Report of Meeting
L-37-1 Surveillance Panel Conference Call
February 9th, 2022

Attendees:

SwRI -	**Warden,** Kostan, Mueller
Lubrizol -	Venhoff, **Slocum**, Bealko
Afton -	**Sangpeal,** Bell, Horvath
Intertek -	**Lange**
TMC -	**Beck**
ExxonMobil -	**Banas**
BASF -	**Goyal,** Mosher
Dana -	**Zyski**
Meritor -	LaBond, **Carter**
Army -	**Comfort**
AAM -	**Muransky**
Shell -	Uy, Jordan
Chevron -	Martinez
	Dvorak

Voting Members in **BOLD**

1.0 Membership Review

Motion #1 → T. Muransky 1st /2nd A. Zyski to approve the SwRI voting membership change from Rebecca Warden to Caroline Mueller. Motion passed unanimously, 11-0-0 (Yes-No-Abstain).

2.0 Meeting minutes Approval

- November 9th, 2021, ASTM Meeting

Motion #2 → W. Venhoff 1st /2nd A. Lange to approve the meeting minutes from the November 9th, 2021, ASTM Meeting. Motion passed unanimously, 11-0-0 (Yes-No-Abstain).

3.0 L-37-1 LTMS Discussion

Action Items:

- **TMC to provide hypothetical TCR's to the labs generated with the recommended values of lambda .30, Zi limit +/- 1.2, Ei limit level 3 +/- 2.066 and level 2 +/- 1.734 to see if it would have any effect on labs current calibration status**
- **R. Slocum to put together email vote to accept LTMS change assuming no labs have calibration issues with hypothetical TCR's**
- **Will need to still decide how to treat Pitting/Spalling**
  - **Reported as non-critical parameter??**
  - **Acceptance bands??**

4.0 Sec 9.3.6 – (Canadian Referencing)

Action Items:

- **R. Slocum to investigate the difference between D6121 and D8165 and create an email vote to get rid of the Canadian reference portion of D8165 sec. 9.3.6. No one is sure on how that wording first got into the D8165 procedure**

5.0 "Lubrited" word use in Sec. 6.2.1??

- Will address the use of the word "Lubrited" in both L37/L371 procedures
  - Motion for D8165 change below and email vote in future for D6121
- Word is trademarked and will change to "Manganese Phosphate Coated (MnP)" for "Lubrited" and "Uncoated" for "Non-Lubrited"

Motion #3 → A. Zyski 1st /2nd T. Muransky to approve the change to D8165-21 Sec. 6.2.1 to replace "Lubrited" with "Manganese Phosphate Coated (MnP)" and "Non-Lubrited" to "Uncoated". Motion passed unanimously, 11-0-0 (Yes-No-Abstain).

6.2.1 A Gleason Works[10,11] test axle part number 1758276 (Uncoated ~~non-lubrited~~) or test axle part number 1559643 (Manganese Phosphate Coated (MnP) ~~lubrited~~) assembled into a Dana Model 60[12,11] axle housing (from Dana P/N 060AA100-2 or 060AA100-4) or Strange Axle housing[13,11] (from Strange Engineering Inc. P/N H60LE – IAR) using either the spool or open carrier.

6.0 Gleason Hardware Supply/Lab Impacts

- Gleason has been having supply and manufacturing issues delaying part shipments to labs
- Two labs have received their 1st 45 gears and 2 have not
- Labs need (MnP) coated sets sooner than later
  - One lab has been quoted and the other 2 have not

7.0 Old Business

- Still need to work on Build Procedure with the labs

8.0 Adjourn

Motion #4 → A. Goyal 1st /2nd A. Lange to adjourn. Motion passed unanimously, 11-0-0 (Yes-No-Abstain).

Respectfully submitted,

Robert Slocum
L-37-1 Surveillance Panel Chairman

D02.B0.03

L-37-1 Surveillance Panel Meeting

02/09/2022
2:45 pm – 4:45 pm
Robert Slocum

Agenda

- Call to Order/Agenda review
- Membership Review
- Meeting Minute Approvals
- November 9th, 2021, ASTM Meeting
- L-37-1 LTMS Discussion
- Sec 9.3.6 - (Canadian Referencing)
- “Lubrited” word use in Sec. 6.2.1??
- Gleason Hardware supply/lab impacts??
- Old Business
- New business
- Adjournment

Membership Review

Rob Banas	ExxonMobil
Allen Comfort	US Army
Troy Muransky	AAM
Matt Sangpeal	Afton
Arjun Goyal	BASF
Amy Zyski	Dana
Dylan Beck	TMC
Jason Carter	Meritor
Anthony Lange	Intertek
Robert Slocum	Lubrizol
Caroline Mueller	SwRI
Kaled Zreik	GM
Mike Cabaj	Linamar

Total Voting Members = 13

Meeting Minutes Approval

– November 9th, 2021, ASTM Meeting

L-37-1 LTMS Discussion

Background

- Current L-37-1 LTMS includes:
  1. Stand EWMA (Zi) with lambda = 0.3
     - No consequences for exceeding limit
  2. Stand Shewhart Severity (Yi)
     - Fail if beyond +/- 1.8 standard deviations from target.
       - Integer-valued parameters cause problems here (discussed previously)
  3. If calibration test on 134 or subsequent reblends, it must fail for at least one of the five parameters based on GL-5 limits.
  4. Industry precision and severity also control charted.
- LTMS changes considered in this analysis include:
  1. Updates to oil means and standard deviations.
  2. Implementation of Zi and Ei as calibration pass/fail parameters instead of Yi.

Summary of Targets

Below is a summary of the targets, along with the pooled standard deviations to be used for severity adjustments.

Ridging

Oil	Hardware	Mean	S.D.
134/134-1	Nonlubrited	4.4	0.89
152-2	Nonlubrited	9.3	0.89
155-1	Nonlubrited	9.4	0.49
134/134-1	Lubrited	4.9	0.6
152-2	Lubrited	9.6	0.5
155-1	Lubrited	9.3	0.59

Wear

Oil	Hardware	Mean	S.D.
134/134-1	Nonlubrited	5.5	0.73
152-2	Nonlubrited	7.7	0.72
155-1	Nonlubrited	7.6	0.64
134/134-1	Lubrited	6.1	0.64
152-2	Lubrited	8.2	0.67
155-1	Lubrited	7.7	0.7

Rippling

Oil	Hardware	Mean	S.D.
134/134-1	Nonlubrited	7.8	1.11
152-2	Nonlubrited	8.2	0.74
155-1	Nonlubrited	8.2	0.8
134/134-1	Lubrited	6.8	1.24
152-2	Lubrited	9.3	0.49
155-1	Lubrited	8.7	0.59

Severity Adjustment Standard Deviations

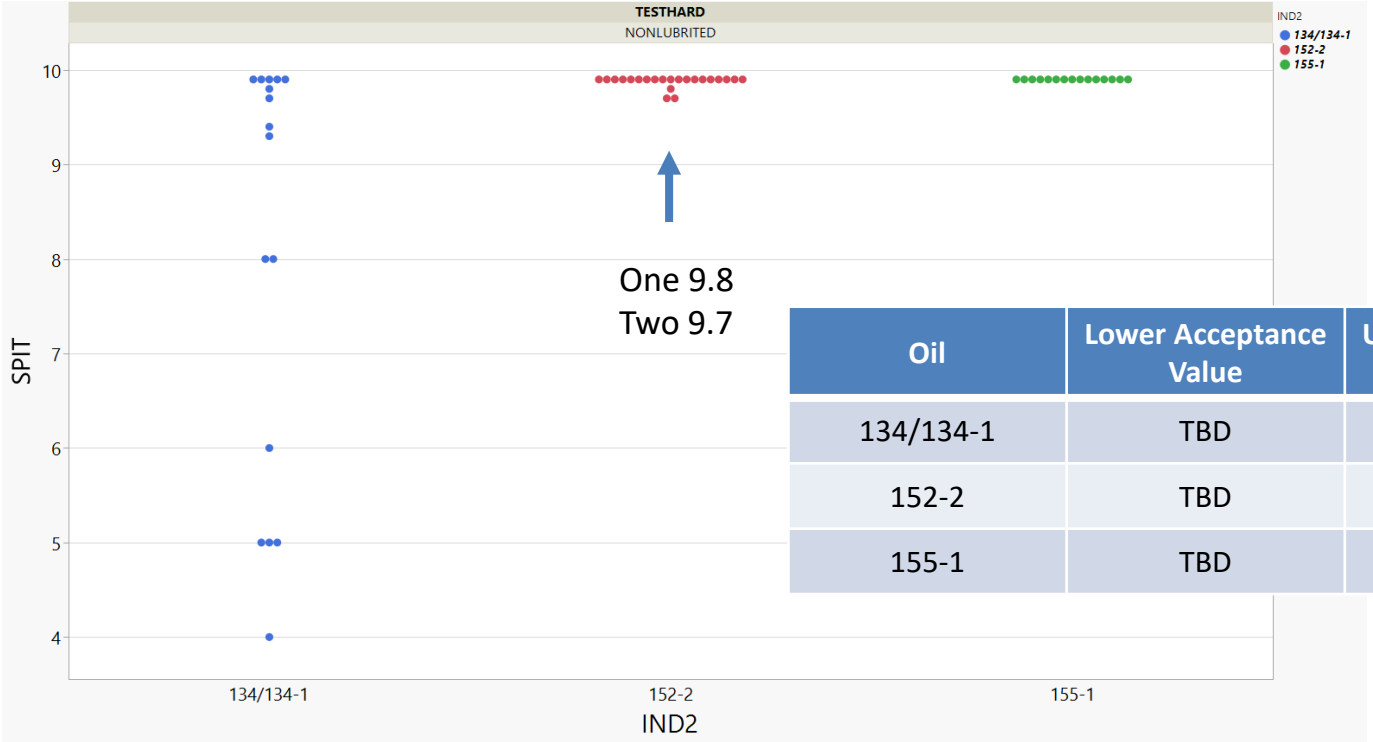
Parameter	Hardware	Pooled S	Option Using 152-2 and 155-1 Only
Ridging	Nonlubrited	0.80	0.69
Rippling	Nonlubrited	0.88	0.77
Wear	Nonlubrited	0.70	0.68
Ridging	Lubrited	0.67	0.55
Rippling	Lubrited	0.89	0.54
Wear	Lubrited	0.67	0.69

Background

At the September 2019 meeting, it was determined that this parameter would move to a Go/No-Go form of acceptance, meaning a reference passes if it achieves a value in a pre-determined, fixed range, and fails otherwise. The Surveillance Panel requested individual plots by oil in order to determine those ranges.

Pitting/Spalling for Nonlubrited Hardware

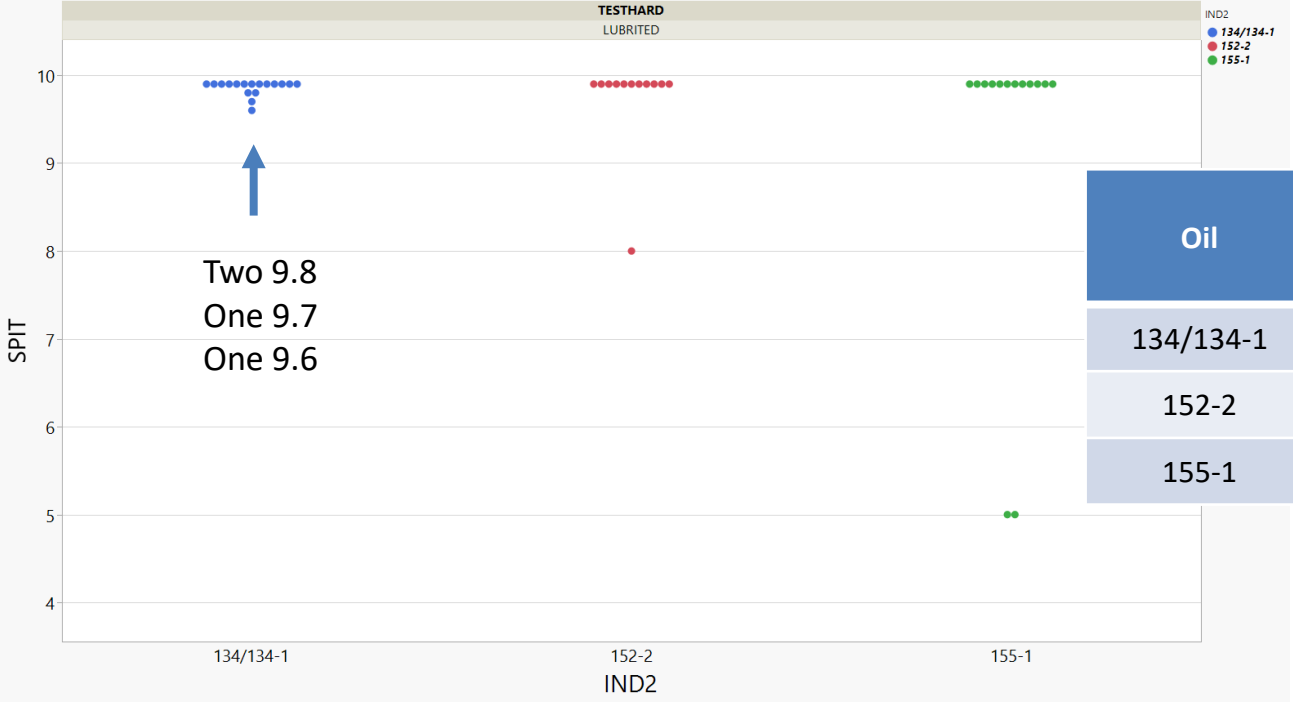
The data is plotted below to help determine upper and lower acceptance values for pitting/spalling.



Oil	Lower Acceptance Value	Upper Acceptance Value
134/134-1	TBD	TBD
152-2	TBD	TBD
155-1	TBD	TBD

Pitting/Spalling for Lubrited Hardware

The data is plotted below to help determine upper and lower acceptance values for pitting/spalling.



Oil	Lower Acceptance Value	Upper Acceptance Value
134/134-1	TBD	TBD
152-2	TBD	TBD
155-1	TBD	TBD

Constants and Limits to Decide

The following are potential constants and limits to use for Zi and Ei:

- Lambda – Recommend to use 0.30
  - Zi is updated by $Z_i = \lambda * Y_i + (1 - \lambda) * Z_{i-1}$
- Zi limit – Recommend to use +/-1.2 to +/-1.5
  - Your stand EWMA can drift up to Zi standard deviations from target
- Ei limits – Recommend to use level 3 limit of +/-2.066 and level 2 limit of +/-1.734
  - Each new calibration test result (Yi) must be within 2.066 standard deviations of where we thought the stand was performing (Z_{i-1}).
- Decide whether or not to adopt severity adjustments
- Acceptance bands for Pitting/Spalling

Sec 9.3.6 - (Canadian Referencing)

9.3.6 Within a reference period, alternate testing using different gear batches, or dynamometer torque conditions, or test temperatures does not necessitate recalibration. However, calibrate the test stand for both the standard and Canadian tests independently in order for results at either condition to be valid.

“Lubrited” word use in Sec. 6.2.1??

6.2.1 A Gleason Works[10,11] test axle part number 1758276 (non-lubrited) or test axle part number 1559643 (lubrited) assembled into a Dana Model 60[12,11] axle housing (from Dana P/N 060AA100-2 or 060AA100-4) or Strange Axle

Manganese phosphate coated (MnP)
uncoated

Gleason Hardware supply/lab impacts??

10 – 2/28/22
20 – 3/10/22
30 – 4/19/22
40 – 5/19/22
50 – 6/17/22
60 – 7/14/22
70 – 7/20/22

Old Business

Build procedure

New Business

Adjourn