridg	9	9	9	9	9	9	9	9.0	9.0	9.00	0.000	8.8
42	A	Ripp	7	7	7	7	7	7	7	7.0	7.0	7.00	0.000	6.8
42	A	Spit	9.8	9.3	9.9	9.3	9.9	9.8	9.7	9.3	9.9	9.67	0.263	9.8
42	B	Wear	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	
42	B	Ridg	9	9	9	9	9	9	9	9.0	9.0	9.00	0.000	
42	B	Ripp	7	7	7	7	7	7	7	7.0	7.0	7.00	0.000	
42	B	Spit	9.6	9.4	9.6	9.0	9.7	9.7	9.6	9.0	9.7	9.51	0.248	
42	C	Wear	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	
42	C	Ridg	9	9	9	9	9	9	9	9.0	9.0	9.00	0.000	
42	C	Ripp	7	7	7	7	7	7	7	7.0	7.0	7.00	0.000	
42	C	Spit	9.8	9.6	9.7	9	9.6	9.6	9.7	9.0	9.8	9.57	0.263	
42	D	Wear	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	
42	D	Ridg	9	9	9	9	9	9	9	9.0	9.0	9.00	0.000	
42	D	Ripp	8	8	8	8	8	8	8	8.0	8.0	8.00	0.000	
42	D	Spit	9.9	9.5	9.8	9.4	9.8	9.9	9.8	9.4	9.9	9.73	0.198	
42	E	Wear	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	
42	E	Ridg	9	9	9	9	9	9	9	9.0	9.0	9.00	0.000	
42	E	Ripp	7	7	7	7	7	7	7	7.0	7.0	7.00	0.000	
42	E	Spit	9.9	9.5	9.8	9.3	9.8	9.8	9.8	9.3	9.9	9.70	0.216	
42	F	Wear	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	
42	F	Ridg	9	9	9	9	9	9	9	9.0	9.0	9.00	0.000	
42	F	Ripp	7	7	7	7	7	7	7	7.0	7.0	7.00	0.000	
42	F	Spit	9.8	9.4	9.9	9.3	9.7	9.8	9.8	9.3	9.9	9.67	0.229	
42	G	Wear	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	
42	G	Ridg	9	9	9	9	9	9	9	9.0	9.0	9.00	0.000	
42	G	Ripp	8	8	8	8	8	8	8	8.0	8.0	8.00	0.000	
42	G	Spit	9.9	9.7	9.7	9.3	9.8	9.8	9.8	9.3	9.9	9.71	0.195	
42	H	Wear	5	5	5	5	5	5	5	5.0	5.0	5.00	0.000	
42	H	Ridg	8	8	8	8	8	8	8	8.0	8.0	8.00	0.000	
42	H	Ripp	6	6	6	6	6	6	6	6.0	6.0	6.00	0.000	
42	H	Spit	9.9	9.6	9.5	9.3	9.9	9.6	9.8	9.3	9.9	9.66	0.223	

Attachment 3
Page 4 of 6
Reference 1-37

Bartlett, Donald

From: william.t.sullivan@exxonmobil.com
Sent: Wednesday, January 04, 2006 8:02 AM
To: Bartlett, Donald
Cc: bkoehler@swri.edu; Bruce.McGlone@ArvinMeritor.com; Castanien, Chris; claire.whitton@aftonchemical.com; Comforta@tacom.army.mil; Koglin, Cory; Schenkenberger, Chris; Dhartej@aam.com; dml@astmtmc.cmu.edu; don.bell@aftonchemical.com; don.kreinbring@dana.com; Vermilya, Denise; dsmith@parctech.com; Bartlett, Donald; Akucewich, Edward; fmf@astmtmc.cmu.edu; greg.fett@dana.com; hchamber@visteon.com; Hector De La Fuente (E-mail); HURO@chevrontexaco.com; jabu@chevrontexaco.com; james.l.linden@gm.com; jaza@chevrontexaco.com; Gropp, Jerrold; Kenny.miller@dana.com; kevin.layton@aftonchemical.com; kpurnell@sae.org; Mike Follis (E-mail); pvettel@dastuart.net; Robert Burrow@aftonchemical.com; thelmaemarougy@eaton.com; thomas.bryson@volvo.com; Tom Boschert (Tom.boshert@aftconchemical.com)
Subject: Re: FW: L-37 Update of action items and planned teleconference call for Wednesday, January 4, 2006

Attachments: rpt qry tbll37fluid rtonly TC118.rtf; Rate_All_Teeth.xls; NonLubHardwareMatrix.doc


rpt qry tbll37fluid rtonly TC1...


Rate_All_Teeth.xls


NonLubHardwareMatrix.doc

Don,

As mentioned, I would also like to discuss gear batch L247 : T758A. This batch is showing itself to be specifically problematic to synthetic fluids.
This is true even for what could be called the industry's best synthetic fluid on the market today: an OEM approved SAE 75W-140 The attached RTF file shows 3 standard L-37 tests on that fluid that have been run at PARC.

(See attached file: rpt qry tbll37fluid rtonly TC118.rtf)

My proposal on the table is to run some TMC 152/153 tests as a first step towards better defining this problem. note that my fear is that we are remiss if we don't start including at least one of these oils in the RT matrix also in the future.

Regards,

Bill S
ExxonMobil Chemical Company
Synthetics Division
Tel: 732.321.3354 Fax: 732.321.6064
E-Mail: william.t.sullivan@exxonmobil.com

Attachment 4
Page 1 of 2
Reference L-37

"Bartlett, Donald" <DTB@Lubrizol.com>
01/03/06 04:20 PM

To "Bartlett, Donald" <DTB@Lubrizol.com>, <bkoehler@swri.edu>, <Bruce.McGlone@ArvinMeritor.com>, <Comforta@tacom.army.mil>, <dsmith@parctech.com>, <Dhartej@aam.com>, <dml@astmtmc.cmu.edu>, <don.kreinbring@dana.com>, <james.l.linden@gm.com>,

rpt qry tbll37fluid rtonly GC118

ASTM L-37 RT

Lubrited Gear Heat Code: L247 : T758A L

75W-140 OEM (at least 2) factory fill oil.

Merit

				All Pinion		Ring Ratings				Pinion Ratings				
Test#	Sup	Date	Hrs#	M-A	M-P	RIG	RIP	SPI	W	RIG	RIP	SPI	W	**Evaluation**
P-2005.000255	108	12/14/05	25.7	7.5	5.8	9.0	9.0	9.9	7.0	(7.0)	8.0	(2.0)	6.0	Fail
P-2005.000246	108	12/7/05	25.7	7.3	5.8	8.0	9.0	9.9	6.0	(7.0)	8.0	(2.0)	5.0	Fail
P-2005.000242	108	12/1/05	25.7	8.8	8.4	9.0	9.0	9.9	7.0	8.0	8.0	9.4	6.0	Pass
Averages														
			25.7	7.9	6.7	8.7	9.0	9.9	6.7	7.3	8.0	4.5	5.7	

Attachment 4
Page 2 of 2
Reference L-37

Bartlett, Donald

From: Mike.Follis@dana.com

Sent: Wednesday, January 04, 2006 10:45 AM

To: william.t.sullivan@exxonmobil.com

Cc: bkoehler@swri.edu; Bruce.McGlone@ArvinMeritor.com; Castanien, Chris; claire.whitton@aftonchemical.com; Comforta@tacom.army.mil; Koglin, Cory; Schenkenberger, Chris; Dhartej@aam.com; dml@astmtmc.cmu.edu; don.bell@aftonchemical.com; don.kreinbring@dana.com; Vermilya, Denise; dsmith@parctech.com; Bartlett, Donald; Akucewich, Edward; fmf@astmtmc.cmu.edu; greg.fett@dana.com; hchamber@visteon.com; Hector De La Fuente (E-mail); HURO@chevrontexaco.com; jabu@chevrontexaco.com; james.l.linden@gm.com; jaza@chevrontexaco.com; Gropp, Jerrold; Kenny.miller@dana.com; kevin.layton@aftonchemical.com; kpurnell@sae.org; pvettel@dastuart.net; Robert Burrow@aftonchemical.com; thelmaemarougy@eaton.com; thomas.bryson@volvo.com; Tom Boschert (Tom.boshert@aftconchemical.com)

Subject: Re: FW: L-37 Update of action items and planned teleconference call for Wednesday, January 4, 2006

Attachments: rpt qry tbll37fluid rtonly TC118.rtf; Rate_All_Teeth.xls; NonLubHardwareMatrix.doc; ATT129940.txt

Bill,

Please note that I do not want to have significant correction factors for a batch of gears like the current luberized V1L686/P4L626A code for ridging and the V1L303/P4L514A for pitting and spalling. If it is a gear geometry or phosphate coating problem we need to define it and work to eliminate it. If it is due to different types of lubricant chemistry then that also needs to be defined and understood.

Regards,

Michael Follis
Materials Engineer - Product Integrity
Dana - Automotive Systems Group
Torque - Traction Technologies, Inc.
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Maumee, Ohio 43537
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