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## Committee D02 on PETROLEUM PRODUCTS AND LUBRICANTS

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Reply to:

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ASTM D02.B0.03 L-37 Surveillance Panel

Members and Guests:

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

- o **July 3, 2007 L-37 Surveillance Panel Teleconference Meeting**

Please direct any corrections or comments to my attention.

Sincerely,

Donald T. Bartlett, Chairman

L-37 Surveillance Panel

Attachments

**Report of Meeting**  
**L-37 Surveillance Panel Teleconference Call**  
**July 3, 2007 1:00 pm EDT**

**I. Attendees:**

ASTM TMC:	Don Lind	Afton Chemical:	Cory Koglin
Lubrizol Corp:	Don Bartlett	Lubrizol Corp:	Jerry Gropp
Dana Corp:	Don Kreinbring	SwRI:	Brian Koehler
Intertek-Parc:	Dale Smith	Dana Corp:	Joe Guzikowski
Dana Corp:	Kenny Miller	Dana Corp:	Steve Bird
Lubrizol Corp:	Chris Prengaman	Dana Corp:	Greg Fett
Dana Corp:	Joe Guzikowski	Meritor Automotive:	Bruce McGlone
Afton Chemical:	Jeff Guevremont	Lubrizol Corp:	Allison Podboy

**II. Agenda:**

- Action Items from the June 27 Panel meeting at the Dana Facility, Maumee, Ohio.
- What are the next steps and options that we have with the B6L566 lubrited hardware?
- Mr. Miller action item from July meeting: Pinion inner bearing interference and stretch size/press question.

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

**Action Item Review:** At the June 27<sup>th</sup> Panel meeting, Mr. Fett took Lubrizol sets CMIR 058195 (Set # 2) and CMIR 058292 (Set # 5) to perform metallurgical analysis. He will look at material, heat-treating and Lubriting differences and report back to the panel.

With respect to this action item, Mr. Fett commented:

1. A metallurgical analysis was completed on set # 5 Ring and Pinion. (Set #2 is not complete).
2. For the most part the set looks fine.
3. Case depth was at high end for the ring and pinion. Pinion was .066 (.001 high) Spec is .055-.065.
4. Microstructure spec is 40-65 and was slightly above spec.
5. Hardness (60-62 on both members) looks good, normal.
6. What doesn't look normal?
  - a. The pitting from the phosphating process appears to be quite severe and uniform on both pieces.
  - b. Too much damage to underlying substrate causing sets to not perform properly.
  - c. His opinion is that this would lead to abnormal wear / ridging / spalling, etc.
  - d. Ideally the phosphate crystals should just lie on top without damaging the substrate, and the pitting we see is quite uniform and quite severe.
7. Set #2 might be finished by early next week.
8. Mr. Fett would like the labs to send other hardware types to analyze

Mr. Bartlett- volunteered to send EOT reference parts from lubrited gear batches P4L514A/V1L303, P4L626A/V1L686, and T758A/L247. (Note: Lubrizol D-ticket 80905825-dated 7/17/2007).

Mr. Koglin - volunteered to send EOT reference parts from lubrited gear batches P4L626A/V1L686 and T758A/L247.

Mr. Miller - would also like pieces sent to Ft Wayne for them to analyze (2 bad and 1 good) independently in reference to pitting/spalling concerns. Mr. Bartlett volunteered to send EOT reference parts from the B6L566 lubrited gear batch. (Note: Lubrizol D-ticket 80905797-dated 7/13/2007). Mr. Fett also indicated that he will send pieces to Ft. Wayne after he is done and will discuss further with the respective Ft Wayne personnel.

#### **General Discussions and comments on what can be done with this gear batch:**

Mr. Koglin stated that he felt the axles should be remade, but keep some percentage of them to use for test procedure modification evaluations. He asked: if we're going to modify the procedure, we'll have to get LRI approval, but what are some of the things we need to do to make this happen?

Mr Fett commented: probably a phone conference call is enough to get the LRI onboard and believes they would be OK if we are able to demonstrate that we can separate pass and fail oils.

Mr. Fett discussed a Volvo lubriting specification that can be used to rate the pitting on the surface due to the lubriting process. It is based on the number of pits in a specified area and the depth of those pits. He indicated that some non-lubrited gears could be converted into Lubrited gears with this 'outsourced' alternate lubriting process. He also commented that the new process is currently an outside vendor but Dana is looking at bringing it on sight.

Mr. Koehler asked, are there ways to reduce the acid etch without changing the facility (increase the free iron) to possibly make the hardware work better?

Mr. Koglin asked

- Would the industry be interested in changing the procedure such that we would have a non-lubrited pinion and lubrited ring? This has been discussed in the past with out much support.
- If we reject the batch - what would the timing be for replacement hardware? This would obviously depend on the extent of remake - are any parts reusable?

Mr. Miller commented that he does not feel that replacing just the pinion is a viable option. It might be better to rebuild axles due to teardown and manufacturing costs. \

Mr. Gropp stated his concerns and noted that he is very hesitant about jumping into a new lubriting process, especially with all the history that we have. There would be a lot of testing to show correlation.

- **Action Item:** Dana to have internal discussions about rebuilding the axle batch versus remaking new hardware and report back to the panel.

With respect to evaluating the alternate lubriting process and after much discussion, the following was decided:

Motion 1 ⇒ Mr. Koglin, Second ⇒ Mr. Smith) - The four labs will send two complete axle assemblies from the non-lubrited hardware gear batch P4L792/V1L417 to the attention of Joe Guzikowski at the Maumee facility.

1. Dana will disassemble the axles; perform the Ft. Wayne lubriting process on 4 axles and the alternate lubriting process on the other four axles and reassemble the axles (identifying on the axle tube which lubriting process was used and ship the axles back to the labs.
2. The labs, upon receipt, will conduct two tests on TMC 153 as soon as possible and report the results to the TMC
3. The panel will review the results.

The motion passed 5-0-2


**Mr. Miller Action Item from June 27 Panel meeting:**

Mr. Miller, in an email to the chairman, offered the follow up response to a question on the bearing press for the inner pinion bearing. "From our carrier assembly drawings, O60CA103-2X, the L-37 hardware uses the Timken HM803146 cone. Looking at the bearing tolerance and pinion journal tolerance, the build press between this cone and the bearing journal is .0002 to .0017 tight. To my knowledge, this is as it has been since before the time of my involvement".

"I also looked at Timken's recommendation for this bearing. For "constant loads, moderate speed", they say use .0005 to .0015 tight. For "heavy loads, high speed", they say use .0010 to .0025 tight. It seems we could be something tighter given the severe nature of the test. We will have some internal discussion to follow up".

A follow up teleconference call will be scheduled in a couple weeks.

Respectfully submitted:



Donald T. Bartlett  
L-37 Surveillance Panel Chairman