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## Committee D02 on PETROLEUM PRODUCTS AND LUBRICANTS

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November 17th, 2023

Reply to:
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Afton Chemical Corporation
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Richmond, VA 23219
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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:

**November 8, 2023 L-42 Surveillance Panel Meeting (Southwest Research Institute, Ann Arbor, MI and Virtual Meeting – Microsoft Teams)**

Please direct any corrections or comments to my attention.

Very Respectfully,

Matthew A Sangpeal

Matt Sangpeal, Chairman
L-42 Surveillance Panel

L-42 Surveillance Panel Meeting Minutes

Southwest Research Institute, Ann Arbor, MI and Virtual Meeting – Microsoft Teams

November 8, 2023

**Attendees**: voting members in **bold,** * indicates virtual attendance

N. Ariemma (Lubrizol)
**D. Beck (TMC)**
D. Bell (Afton)
T. Bender (Fuchs)
M. Burgman (Fuchs)
M. Caridi (BASF)
**J. Carowick (Cummins-Meritor)**
J. Clark (TMC)
**A. Comfort (US Army)**
K. Drlja (Lubrizol)
J. Gingerich (Lubrizol)
**A. Goyal (BASF)**
D. Horvath (Afton)
A. Jackson (Chevron Oronite)
B. Jordan (Shell)*
**A. Lange (Intertek)**
J. Morris (Navistar)
D. Moser (BASF)
**C. Mueller (SwRI)**
**T. Muransky (AAM)**
**M. Sangpeal (Afton/C)**
E. Sattler (US Army)
**N. Schaup (LZ)**
A. Schweitzer (Shell)
**R. Warden (Chevron Oronite)**
F. Yucebilgic (Fuchs)
**A. Zyski (Dana)**

**Call to Order**

**Review of Agenda**
The meeting agenda is attached.

**Review of Membership**
A motion was made to elect J. Carowick as the voting member for Cummins-Meritor.
Motion: M. Sangpeal
Second: A. Goyal
All in favor, no objections, no abstentions.

**Approval of Meeting Minutes**
Meeting minutes for approval:

- "20230809_SP" à August 9, 2023 – Surveillance Panel Meeting – Warrendale, PA
- "September 18, 2023 – L-42-1 Task Force Meeting" – Microsoft Teams
- "20231030 HW Approval" – Microsoft Teams

A motion was made to approve the meeting minutes as presented.
Motion: A. Goyal
Second: J. Carowick
All in favor, no objections, no abstentions.

**Graph Correction in D7452-22**

Figures A6.11-A6.16 in D7452-22 contain information about setpoints and limits. That information is redundant and, in some cases, inaccurate. Setpoint and limit information is in the text of D7452-22. Each figure is also referenced in the text, so no additional information is needed on the figures.

A motion was made to remove all setpoint and limit information from figures A6.11-A6.16.
Motion: C. Mueller
Second: A. Lange
All in favor, no objections, no abstentions.

**L-42-1 Development**

C. Mueller gave an update on SwRI's progress on electric L-42-1 test development. After increasing repetitions of Cond. 4 and Shock II, good discrimination was shown between Hi and Lo Reference Oils. Details can be found in the attached presentation.

Summary of operating conditions (Yellow indicates differences from current L-42 procedure):

| Test Phase | Dyno Setpoint (Input) | Output Speed(s) | Duration | Temperature |
|---|---|---|---|---|
| Conditioning 1 | 60 lb-ft | 575 rpm | 10 mins | Ramp and hold 225 °F ±5 |
| Conditioning 2 | 60 lb-ft | 385/575 rpm | 4 cycles | Ramp and hold 225 °F ±5 |
| Conditioning 3 | 70 lb-ft | 815 rpm | 20 mins | Ramp and hold 225 °F ±5 |
| Conditioning 4 | 70 lb-ft | 670/815 rpm | 8 cycles | Ramp and hold 225 °F ±5 |
| Shock 1 | 60 lb-ft | 530/1050 rpm | 5 cycles | Start 200 °F ±5 |
| Shock 2 | 100 lb-ft | 530/630 rpm | 15 cycles | Start <280 °F |

Two additional Hi Reference oils will be run to simulate a typical four test reference sequence. Two additional 2023 batch axles are needed.

Non-reference oils need to be tested and performance compared to traditional L-42 results. A matrix will be defined at the next Task Force Meeting.

M. Sangpeal stated that Regen T-Rig data was not available. There was concern by some panel members that a Regen T-Rig might not give equivalent results to traditional Eddy Current Dynos / Electric Drive Motor.

**Action items:**
**1.** M. Sangpeal to schedule next L-42-1 Taskforce Meeting
**2.** C. Mueller to tabulate how many axles have been donated by each lab
3. M. Sangpeal to run Hi and Lo Reference Oils on Regen T-Rig
**4.** A. Lange to donate two axles from the 2023 batch to SwRI for Reference runs

**2023 Hardware Order**

M. Sangpeal gave an update on Dana's progress with the 2023 hardware order (details can be found in the attached presentation). All available axles have been received by the labs. The axles have also been approved for testing.

Dana has requested more lead time for the next order (9 months vs. 6 months). The panel has agreed to begin discussions about the next order in one year (November SP meeting).

Dana mentioned that there is some potential for cost savings on the next hardware order.

**Action item:** M. Sangpeal to schedule meeting with Dana and labs to discuss cost savings.

**New/Open Issues**

None.

**Adjournment**

A motion was made to adjourn.
Motion: M. Sangpeal
Second: N. Schaup
All in favor, no objections, no abstentions.

Meeting adjourned.

Respectfully submitted,

Matthew A Sangpeal

Matt Sangpeal
L-42 Surveillance Panel Chairman

# L-42 Surveillance Panel Meeting

ASTM D7452

Southwest Research Institute

Ann Arbor, MI

November 8, 2023

12:30 – 1:30 PM  EST

Passion for Solutions™

# Agenda

- **Call to Order**
- **Agenda**
- **Membership Review & Update**
- **Approval of Meeting Minutes**
  - “20230809 SP” – PRI Headquarters, Warrendale, PA
  - “September 18, 2023 – L-42-1 Task Force Meeting” – Microsoft Teams
  - “20231030 HW Approval” – Microsoft Teams
- **Correction of Graphs in ASTM D7452**
- **L-42-1 Development Updates**
  - Update from SwRI
  - Update from Afton
- **2023 Hardware Order / Approval**
- **New Issues**
- **Adjournment**

# L-42 SP Voting Members

- **Rob Banas:** Exxon Mobil
- **Dylan Beck:** TMC
- **Allen Comfort:** US Army
- **Arjun Goyal:** BASF
- **Troy Muransky:** AAM
- **Jason Carter:** Cummins-Meritor *Replace w/Jessica Carowick?
- **Matt Sangpeal:** Afton Chemical (Chair)
- **Nick Schaup:** Lubrizol
- **Anthony Lange:** Intertek
- **Caroline Mueller:** SwRI
- **Amy Zyski:** Dana
- **Rebecca Warden:** Chevron Oronite

# Approval of Meeting Minutes

## SP Meeting Minutes

- "20230809 _SP" à August 9, 2023 – Surveillance Panel Meeting – PRI Headquarters, Warrendale, PA and Virtual Meeting via Microsoft Teams
- "September 18 2023 - L-42-1 Task Force Meeting" à Virtual via Microsoft Teams
- "20231030 HW Approval" - L-42 Hardware Approval Meeting à Virtual via Microsoft Teams

# Graph Correction in ASTM D7452

- **See attachment from TMC**
- **Motion to approve?**

# L-42-1 Development Update

- **Update from SwRI on progress**

# L-42-1 Development Update - Afton

- **All components have been acquired to mount axle on T-Rig**
  - Drive axles
  - Drive shafts
  - Axle mounts
  - Water cooling parts
- **Test rig demand suddenly increased**
  - No data to share
- **Plan to re-start efforts Q1 2024**

# 2023 Hardware Order

- **First shipment of axles received**
- **Panel meeting on 10/30/23 voted to approve hardware**
- **Final shipments complete?**
  - Have all labs received final shipment?
- **Final Quantities (495) / Original Order (690)**
  - Afton: 112 / 150 (75%)
  - IAR: 168 / 240 (70%)
  - SwRI: 215 / 300 (72%)
- **Dana is requesting more lead time for next order**
  - 9 months vs 6 months
  - Should start next order one year ahead of need by date

# New Issues

- ?

Thanks!

*Removal of wheel speed and pinion torque limits from Figures A6.11 – A6.16*

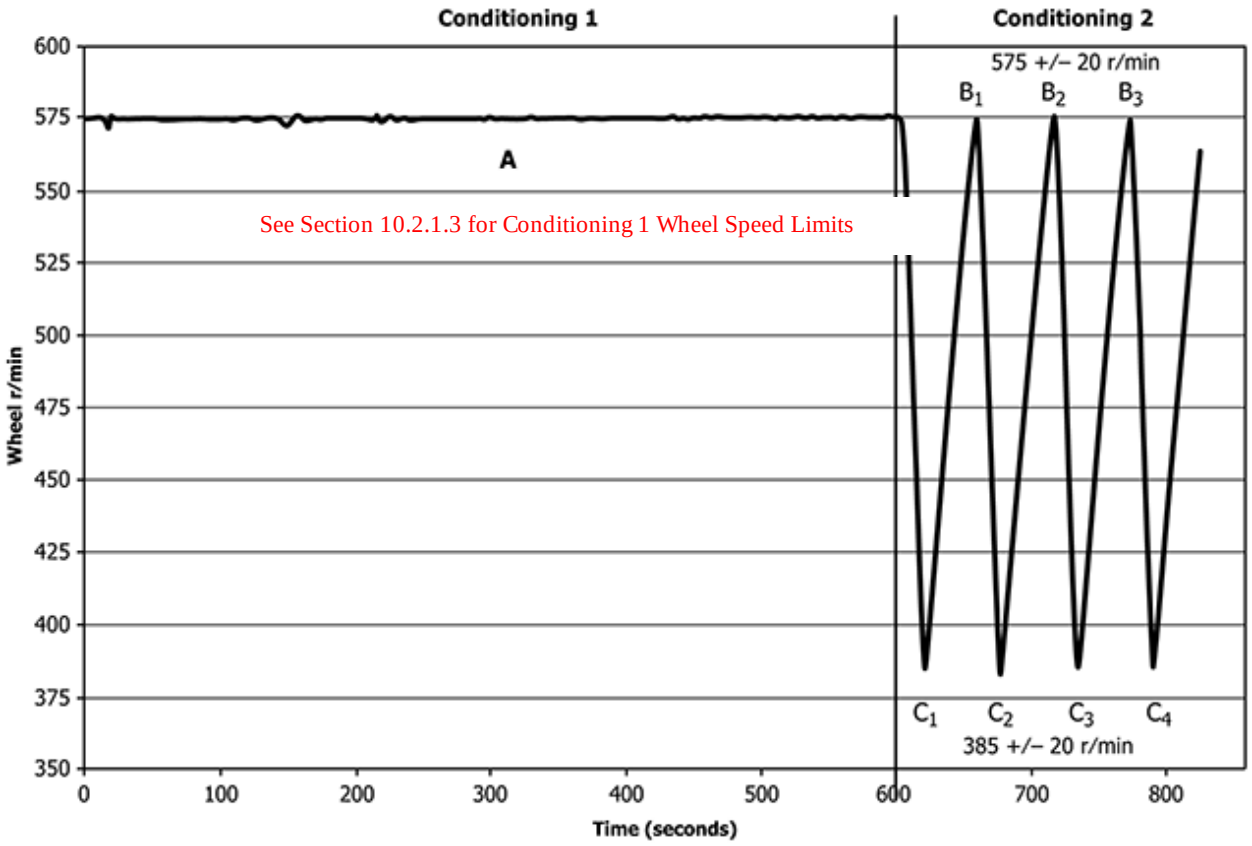



**FIG. A6.11 Conditioning 1 & 2—Wheel Speed**

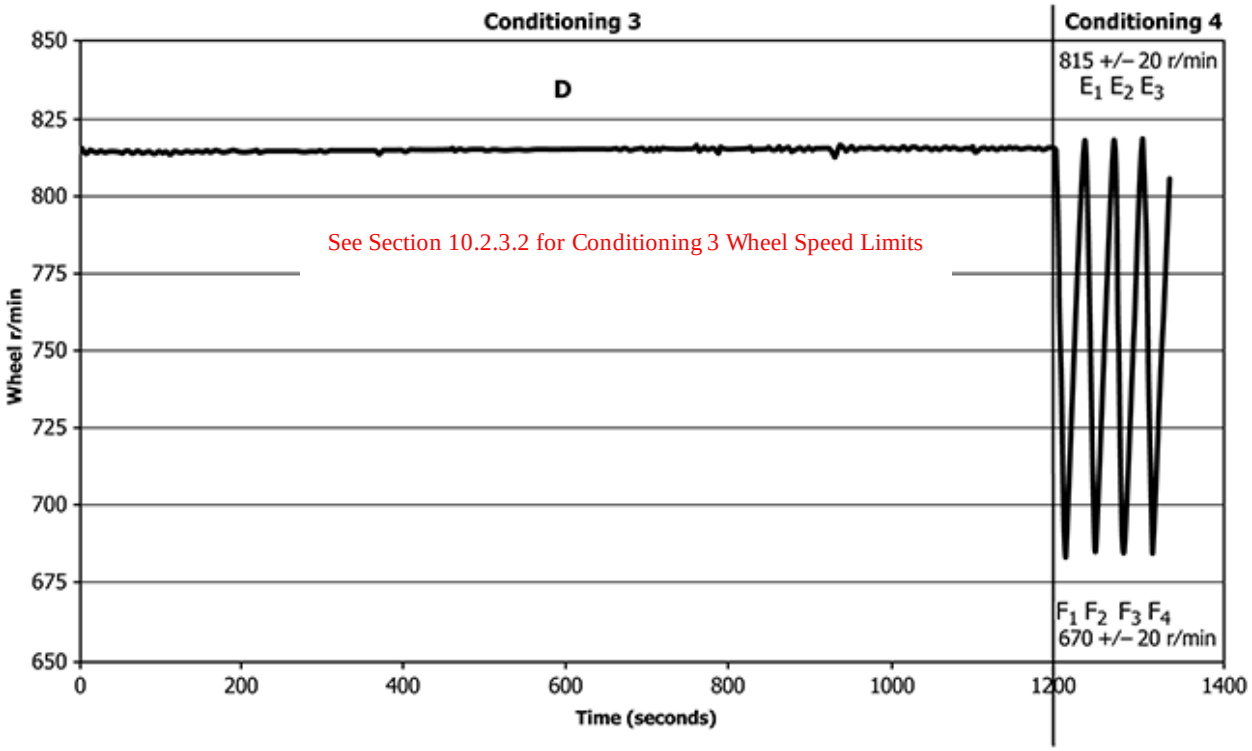



**FIG. A6.12 Conditioning 3 & 4—Wheel Speed**

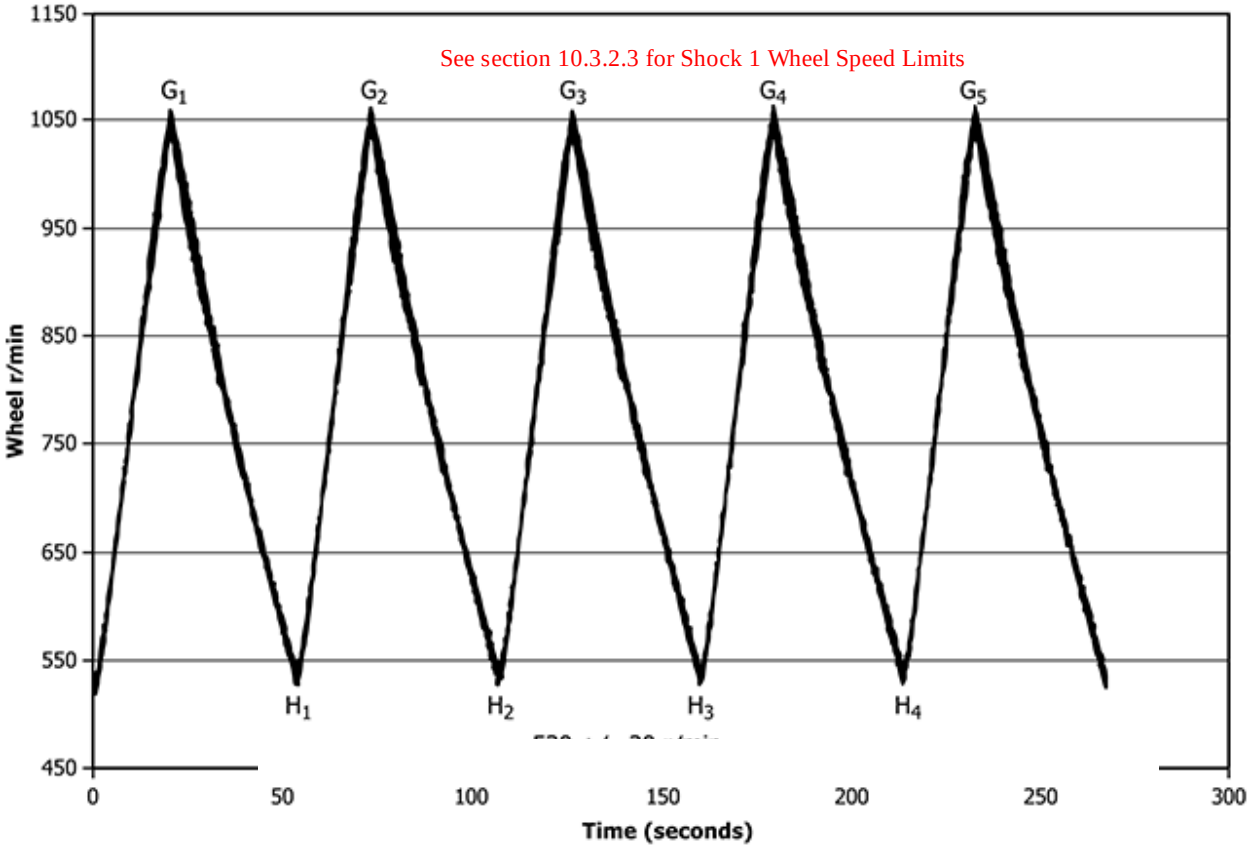



**FIG. A6.13 Shock Series One—Wheel Speed (5 Shocks)**

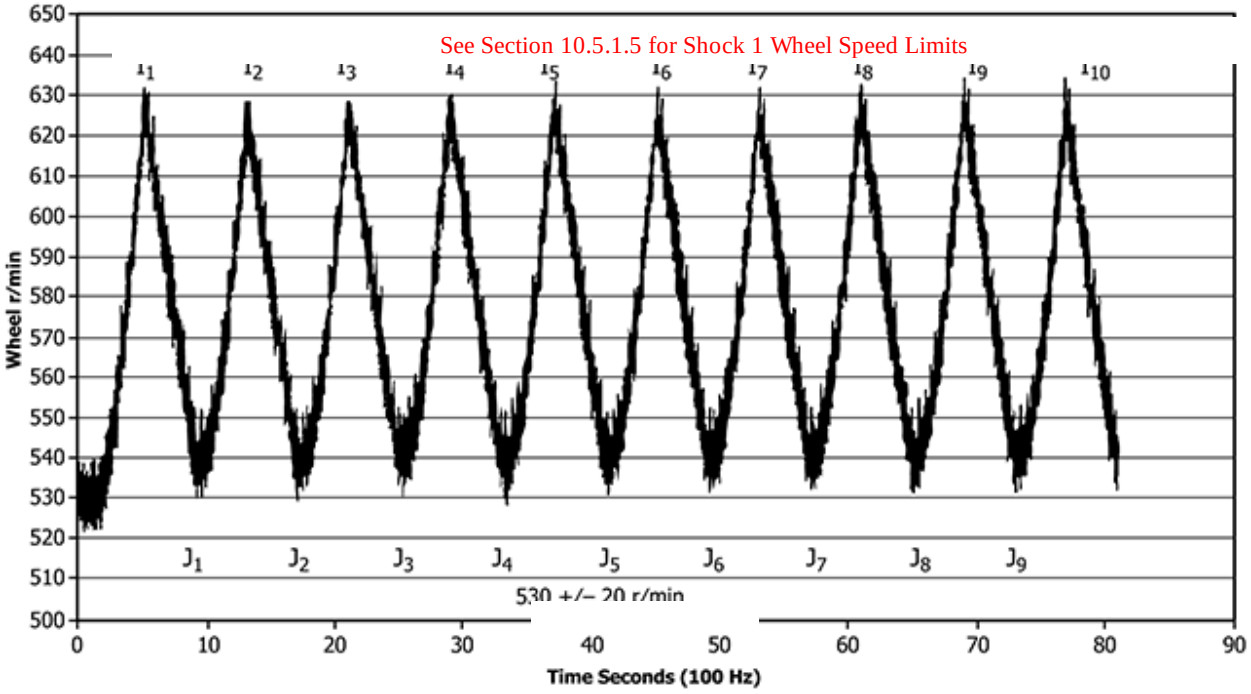



**FIG. A6.14 Shock Series Two—Wheel Speed (10 Shocks)**

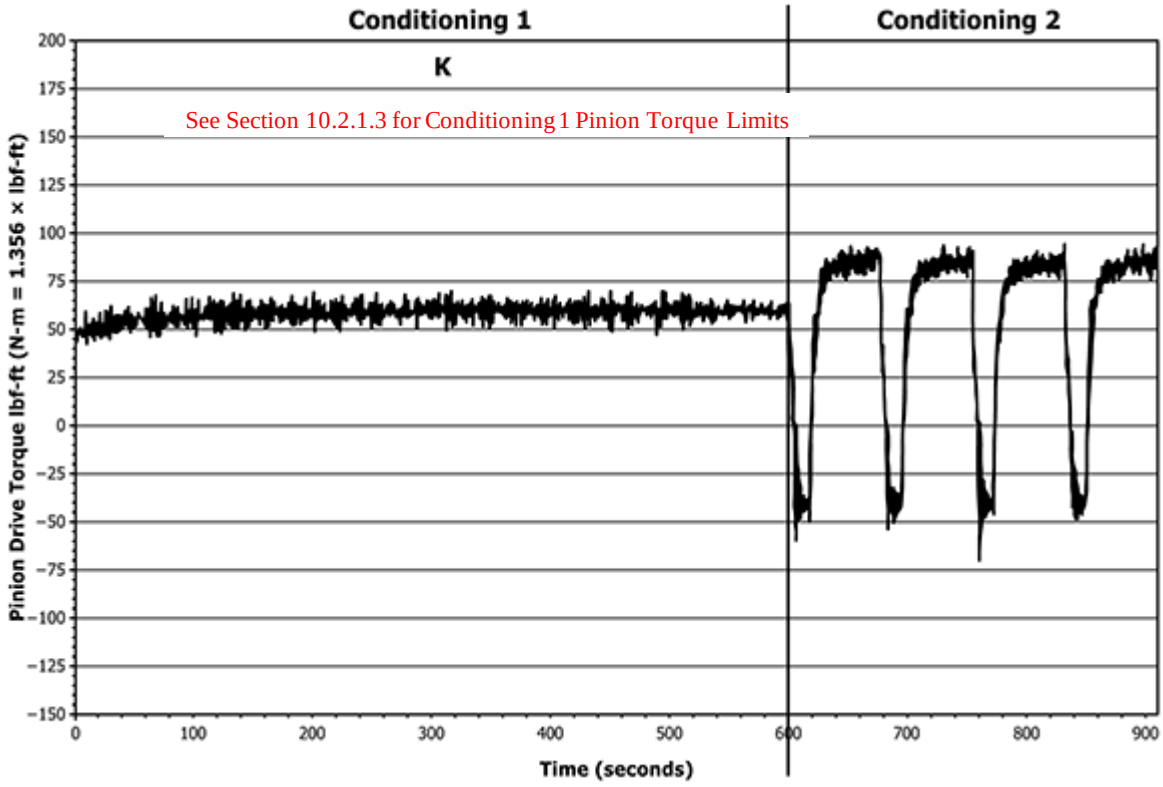



**FIG. A6.15 Conditioning 1 & 2—Pinion Torque**

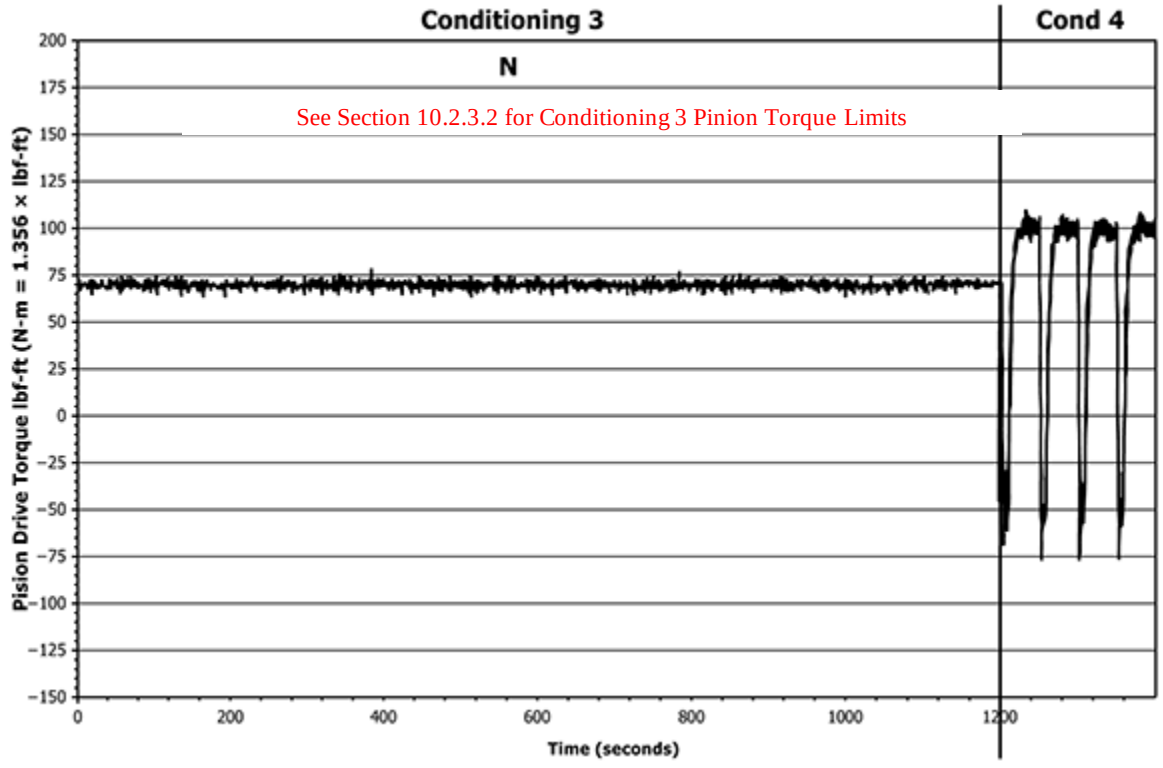



**FIG. A6.16 Conditioning 3 & 4—Pinion Torque**

# L-42-1 Development Update November 2023

SOUTHWEST RESEARCH INSTITUTE®

Caroline Mueller

11/8/2023

# Where we left off…

§ 4 More severity runs completed by Aug 2023
  – Eliminated C4 to try and discriminate further
  – Increase number of S2 cycles to try and discriminate further
  – Pending new hardware batch delivery from Dana
§ Outcomes: Scoring was more severe, but not quite discriminating

§ Action items from August 2023:
  – Reintroduce C4
  – Kickoff meeting for developing official L-42-1 procedure (hosted by Matt Sangpeal in Sept 2023)

# Data Summary

| Test Number | Oil Code | Scoring %, Pinion | Scoring %, Ring | Notes | On L-42 Target? Y/N |
|---|---|---|---|---|---|
| 0022 | TMC 117 | 20 | 11 | C4 has 8 cycles, S2 has 15 cycles | Y |
| 0021 | TMC 119 | 42 | 32 | Discriminates! | Y |
| 0023 | TMC 117 | 15 | 10 | Same as above, 2023 hardware | Y |
| 0024 | TMC 119 | 34 | 24 | Discriminates! | Y |

Targets for pinion scoring % on TMC 117: *14-32*
correction factor +6 pinion, +4 ring
Targets for pinion scoring % on TMC 119: *2x most recent 117 run, including correction*

# Discussion & Next Steps

§ Per L-42 targets, electric non-regen stand achieves appropriate severity on 2020 and 2023 batches (n = 2)

§ I suggest running out *at least* full calibration sequence on 2023 hardware for larger n size

– Moving forward with development on 2023 hardware. Donated hardware practice needs discussion due to batch availability among labs

§ Other suggestions/next steps from committee?

# Operational Data 0021-0024

# (Truncated)

# Test 01-0021

# Summary Data—Conditioning 01-0021

| Conditioning 1 | | | |
|---|---|---|---|
| **Input Torque [ft-lb]** | | **Input Speed [rpm]** | |
| *Target* | *60 ± 5* | *Target* | *2363* |
| Avg | 59.8 | Avg | 2361 |
| Min | 58.3 | Min | 2358 |
| Max | 62.1 | Max | 2364 |

| Conditioning 3 | | | |
|---|---|---|---|
| **Input Torque [ft-lb]** | | **Input Speed [rpm]** | |
| *Target* | *70 ± 5* | *Target* | *3350* |
| Avg | 70.0 | Avg | 3346 |
| Min | 67.8 | Min | 3344 |
| Max | 73.4 | Max | 3349 |

| Conditioning 2 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Peak Input Torque Drive [ft-lb]** | | **Peak Input Torque Coast [ft-lb]** | | **Maximum Input Speed [rpm]** | | **Minimum Input Speed [rpm]** | |
| *Target* | | *Target* | | *Target* | *2363* | *Target* | *1562* |
| Avg | 111.9 | Avg | -59.1 | Avg | 2366 | Avg | 1582 |
| Min | 110.9 | Min | -65.0 | Min | 2365 | Min | 1581 |
| Max | 112.5 | Max | -53.3 | Max | 2366 | Max | 1582 |

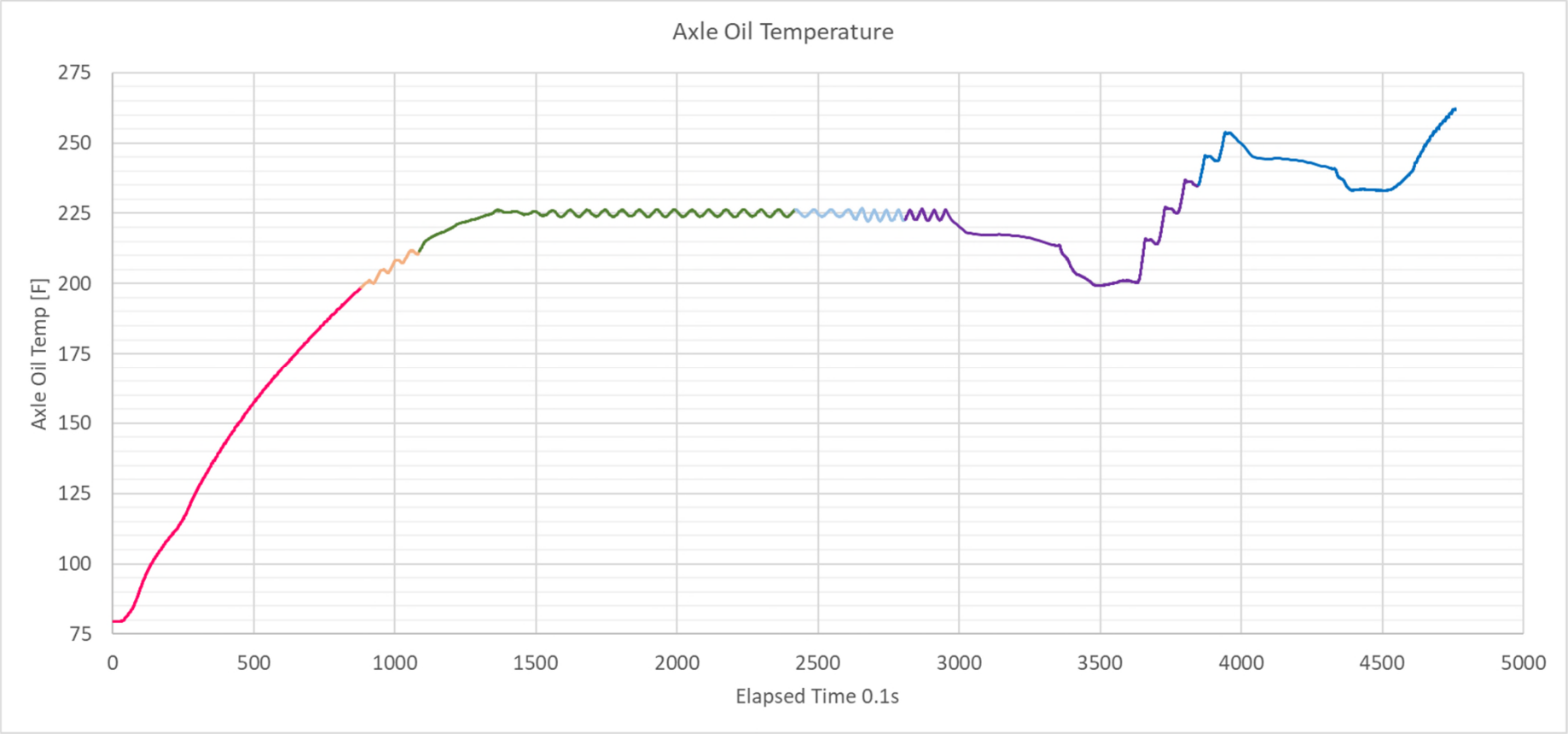
| Conditioning 4 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Peak Input Torque Drive [ft-lb]** | | **Peak Input Torque Coast [ft-lb]** | | **Maximum Input Speed [rpm]** | | **Minimum Input Speed [rpm]** | |
| *Target* | | *Target* | | *Target* | *3350* | *Target* | *2754* |
| Avg | 114.9 | Avg | -69.0 | Avg | 3352 | Avg | 2752 |
| Min | 113.9 | Min | -76.4 | Min | 3348 | Min | 2750 |
| Max | 116.0 | Max | -58.9 | Max | 3354 | Max | 2754 |

# Summary Data—Shocks 01-0021

| Shock 1 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Peak Input Torque Drive [ft-lb]** | | **Peak Input Torque Coast [ft-lb]** | | **Maximum Input Speed [rpm]** | | **Minimum Input Speed [rpm]** | |
| *Target* | | *Target* | | *Target* | *4316* | *Target* | *2178* |
| Avg | 234.1 | Avg | -67.6 | Avg | 4349 | Avg | 2192 |
| Min | 233.2 | Min | -71.5 | Min | 4348 | Min | 2175 |
| Max | 235.4 | Max | -65.3 | Max | 4351 | Max | 2197 |

| Shock 2 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Peak Input Torque Drive [ft-lb]** | | **Peak Input Torque Coast [ft-lb]** | | **Maximum Input Speed [rpm]** | | **Minimum Input Speed [rpm]** | |
| *Target* | | *Target* | | *Target* | *3083* | *Target* | *2178* |
| Avg | 234.6 | Avg | -228.8 | Avg | 2599 | Avg | 2192 |
| Min | 224.2 | Min | -236.4 | Min | 2594 | Min | 2172 |
| Max | 253.4 | Max | -202.5 | Max | 2602 | Max | 2206 |

# Temperature Data—01-0021



# Test 01-0022

# Summary Data—Conditioning 01-0022

| Conditioning 1 | | | |
|---|---|---|---|
| **Input Torque [ft-lb]** | | **Input Speed [rpm]** | |
| *Target* | *60 ± 5* | *Target* | *2363* |
| Avg | 59.5 | Avg | 2361 |
| Min | 57.6 | Min | 2358 |
| Max | 61.2 | Max | 2364 |

| Conditioning 3 | | | |
|---|---|---|---|
| **Input Torque [ft-lb]** | | **Input Speed [rpm]** | |
| *Target* | *70 ± 5* | *Target* | *3350* |
| Avg | 69.9 | Avg | 3346 |
| Min | 67.8 | Min | 3344 |
| Max | 71.3 | Max | 3349 |

| Conditioning 2 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Peak Input Torque Drive [ft-lb]** | | **Peak Input Torque Coast [ft-lb]** | | **Maximum Input Speed [rpm]** | | **Minimum Input Speed [rpm]** | |
| *Target* | | *Target* | | *Target* | *2363* | *Target* | *1562* |
| Avg | 114.0 | Avg | -59.2 | Avg | 2366 | Avg | 1581 |
| Min | 112.5 | Min | -63.0 | Min | 2365 | Min | 1580 |
| Max | 114.9 | Max | -54.8 | Max | 2366 | Max | 1582 |

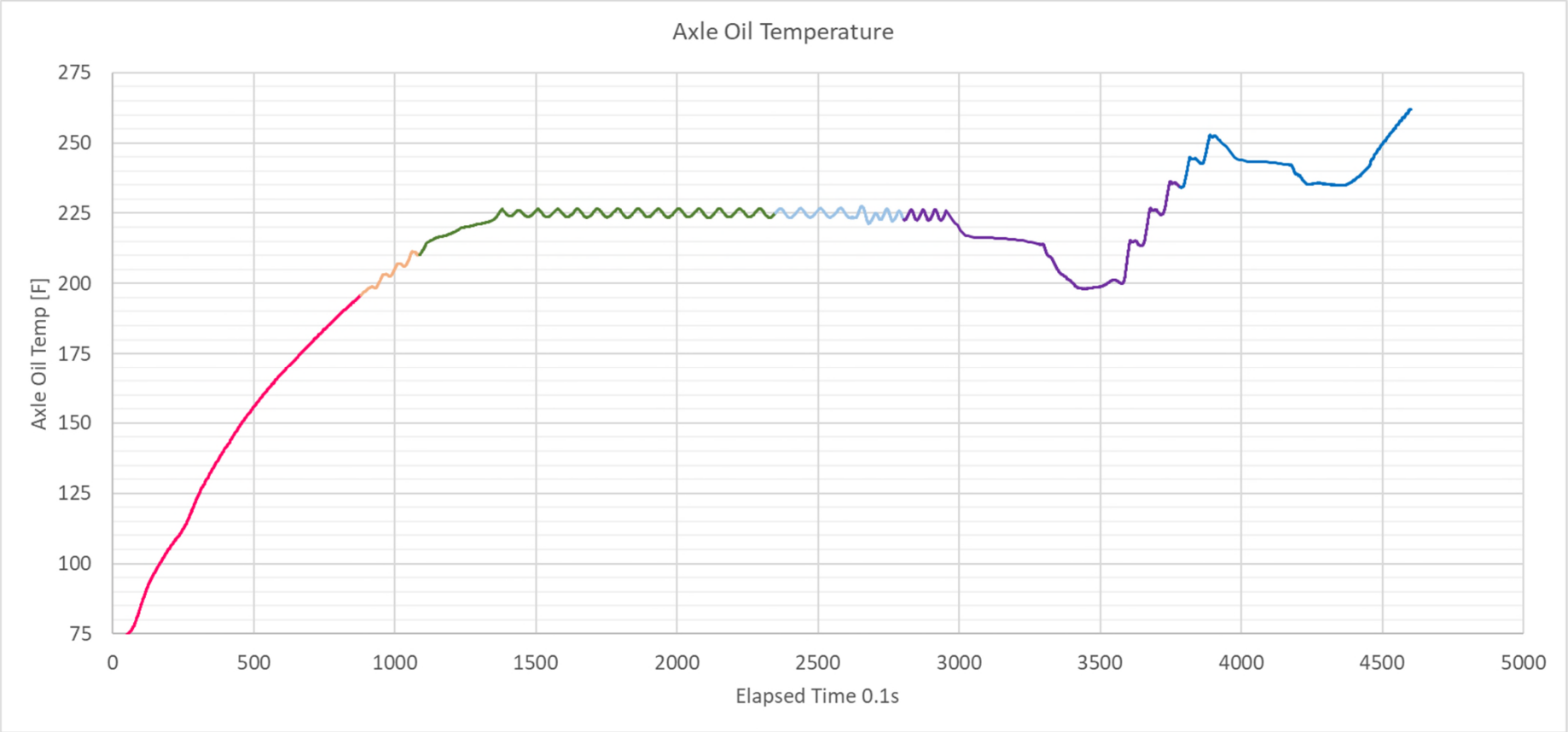
| Conditioning 4 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Peak Input Torque Drive [ft-lb]** | | **Peak Input Torque Coast [ft-lb]** | | **Maximum Input Speed [rpm]** | | **Minimum Input Speed [rpm]** | |
| *Target* | | *Target* | | *Target* | *3350* | *Target* | *2754* |
| Avg | 114.3 | Avg | -68.4 | Avg | 3353 | Avg | 2752 |
| Min | 113.7 | Min | -77.3 | Min | 3350 | Min | 2751 |
| Max | 115.1 | Max | -58.0 | Max | 3353 | Max | 2753 |

# Summary Data—Shocks 01-0022

| Shock 1 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Peak Input Torque Drive [ft-lb]** | | **Peak Input Torque Coast [ft-lb]** | | **Maximum Input Speed [rpm]** | | **Minimum Input Speed [rpm]** | |
| *Target* | | *Target* | | *Target* | *4316* | *Target* | *2178* |
| Avg | 235.2 | Avg | -67.0 | Avg | 4349 | Avg | 2191 |
| Min | 234.2 | Min | -70.2 | Min | 4347 | Min | 2174 |
| Max | 237.1 | Max | -65.1 | Max | 4350 | Max | 2197 |

| Shock 2 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Peak Input Torque Drive [ft-lb]** | | **Peak Input Torque Coast [ft-lb]** | | **Maximum Input Speed [rpm]** | | **Minimum Input Speed [rpm]** | |
| *Target* | | *Target* | | *Target* | *3083* | *Target* | *2178* |
| Avg | 236.2 | Avg | -229.8 | Avg | 2600 | Avg | 2193 |
| Min | 223.4 | Min | -234.5 | Min | 2597 | Min | 2172 |
| Max | 265.1 | Max | -204.3 | Max | 2603 | Max | 2205 |

# Temperature Data—01-0022



# Test 01-0023

# Summary Data—Conditioning 01-0023

| Conditioning 1 | | | |
|---|---|---|---|
| **Input Torque [ft-lb]** | | **Input Speed [rpm]** | |
| *Target* | *60 ± 5* | *Target* | *2363* |
| Avg | 59.8 | Avg | 2361 |
| Min | 58.2 | Min | 2357 |
| Max | 61.8 | Max | 2364 |

| Conditioning 3 | | | |
|---|---|---|---|
| **Input Torque [ft-lb]** | | **Input Speed [rpm]** | |
| *Target* | *70 ± 5* | *Target* | *3350* |
| Avg | 70.0 | Avg | 3347 |
| Min | 68.5 | Min | 3344 |
| Max | 70.6 | Max | 3349 |

| Conditioning 2 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Peak Input Torque Drive [ft-lb]** | | **Peak Input Torque Coast [ft-lb]** | | **Maximum Input Speed [rpm]** | | **Minimum Input Speed [rpm]** | |
| *Target* | | *Target* | | *Target* | *2363* | *Target* | *1562* |
| Avg | 114.4 | Avg | -59.6 | Avg | 2365 | Avg | 1581 |
| Min | 113.2 | Min | -62.6 | Min | 2365 | Min | 1581 |
| Max | 115.5 | Max | -54.5 | Max | 2366 | Max | 1582 |

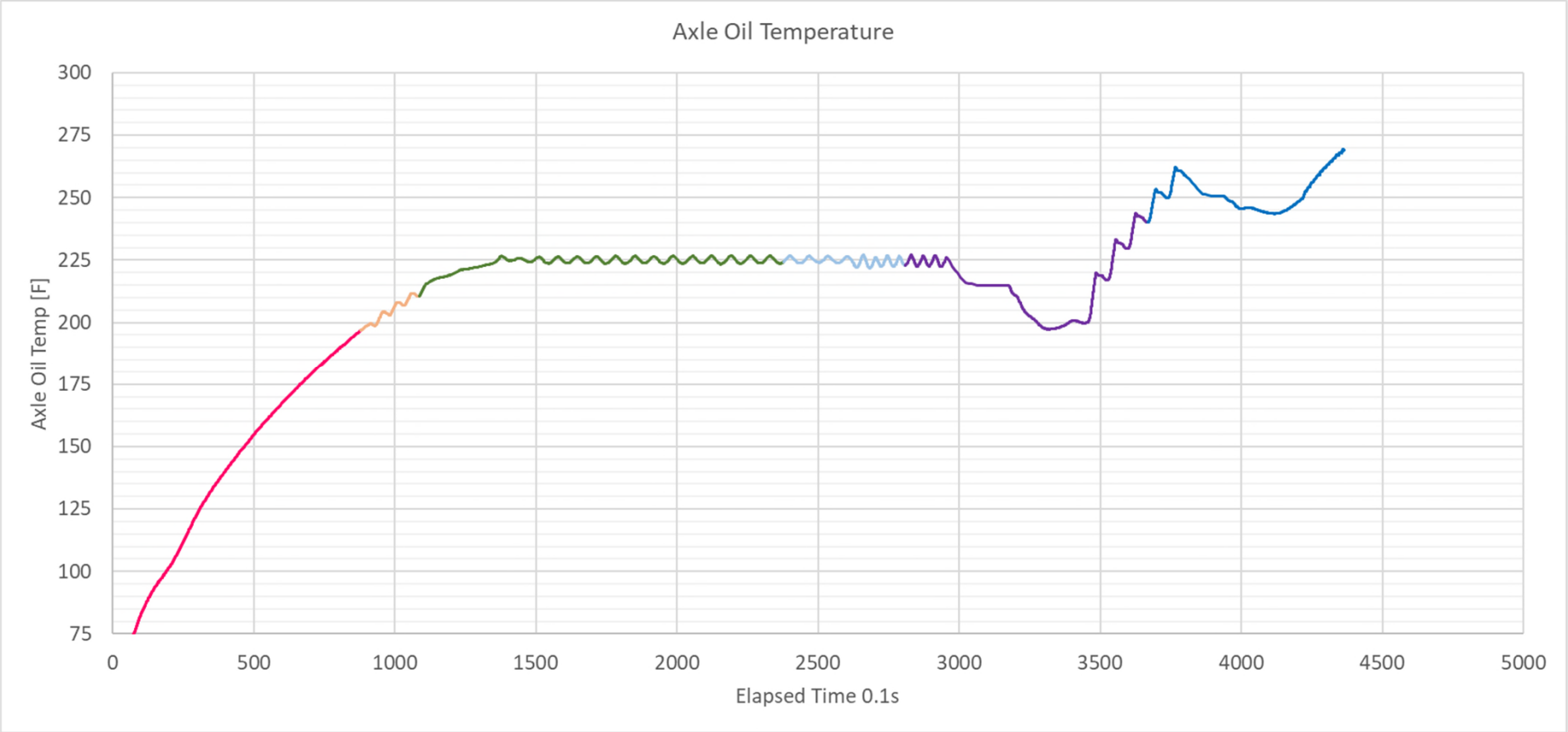
| Conditioning 4 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Peak Input Torque Drive [ft-lb]** | | **Peak Input Torque Coast [ft-lb]** | | **Maximum Input Speed [rpm]** | | **Minimum Input Speed [rpm]** | |
| *Target* | | *Target* | | *Target* | *3350* | *Target* | *2754* |
| Avg | 114.8 | Avg | -69.5 | Avg | 3351 | Avg | 2752 |
| Min | 114.3 | Min | -75.2 | Min | 3350 | Min | 2750 |
| Max | 115.3 | Max | -61.8 | Max | 3353 | Max | 2753 |

# Summary Data—Shocks 01-0023

| Shock 1 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Peak Input Torque Drive [ft-lb]** | | **Peak Input Torque Coast [ft-lb]** | | **Maximum Input Speed [rpm]** | | **Minimum Input Speed [rpm]** | |
| *Target* | | *Target* | | *Target* | *4316* | *Target* | *2178* |
| Avg | 233.5 | Avg | -67.6 | Avg | 4348 | Avg | 2191 |
| Min | 232.6 | Min | -76.1 | Min | 4348 | Min | 2175 |
| Max | 235.5 | Max | -62.4 | Max | 4350 | Max | 2197 |

| Shock 2 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Peak Input Torque Drive [ft-lb]** | | **Peak Input Torque Coast [ft-lb]** | | **Maximum Input Speed [rpm]** | | **Minimum Input Speed [rpm]** | |
| *Target* | | *Target* | | *Target* | *3083* | *Target* | *2178* |
| Avg | 237.0 | Avg | -235.2 | Avg | 2600 | Avg | 2192 |
| Min | 222.5 | Min | -239.7 | Min | 2596 | Min | 2172 |
| Max | 270.3 | Max | -208.6 | Max | 2602 | Max | 2201 |

# Temperature Data—01-0023



# Test 01-0024

# Summary Data—Conditioning 01-0024

| Conditioning 1 | | | |
|---|---|---|---|
| **Input Torque [ft-lb]** | | **Input Speed [rpm]** | |
| *Target* | *60 ± 5* | *Target* | *2363* |
| Avg | 59.9 | Avg | 2361 |
| Min | 54.4 | Min | 2357 |
| Max | 68.6 | Max | 2364 |

| Conditioning 3 | | | |
|---|---|---|---|
| **Input Torque [ft-lb]** | | **Input Speed [rpm]** | |
| *Target* | *70 ± 5* | *Target* | *3350* |
| Avg | 70.0 | Avg | 3346 |
| Min | 65.6 | Min | 3344 |
| Max | 73.5 | Max | 3349 |

| Conditioning 2 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Peak Input Torque Drive [ft-lb]** | | **Peak Input Torque Coast [ft-lb]** | | **Maximum Input Speed [rpm]** | | **Minimum Input Speed [rpm]** | |
| *Target* | | *Target* | | *Target* | *2363* | *Target* | *1562* |
| Avg | 112.6 | Avg | -58.1 | Avg | 2366 | Avg | 1581 |
| Min | 112 | Min | -58.8 | Min | 2365 | Min | 1581 |
| Max | 112.9 | Max | -56.9 | Max | 2366 | Max | 1582 |

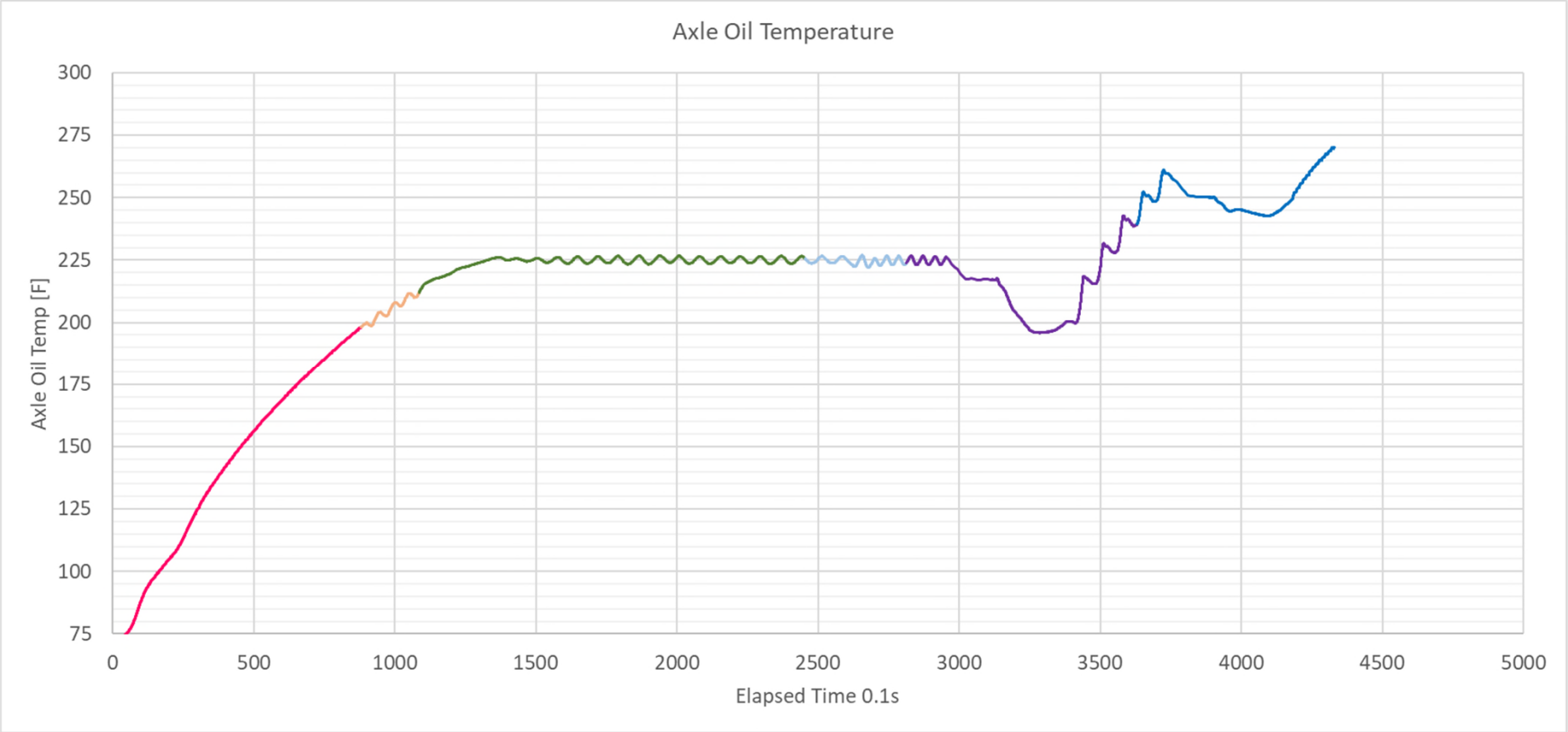
| Conditioning 4 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Peak Input Torque Drive [ft-lb]** | | **Peak Input Torque Coast [ft-lb]** | | **Maximum Input Speed [rpm]** | | **Minimum Input Speed [rpm]** | |
| *Target* | | *Target* | | *Target* | *3350* | *Target* | *2754* |
| Avg | 114.6 | Avg | -65.6 | Avg | 3353 | Avg | 2752 |
| Min | 113.6 | Min | -77.0 | Min | 3348 | Min | 2750 |
| Max | 115.7 | Max | -57.6 | Max | 3355 | Max | 2753 |

# Summary Data—Shocks 01-0024

| Shock 1 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Peak Input Torque Drive [ft-lb]** | | **Peak Input Torque Coast [ft-lb]** | | **Maximum Input Speed [rpm]** | | **Minimum Input Speed [rpm]** | |
| *Target* | | *Target* | | *Target* | *4316* | *Target* | *2178* |
| Avg | 235.5 | Avg | -64.7 | Avg | 4349 | Avg | 2192 |
| Min | 234.5 | Min | -70.7 | Min | 4348 | Min | 2174 |
| Max | 237.9 | Max | -60.9 | Max | 4354 | Max | 2197 |

| Shock 2 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Peak Input Torque Drive [ft-lb]** | | **Peak Input Torque Coast [ft-lb]** | | **Maximum Input Speed [rpm]** | | **Minimum Input Speed [rpm]** | |
| *Target* | | *Target* | | *Target* | *3083* | *Target* | *2178* |
| Avg | 231.3 | Avg | -230.2 | Avg | 2599 | Avg | 2188 |
| Min | 224.4 | Min | -237.0 | Min | 2596 | Min | 2170 |
| Max | 248.5 | Max | -204.8 | Max | 2602 | Max | 2202 |

# Temperature Data—01-0024



# Reference: all ratings to date

| Test Number | Oil Code | EOT Date | Final Pinion Rating (Adjusted) | Final Ring Rating (Adjusted) | On L-42 Target? |
|---|---|---|---|---|---|
| 01-0003 | TMC 117 (High Ref) | 4/22/22 | 22% | 15% | Y |
| 01-0004 | TMC 113 (Disc. Oil) | 4/25/22 | 52% | 42% | Y |
| 01-0005 | TMC 117 (High Ref) | 6/16/22 | 30% | 18% | Y |
| 01-0006 | TMC 113 (Disc. Oil) | 6/17/22 | 46% | 36% | N |
| 01-0007 | TMC 117 (High Ref) | 6/20/22 | 30% | 20% | Y |
| 01-0008 | TMC 113 (Disc. Oil) | 6/20/22 | 43% | 33% | N |
| 01-0009 | TMC 117 (High Ref) | 9/27/22 | 33% | 18% | N |
| 01-0010 | TMC 113 (Disc. Oil) | 9/28/22 | 61% | 49% | N |
| 01-0012 | TMC 117 (High Ref) | 10/19/22 | 35% | 23% | N |
| 01-0011 | TMC 113 (Disc. Oil) | 10/19/22 | 60% | 48% | N |

# Reference: all ratings to date, continued

| Test Number | Oil Code | EOT Date | Final Pinion Rating (Adjusted) | Final Ring Rating (Adjusted) | On L-42 Target? |
|---|---|---|---|---|---|
| 01-0013 | TMC 117 (High Ref) | 7/26/23 | 16 | 11 | Y |
| 01-0014 | TMC 119 (Disc. Oil) | 7/26/23 | 28 | 18 | N |
| 01-0015 | TMC 117 (High Ref) | 7/29/23 | 19 | 12 | Y |
| 01-0016 | TMC 119 (Disc. Oil) | 7/30/23 | 28 | 28 | N |
| 01-0017 | TMC 117 (High Ref) | 8/7/23 | 18 | 12 | Y |
| 01-0018 | TMC 119 (Disc. Oil) | 8/7/23 | 35 | 26 | N |
| 01-0019 | TMC 119 (leftover 2023 pilot axle) | 9/25/23 | 28 | 18 | n/a |
| 01-0020 | TMC 117 (High Ref) | | Invalid | | |

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| | | | 5404 Bandera Rd.<br>San Antonio, TX 78238 | E-mail: | nancy.aguirre@intertek.com |
| NA | Ariemma, Nick | NV | The Lubrizol Corporation | Phone: | |
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| | Banas, Rob | V | ExxonMobil Product Solutions | Phone: | 770-833-5920 |
| | | | 535 Thomas Lane<br>Waleska, GA 30183 | E-mail: | rob.a.banas@exxonmobil.com |
| DB | Beck, Dylan | V | ASTM Test Monitoring Center | Phone: | 724-355-1854 |
| | | | 203 Armstrong Drive<br>Freeport, PA 16229 | E-mail: | djb@astmtmc.org |
| DB | Bell, Don | NV | Afton Chemical | Phone: | 804-788-6332 |
| | | | 500 Spring St.<br>Richmond, VA 23219 | E-mail: | don.bell@aftonchemical.com |

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| TB | Bender, Tobias | NV | Fuchs Lubricants | Phone: | 708-737-1681 |
| | | | 17050 Lathrop Ave<br>Harvey, IL 60426 | E-mail: | Tobias. Bender@fuchs.com |
| | Camposo, Lucas | NV | Evonik | Phone: | 215-706-5809 |
| | | | 723 Electronic Dr<br>Horsham, PA 19044 | E-mail: | lucas.camposo@evonik.com |
| MC | Caridi, Margaret | NV | BASF | Phone: | 914-785-2336 |
| | | | 500 White Plains Rd<br>Tarrytown, NY 10591 | E-mail: | margaret.caridi@basf.com |
| | Cereghino, Brian | NV | IPAC Inc. | Phone: | |
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| | Charron, Michael | NV | Southwest Research Institute | Phone: | 832-444-2180 |
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| JC | Clark, Jeff | NV | ASTM Test Monitoring Center | Phone: | 412-365-1032 |
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| AC | Comfort, Allen | V | US Army DEVCOM | Phone: | 586-282-4225 |
| | | | | E-mail: | allen.s.comfort.civ@army.mil |
| | Drlja, Kristijan | NV | The Lubrizol Corporation | Phone: | 440-391-6374 |
| | | | 29400 Lakeland Boulevard Wickliffe, OH 44092 | E-mail: | krdr@lubrizol.com |
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| | Grundza, Rich | NV | ASTM Test Monitoring Center | Phone: | 412-365-1031 |
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| | Haynes, Troy | NV | IPAC Inc. | Phone: | |
| | | | | E-mail: | thaynes@ipac-inc.com |
| DH | Horvath, Dan | NV | Afton Chemical | Phone: | 248-514-2551 |
| | | | 2000 Town Center, Suite 1160 Southfield, MI 48075 | E-mail: | dan.horvath@aftonchemical.com |
| AJ | Jackson, Alexander | NV | Chevron Oronite | Phone: | 510-367-7541 |
| | | | 4502 Centerview, Suite 210 San Antonio, TX 78228 | E-mail: | alexmjack@chevron.com |
| Virtual | Jordan, Brad | NV | Shell | Phone: | 804-516-1238 |
| | | | 2084 Ditchley Rd Kilmarnock, VA 22482 | E-mail: | brad.jordan@shell.com |
| | Joy, Tisha | NV | BASF | Phone: | 914-785-2206 |
| | | | | E-mail: | tisha.joy@basf.com |

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| | Kanga, Percy | NV | Exxon Mobil (Retired) | Phone: | |
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| | Kostan, Travis | NV | Southwest Research Institute | Phone: | 210.522.2407 |
| | | | | E-mail: | travis.kostan@swri.org |
| JL | LaBond, Carowick, Jessica | NV, V | Cummins-Meritor | Phone: | 248-872-3055 |
| | | | 2135 W. Maple Rd<br>Troy, MI 48084 | E-mail: | Jessica.LaBond@cummins.com |
| AL | Lange, Anthony | V | Intertek Automotive Research | Phone: | 210-634-1103 |
| | | | 5404 Bandera Rd.<br>San Antonio, TX 78238 | E-mail: | anthony.lange@intertek.com |
| JM | Morris, Jeanelle | NV | Navistar | Phone: | 331-332-1661 |
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| DMM | Mosher, Donna | NV | BASF | Phone: | 269-217-1715 |
| | | | 100 Park Ave<br>Florham Park, NJ 07932 | E-mail: | donna.mosher@basf.com |
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| | | | 6220 Culebra Rd.<br>San Antonio, TX 78238 | E-mail: | caroline.louis@swri.org |
| TM | Muransky, Troy | V | AAM | Phone: | 734-564-8406 |
| | | | 1840 Holbrook<br>Detroit, MI | E-mail: | troy.muransky@aam.com |
| | Neil, Suzanne | NV | Daimler Trucks/Detroit Diesel | Phone: | |
| | | | | E-mail: | suzanne.neal@daimler.com |
| | Portell, Michael | NV | Intertek Automotive Research | Phone: | 210-896-8012 |
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| | | | 500 Spring St.<br>Richmond, VA 23219 | E-mail: | matt.sangpeal@aftonchemical.com |
|  | Sattler, Eric | NV | CCDC-GVSC | Phone: | 586-282-2272 |
| | | | Warren, MI | E-mail: | eric.r.sattler.civ@army.mil |
|  | Schaup, Nick | V | The Lubrizol Corporation | Phone: | |
| | | | 29400 Lakeland Boulevard<br>Wickliffe, OH 44092 | E-mail: | Nick.Schaup@Lubrizol.com |
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| | | | 823 Joslyn Ave Pontiac, MI 84340-2925 | E-mail: | khaled.zreik@gm.com |
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| MB | Maxim Burgman | NV | Fuchs Lubricants | Phone: | 248 846 3120 |
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