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Committee D02 on PETROLEUM PRODUCTS AND LUBRICANTS

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May 17th, 2022

Reply to:
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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:

May 11, 2022 L-42 Surveillance Panel Meeting (Intertek Automotive Research, Plymouth, 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

Intertek Automotive Research, Plymouth, MI and Virtual Meeting – Microsoft Teams

May 11, 2022

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

R. Banas (Exxon Mobil)*	F. Farber (TMC)*	**C. Louis (SwRI)**
S. Bealko (LZ)*	R. Grundza (TMC)	D. Moser (BASF)
D. Beck (TMC)	**A. Goyal (BASF)**	**T. Muransky (AAM)**
D. Bell (Afton)	D. Horvath (Afton)	**M. Sangpeal (Afton/C)**
M. Cabaj (Linamar)*	P. Kanga (Retired)*	**R. Slocum (LZ)**
M. Caridi (BASF)	T. Kostan (SwRI)*	W. Venhoff (LZ)
J. Carter (Meritor)	J. LaBond (Meritor)	**A. Zyski (Dana)**
M. Charron (SwRI)	**A. Lange (Intertek)**	

Call to Order

Review of Agenda

The meeting agenda is attached.

Review of Membership

No changes were necessary.

Approval of Meeting Minutes

Meeting minutes for approval:

- "20220209_SP" → February 9, 2022 – Surveillance Panel Meeting – Warrendale, PA

A motion was made to approve these meeting minutes as presented.
Motion: M. Sangpeal
Second: R. Slocum
All in favor, no objections, no abstentions.

L-42 Hardware Print Review

A discussion was had to review intent of asking Dana for detailed prints and manufacturing tolerances for the L-42 axles. The intent of the request was to investigate if establishing acceptance specifications for future hardware orders is feasible. This could help if there was a shift in test severity or a future change of hardware suppliers. Amy Zyski stated that Dana is not comfortable sharing any additional specs or drawings. Dana is willing to investigate potential causes of any futures severity shifts if the need should arise.

L-42-1 Development

C. Louis presented on SwRI's progress on electric L-42-1 test development. Details can be found in the attached presentation. Results from the February meeting were reviewed (scoring severity was too high). Three additional tests were run on the donated hardware using TMC 117 (2) and TMC 113 (1). Shock I peak torque was reduced until EOT scoring was at an acceptable level with TMC 117. Then TMC 113 was run at the same settings. EOT scoring was more than double that of TMC 117.

The number of shocks was kept the same as the current ASTM D7452 procedure requires. Max speeds were slightly higher than spec during both Shock I and II due to limitations of the electric motor.

A discussion was had regarding other labs interest in adopting an electrically driven test. One lab stated that they would need to build an electric stand in parallel to their current gas-engine stand to keep testing going. It was also stated that the Surveillance panel would allow both the gas-engine and electric motor test variants in the future (like L-37 and L-37-1).

SwRI will run four additional tests before the next SP meeting in August: two with TMC 117 and two with TMC 113 to establish repeatability. Current shock settings will be used. This will exhaust inventory of donated axles.

Action Item: SwRI to share specs of their electric motor, drive, and braking resistor with the panel.

L-42-1 Hardware Donation

Plan to review hardware need in August at next SP meeting.

Hardware Order

Labs were asked when they will need to place the next order for more hardware. 2023 will likely be when labs will be ready.

Action Item: Labs will check current inventory and report back at August SP meeting.

Action Item: M. Sangpeal to provide Dana Sales contact info to labs in need of hardware.

L-42 Test Method Revision

D. Beck stated that sections 9.9 and 11.3 in ASTM D7452 contradict each other and can lead to confusion. Details can be found in the attached presentation.

A motion was made to eliminate section 9.9 and to keep section 11.3 as it currently stands.
Motion: A. Lange
Second: R. Slocum
All in favor, no objections, no abstentions.

New/Open Issues

No new business was discussed.

Adjournment

A motion was made to adjourn.
Motion: W. Venhoff
Second: A. Lange
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

Intertek Automotive Research

Plymouth, MI

May 11, 2022

9:30 – 10:30 AM EDT

Passion for Solutions™

Agenda

- **Call to Order**
- **Agenda**
- **Membership Review & Update**
- **Approval of Meeting Minutes**
  - 20220209 SP Meeting - PRI, Warrendale, PA
- **L-42 Hardware Print Review**
- **L-42-1 Development Updates**
  - Update from SwRI
  - L-42-1 Development Hardware Donation
- **Hardware Inventory Check**
- **L-42 Test Method Revision**
- **New Issues**
- **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**
- **Jason Carter:** **Meritor**
- **Matt Sangpeal:** **Afton Chemical (Chair)**
- **Robert Slocum:** **Lubrizol**
- **Anthony Lange:** **Intertek**
- **Caroline Louis:** **SwRI**
- **Amy Zyski:** **Dana**

Approval of Meeting Minutes

SP Meeting Minutes

- "20220209_SP" → February 9, 2022 – Surveillance Panel Meeting – PRI, Warrendale, PA and Virtual Meeting via Microsoft Teams

L-42 Hardware Print Review

- **Update / discussion**

Electric L-42 Development Update

SOUTHWEST RESEARCH INSTITUTE®

Caroline Mueller

May 11th, 2022

Review/Action Items from February 2022

- First severity run completed
  - On L-42 scale, severe overall
  - Used high ref oil (TMC 117-1), standard temperature conditions
  - Polishing points to high severity coming from Shock 1
- Next step: reduce Shock 1 severity and complete severity run 2
  - Maintain use of high ref oil and standard temp
- All 8 donated axles received by EOM Feb 2022

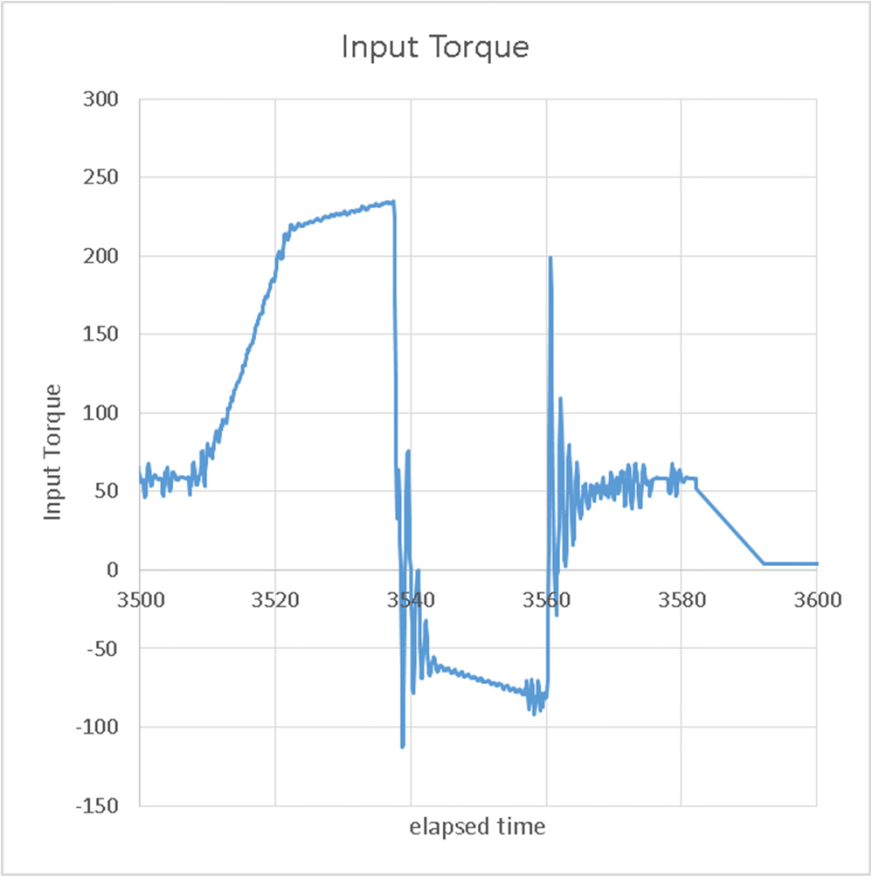
Review: Ratings from 01-0001

L-42-1 Severity Run 01-0001

	Drive Side		Coast Side	
	Pinion	Ring	Pinion	Ring
Shock 1	[redacted]	0%	[redacted]	15%
Rated	0%	0%	44%	34%
Correction Factors			6%	0%
EOT	0%	0%	50%	34%

Notes: 15% coast side polishing on pinion at EOT.

Working target for percent scoring is low 20s on the pinion with 6% correction factor from current hardware on L-42

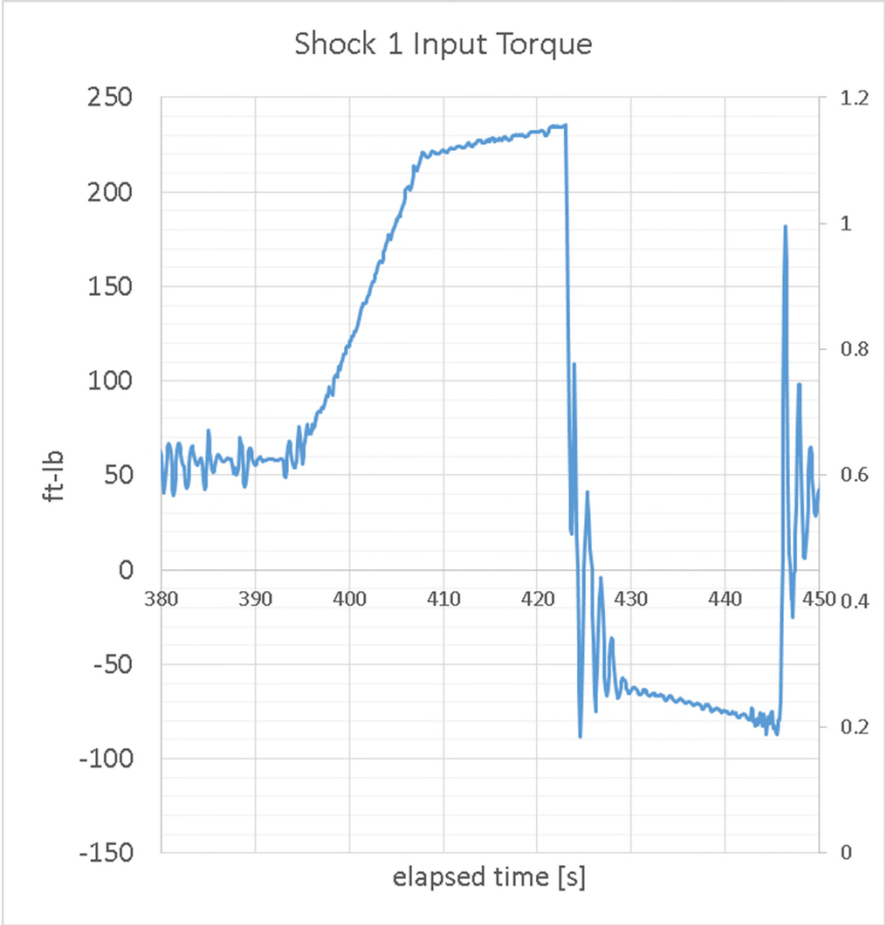


Ratings from 01-0002

	Drive Side		Coast Side	
	Pinion	Ring	Pinion	Ring
Shock 1	[redacted]	0%	[redacted]	12%
Rated	0%	0%	32%	22%
Correction Factors			6%	0%
EOT	0%	0%	38%	22%

Notes: 8% coast side polishing on pinion at EOT.

Working target for percent scoring is low 20s on the pinion with 6% correction factor from current hardware on L-42

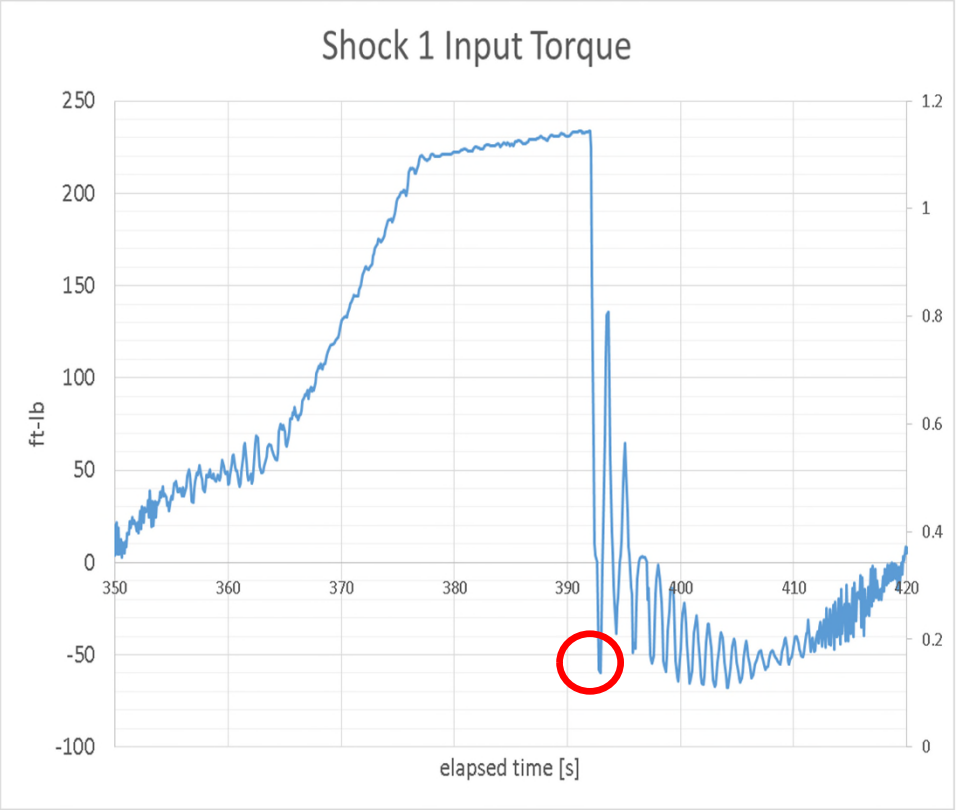


Ratings from 01-0003

	Drive Side		Coast Side	
	Pinion	Ring	Pinion	Ring
Shock 1	[redacted]	0%	[redacted]	0%
Rated	0%	0%	16%	11%
Correction Factors			6%	0%
EOT	0%	0%	22%	11%

Notes: 0% coast side polishing on pinion at EOT.

Working target for percent scoring is low 20s on the pinion with 6% correction factor from current hardware on L-42

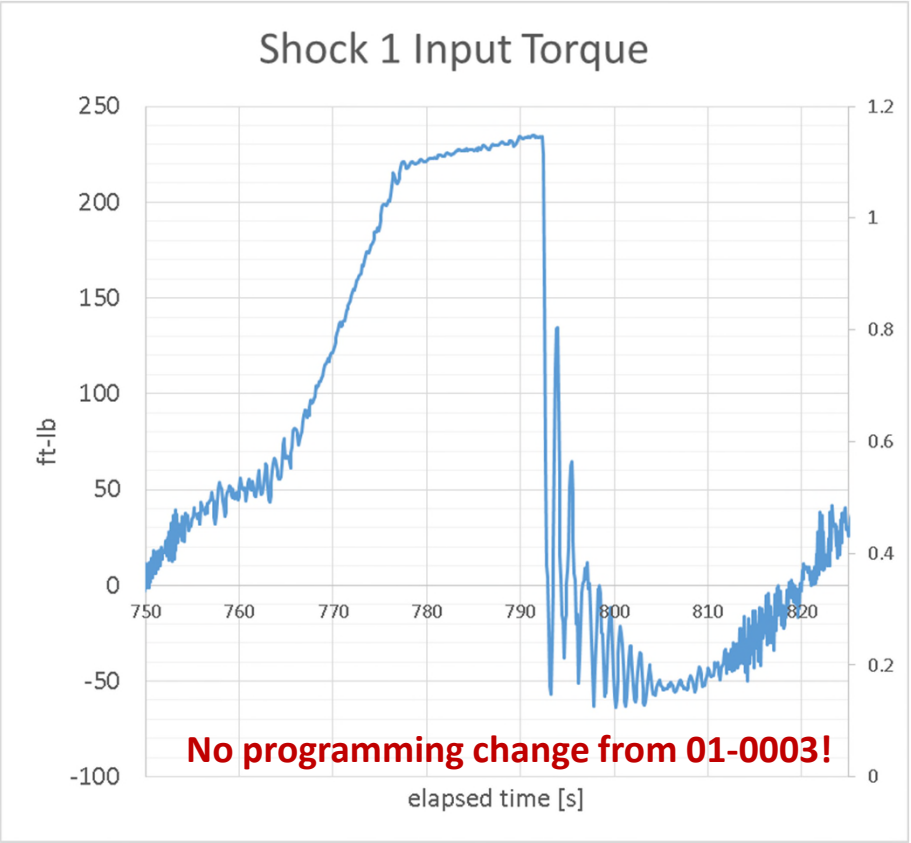


Ratings from 01-0004 (Discrimination run)

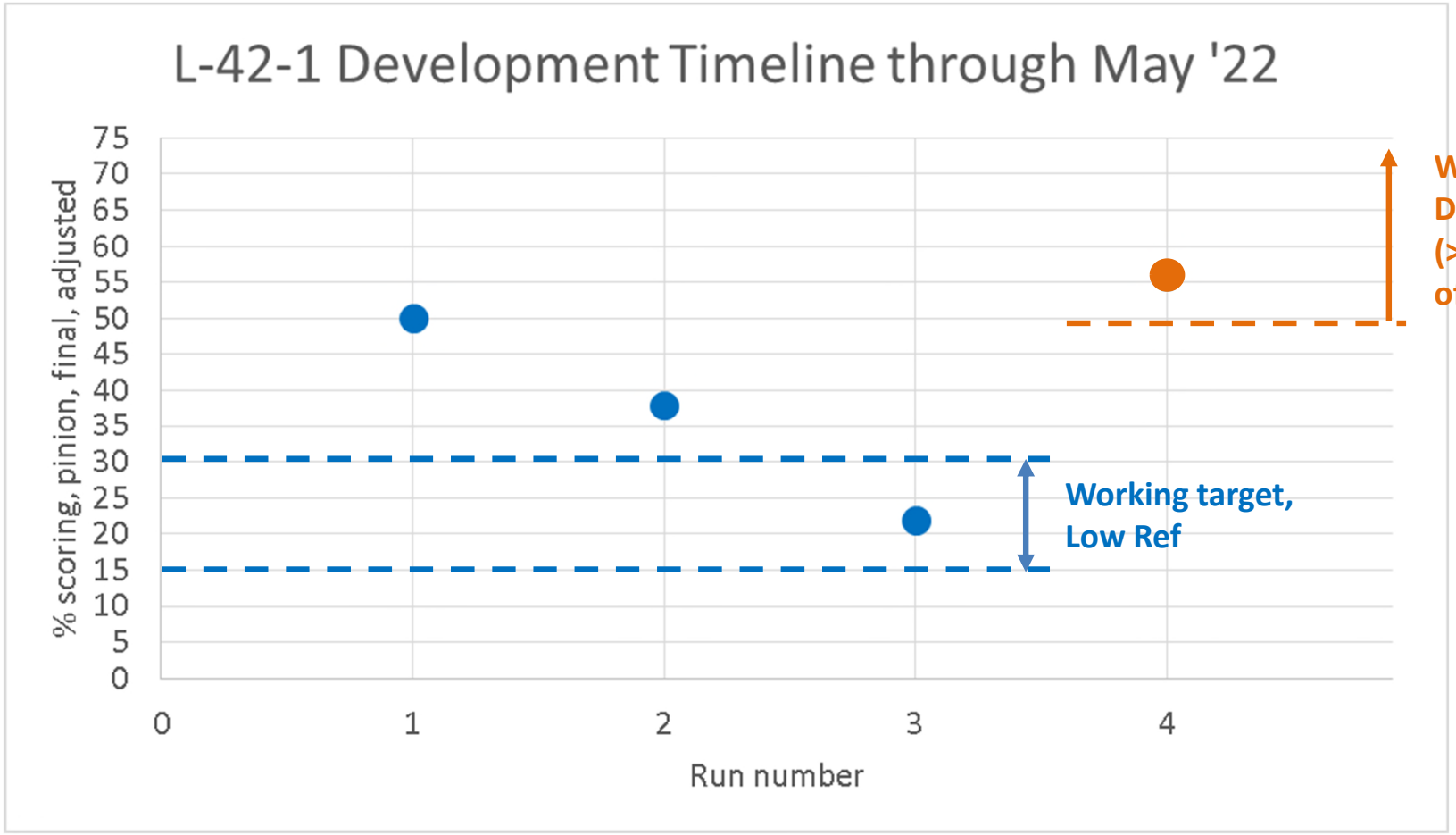
	Drive Side		Coast Side	
	Pinion	Ring	Pinion	Ring
Shock 1	[redacted]	0%	[redacted]	0%
Rated	0%	0%	52%	42%
Correction Factors			6%	0%
EOT	0%	0%	58%	42%

Notes: 0% coast side polishing on pinion at EOT.

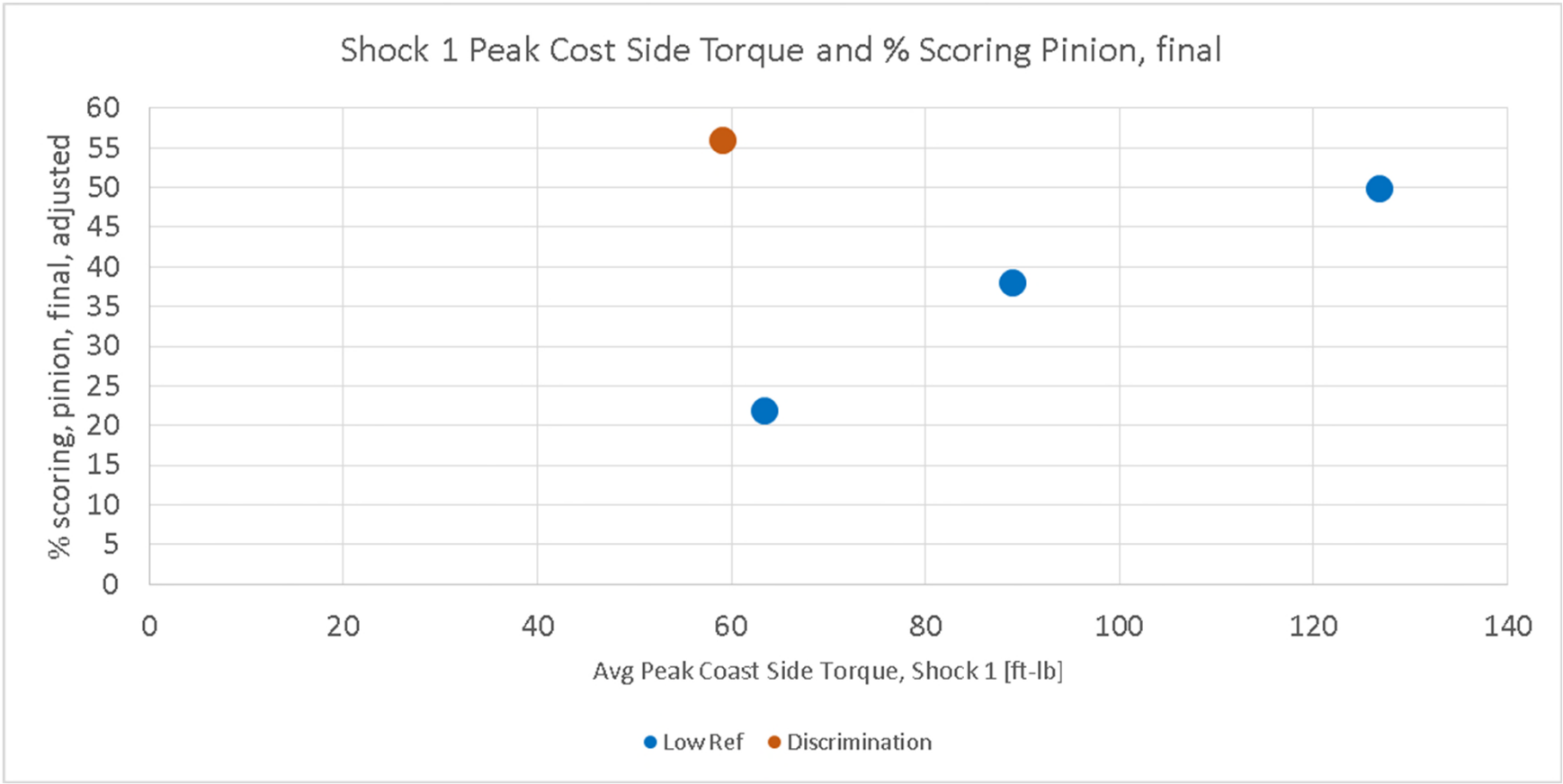
Working target for percent scoring is 2x scoring from 01-0003 on the pinion with 6% correction factor from current hardware on L-42



Tabulated ratings for severity runs 1-4



Final pinion ratings and Shock 1 peak coast torques



Conclusions

- Conditioning still appears to protect drive side appropriately as is—no drive side scoring for any of the 4 runs (3x high ref, 1x discrimination)
- Conditioning severity is appropriately mild to prevent coast side scoring after conditioning on all 4 runs (3x high ref, 1x discrimination)
- Changes to Shock 1 between 01-0002 and 01-0003 got L-42-1 stand on target (according to L-42 targets on same hardware)
- Discrimination oil (TMC 119) was also on target (according to L-42 targets on same hardware)

Things to Note

- For current hardware batch, discrimination oil often shows coast side scoring at shock 1. We're not seeing that for runs 0003 and 0004
  - Simplifies test metric
  - Is different from what we see on the engine stand
- Steady state portions have some intermittent ringing or resonance in the input torque. Investigation is in process:
  - Input torque ringing is decoupled from output torques
  - Phenomenon is new-ish (last 4 to 5 months) and not particular to a single axle or oil
  - Detailed look over of the test stand has not revealed a smoking gun
  - No damping is built into the stand currently. Everything from the motor rotor to the dynos is rigidly connected
  - SwRI is in the process of pulling 10+ diagnostic and operational channels from the VFD to look at that as a potential source

Next Steps

- Currently we have 4 development axles left
- Suggested next steps repeat runs on high ref and discrimination oil, no programming changes
  - High-discrimination-high-discrimination
  - Get idea of repeatability and how that changes with time and axle changeover
    - Operational parameters
    - Ratings

Discussion: longer term next steps

Reference: Operational Data

Operational Data
01-0001 (TMC 117)

Stats—Conditioning 01-0001

Conditioning 1			
Input Torque [ft-lb]		**Input Speed [rpm]**	
Target	***60 ± 5***	***Target***	***2363***
Avg	**60.0**	**Avg**	**2360**
Min	59.2	Min	2357
Max	61.5	Max	2363

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***	***1582***
Avg	**113.3**	**Avg**	-57.8	**Avg**	**2366**	**Avg**	**1581**
Min	112.1	Min	-59.7	Min	2365	Min	1580
Max	113.8	Max	-55.6	Max	2367	Max	1582

Conditioning 3			
Input Torque [ft-lb]		**Input Speed [rpm]**	
Target	***70 ± 5***	***Target***	***3350***
Avg	**69.9**	**Avg**	**3346**
Min	48.9	Min	3343
Max	82.0	Max	3349

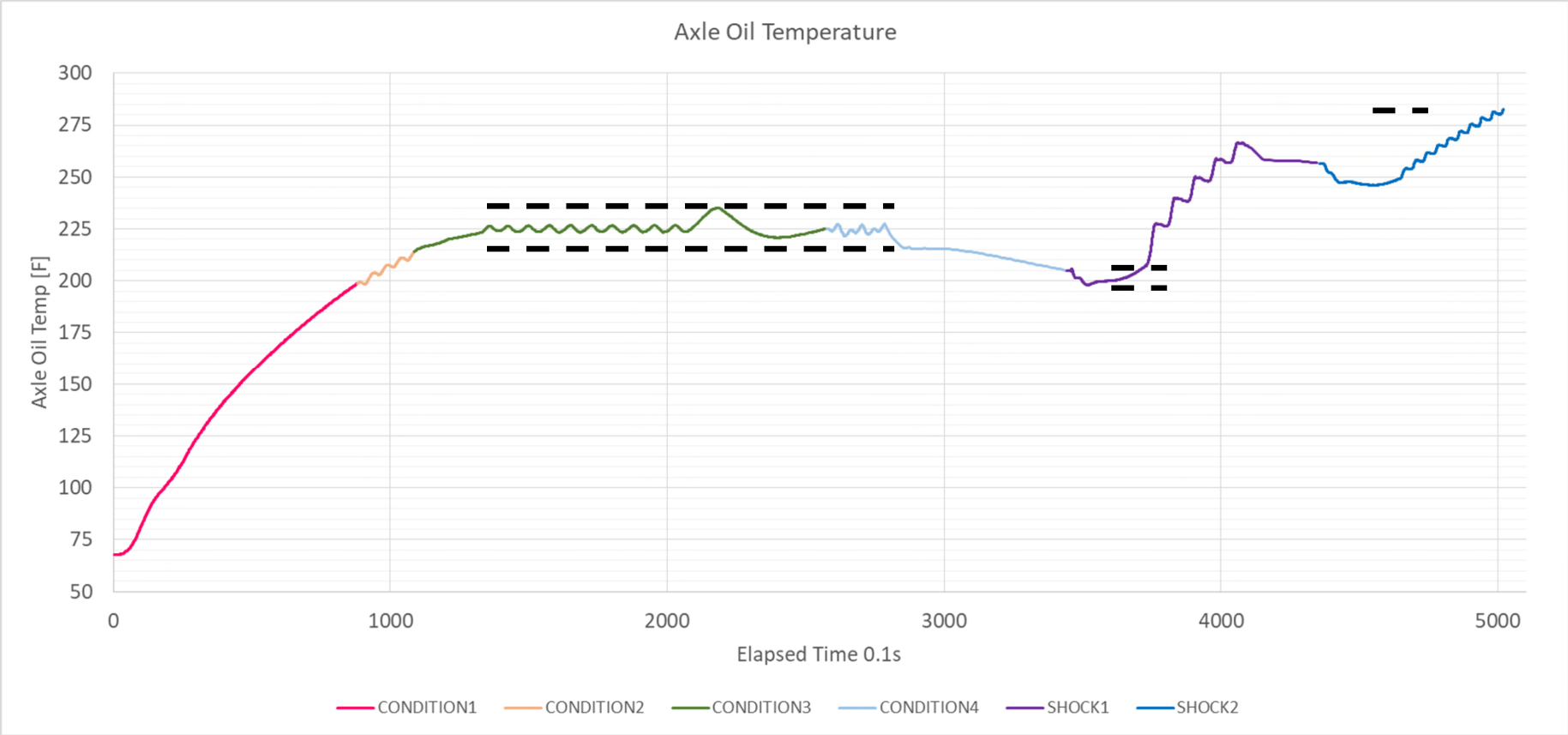
Conditioning 4							
Peak Input Torque Drive [ft-lb]		**Peak Input Torque Coast [ft-lb]**		**Maximum Input Speed [rpm]**		**Minimum Input Speed [rpm]**	
Target		***Target***		***Target***	***3350***	***Target***	***2754***
Avg	**115.0**	**Avg**	**-66.8**	**Avg**	**3354**	**Avg**	**2753**
Min	114.3	Min	-74.3	Min	3352	Min	2753
Max	115.5	Max	-63.6	Max	3355	Max	2754

Stats—Shocks 01-0001

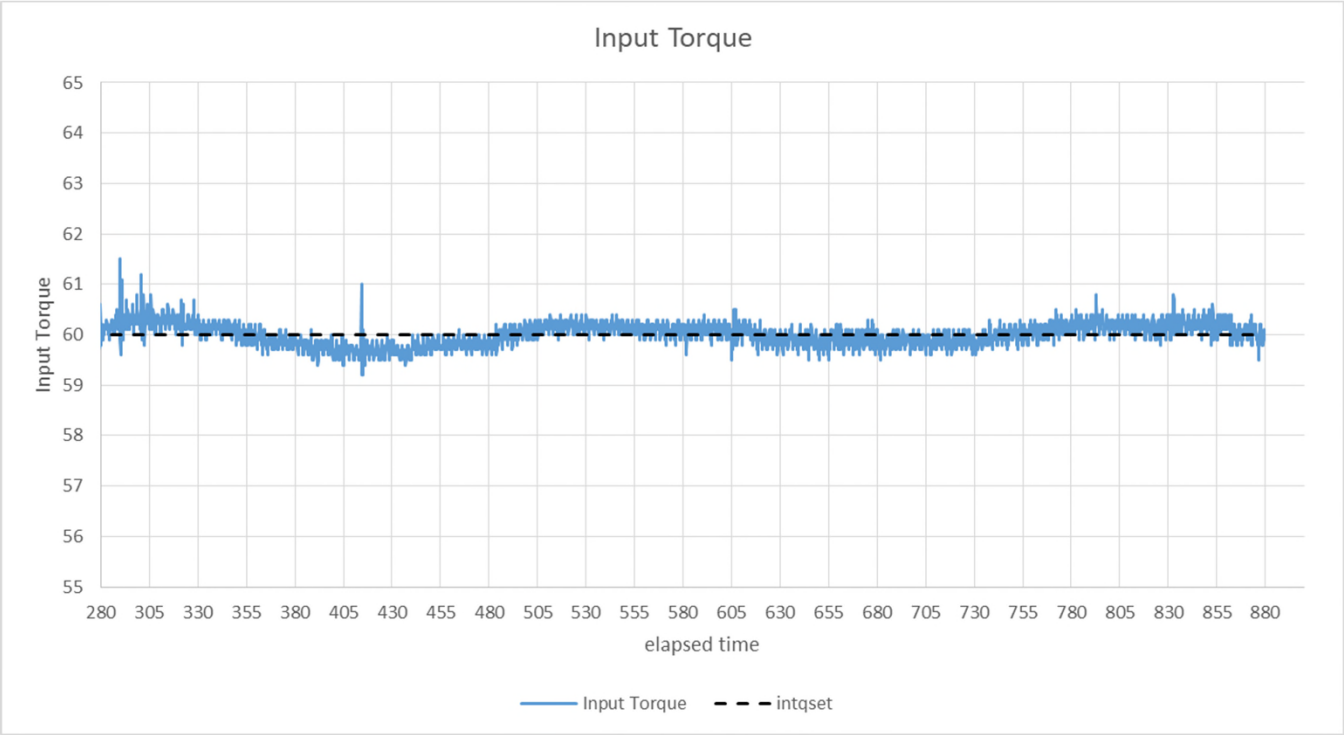
Shock 1							
Peak Input Torque Drive [ft-lb]		**Peak Input Torque Coast [ft-lb]**		**Maximum Input Speed [rpm]**		**Minimum Input Speed [rpm]**	
Target		***Target***		***Target***	***4316***	***Target***	***2178***
Avg	**235.0**	**Avg**	**-126.8**	**Avg**	**4377**	**Avg**	**2177**
Min	233.9	Min	-133.7	Min	4375	Min	2176
Max	236.7	Max	-118.2	Max	4380	Max	2178

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	**225.3**	**Avg**	**-231.7**	**Avg**	**3077**	**Avg**	**2170**
Min	224.3	Min	-232.9	Min	3075	Min	2167
Max	228.6	Max	-226.6	Max	3086	Max	2173

Temperature—01-0001

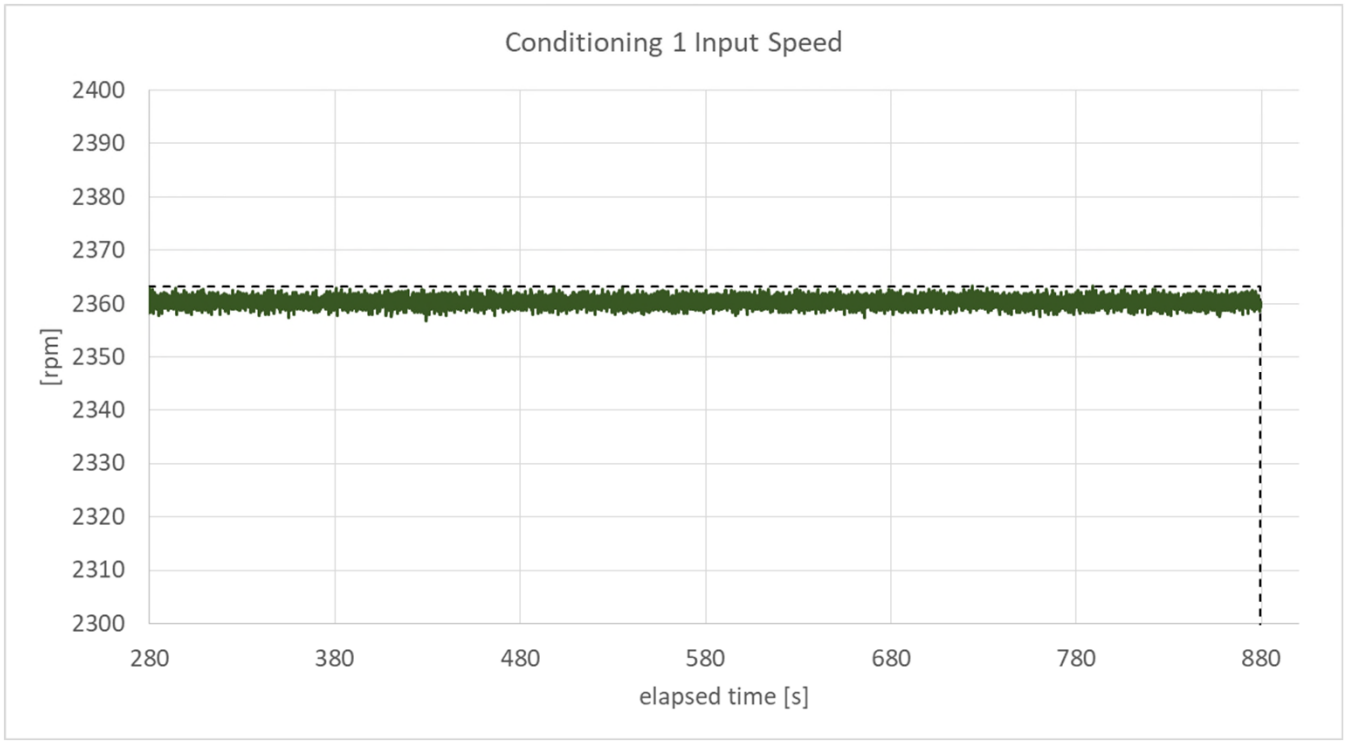


Conditioning 1—01-0001



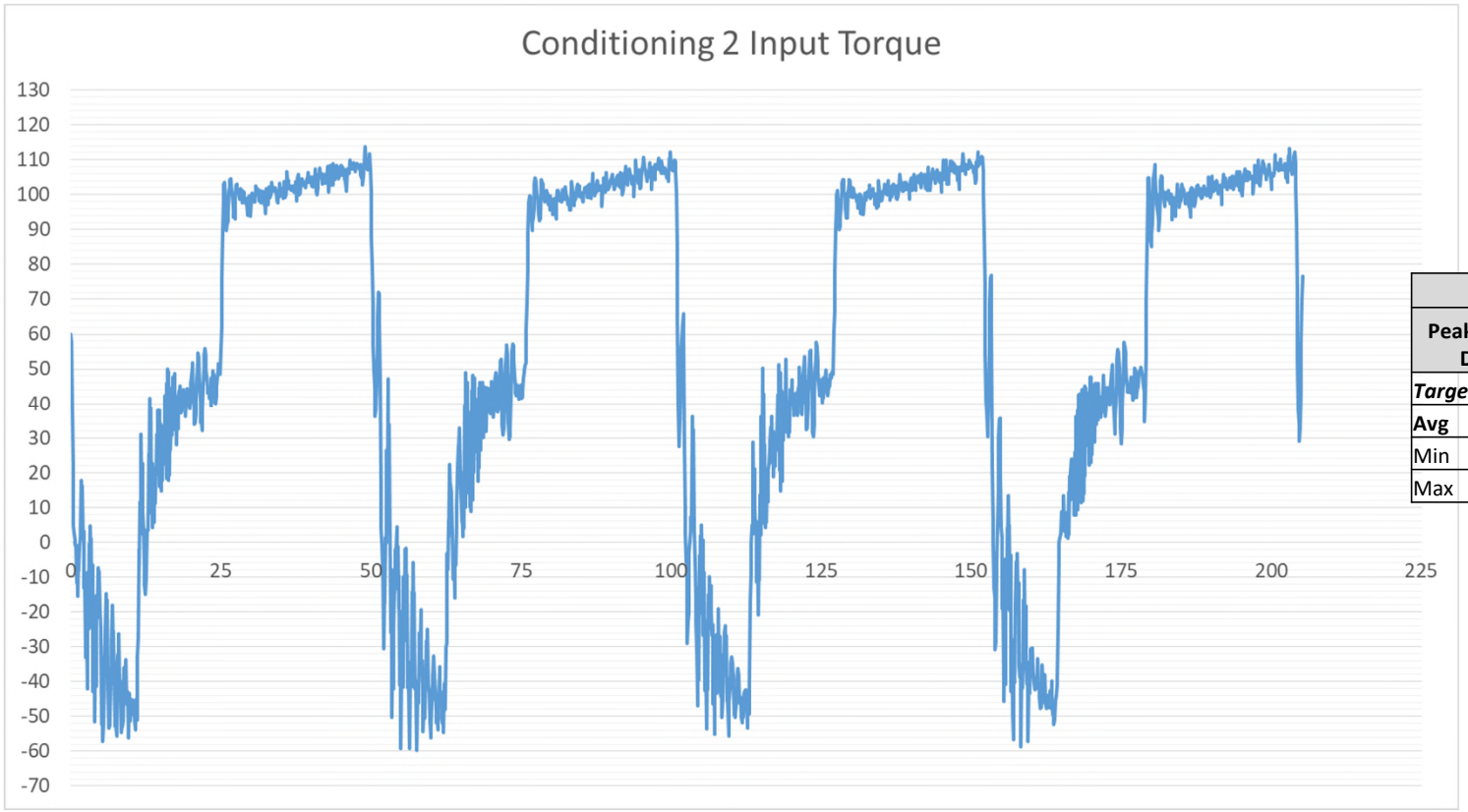
Conditioning 1			
Input Torque [ft-lb]		**Input Speed [rpm]**	
Target	***60 ± 5***	***Target***	***2363***
Avg	**60.0**	**Avg**	**2360**
Min	59.2	Min	2357
Max	61.5	Max	2363

Conditioning 1—01-0001



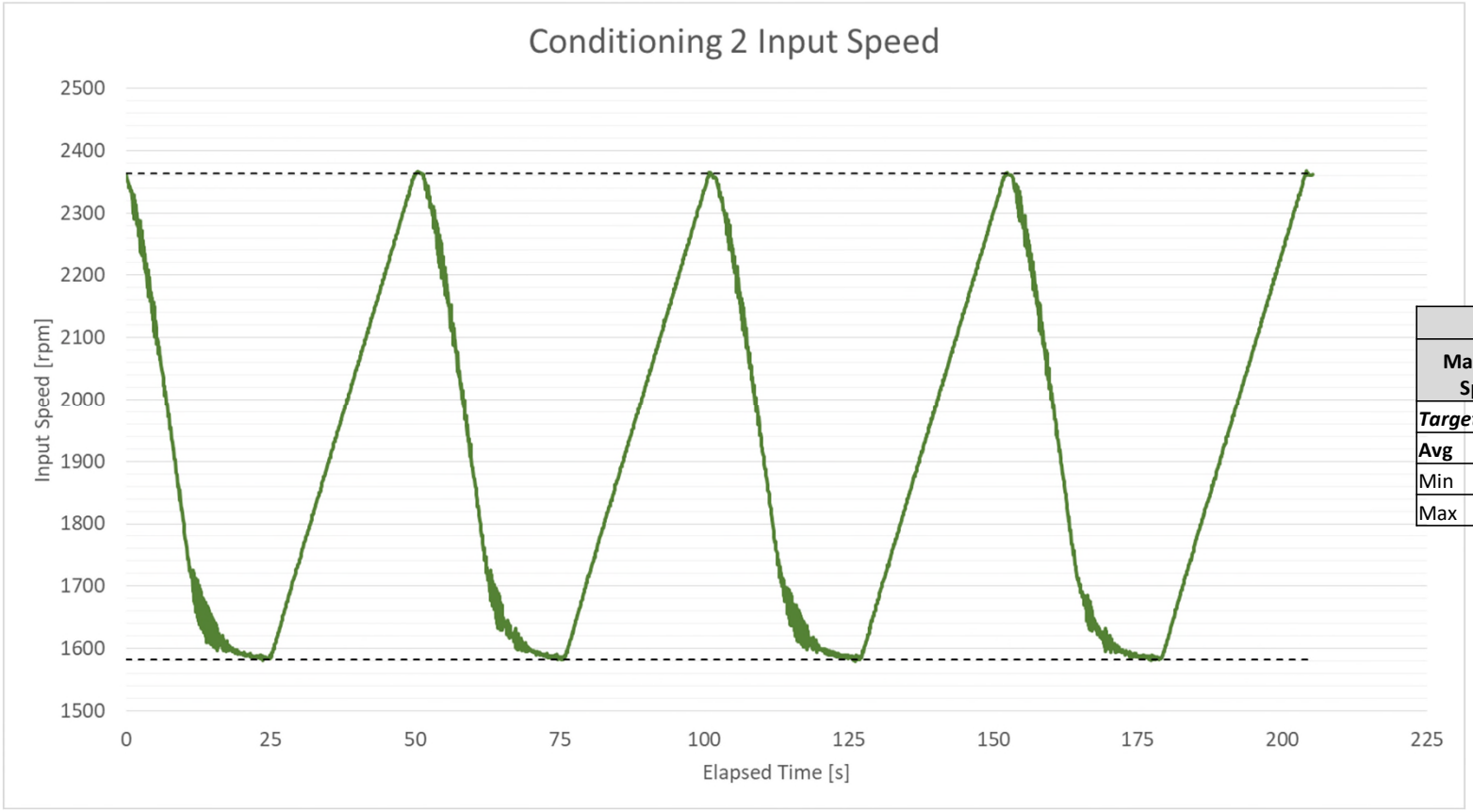
Conditioning 1			
Input Torque [ft-lb]		**Input Speed [rpm]**	
Target	***60 ± 5***	***Target***	***2363***
Avg	**60.0**	**Avg**	**2360**
Min	59.2	Min	2357
Max	61.5	Max	2363

Conditioning 2—01-0001



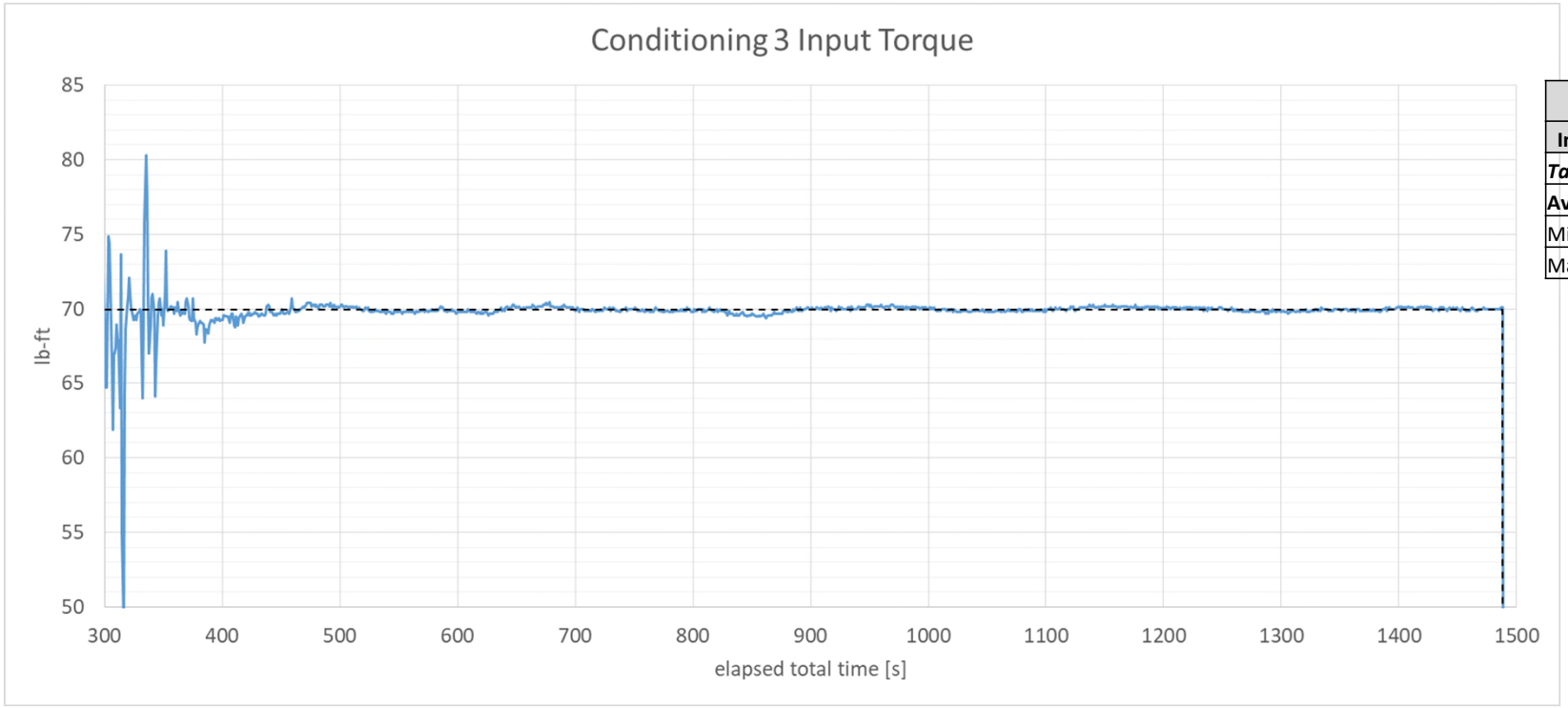
Conditioning 2			
Peak Input Torque Drive [ft-lb]		Peak Input Torque Coast [ft-lb]	
Target		*Target*	
Avg	**113.3**	**Avg**	**-57.8**
Min	112.1	Min	-59.7
Max	113.8	Max	-55.6

Conditioning 2—01-0001



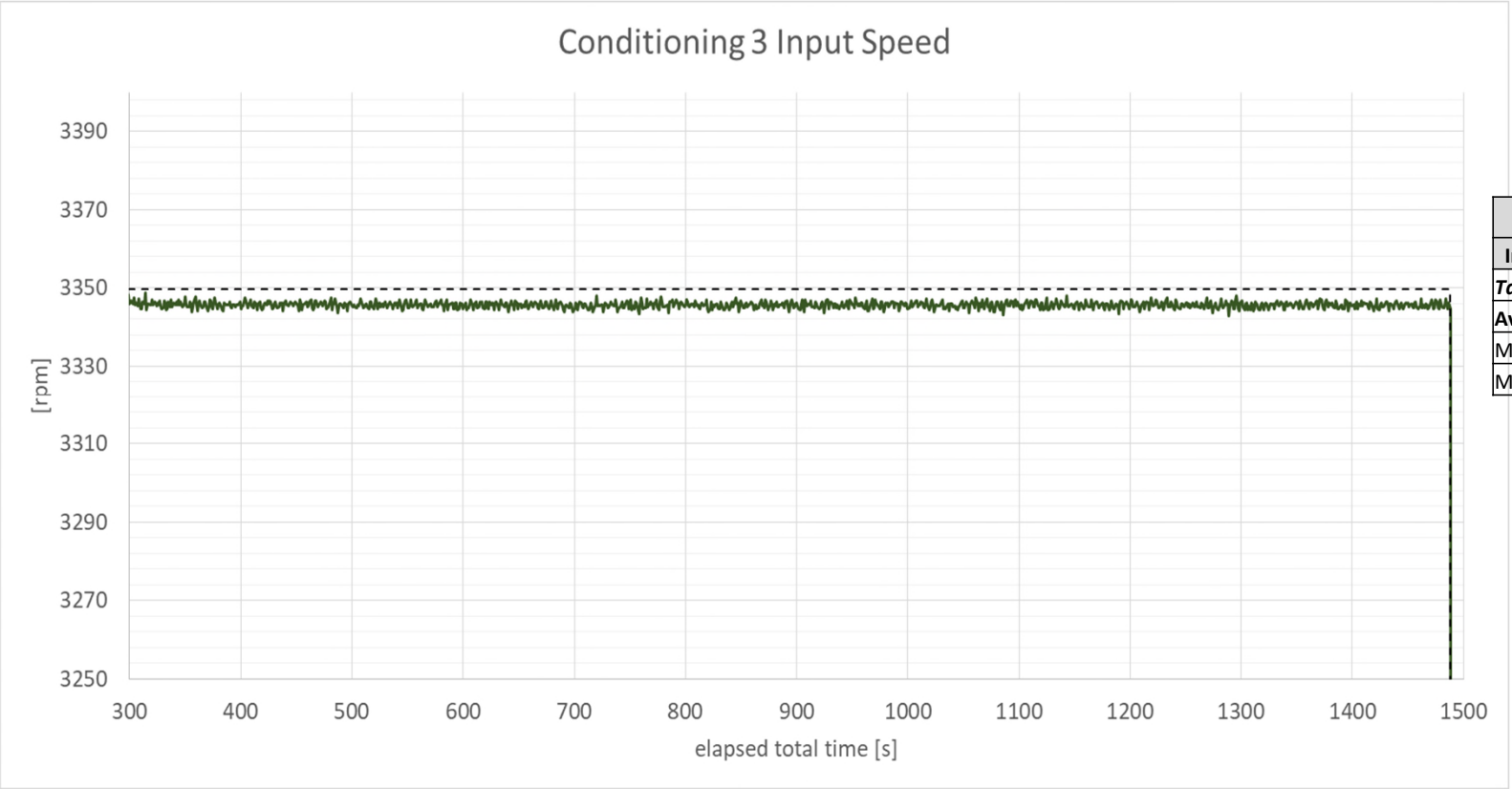
Conditioning 2			
Maximum Input Speed [rpm]		Minimum Input Speed [rpm]	
Target	***2363***	***Target***	***1582***
Avg	**2366**	**Avg**	**1581**
Min	2365	Min	1580
Max	2367	Max	1582

Conditioning 3—01-0001



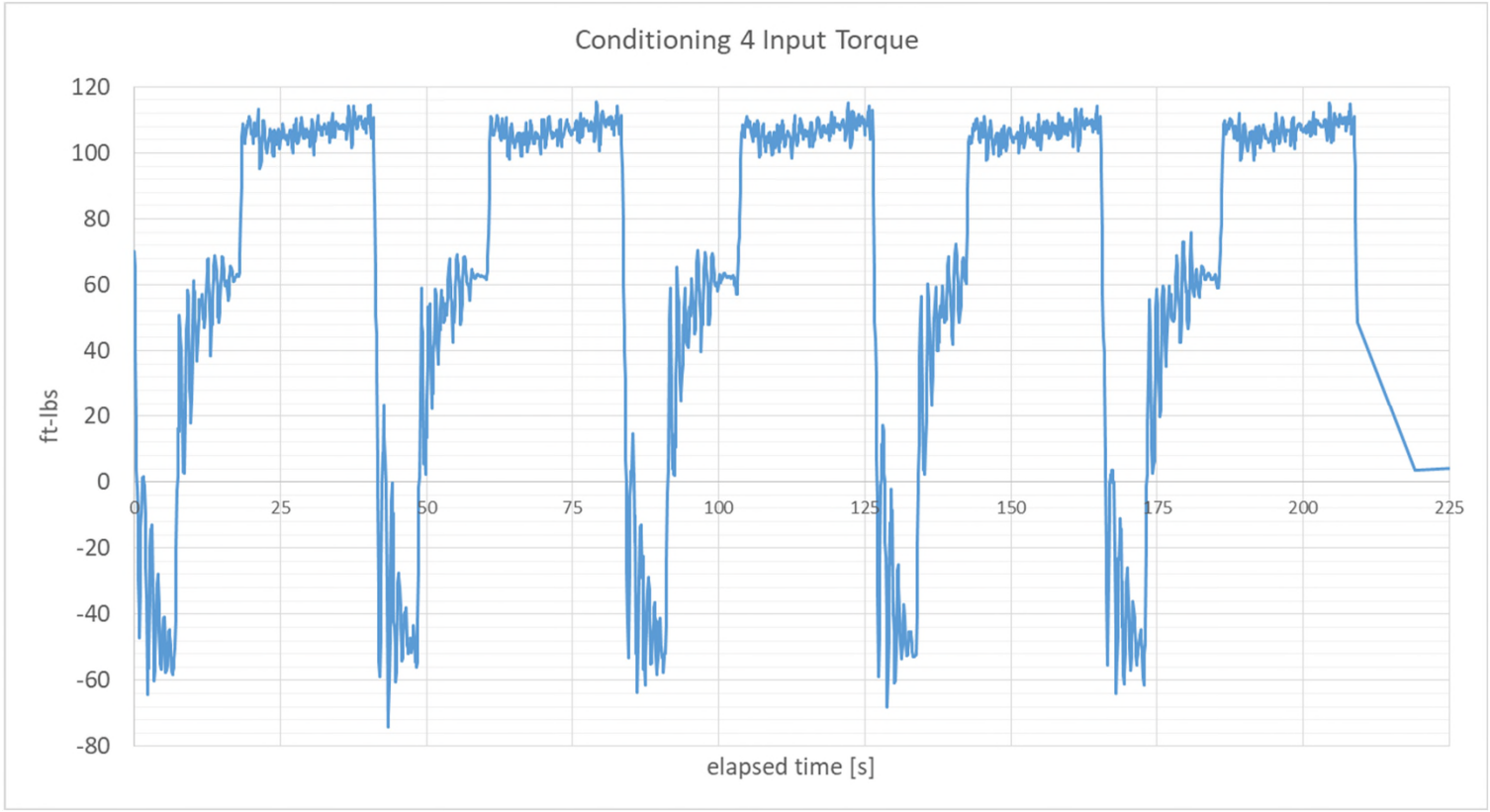
Conditioning 3			
Input Torque [ft-lb]		Input Speed [rpm]	
Target	***70 ± 5***	***Target***	***3350***
Avg	**69.9**	**Avg**	**3346**
Min	48.9	Min	3343
Max	82.0	Max	3349

Conditioning 3—01-0001



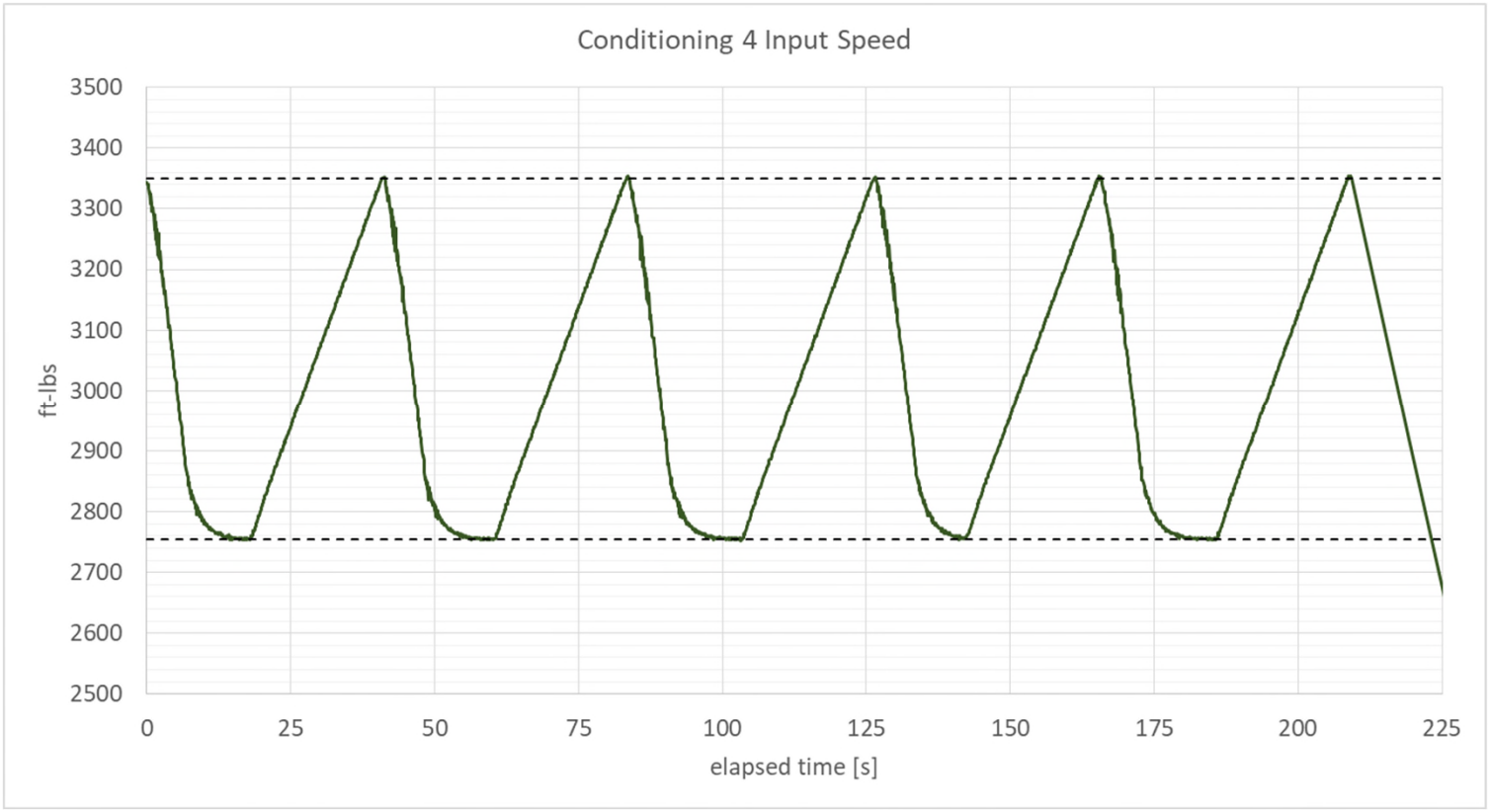
Conditioning 3			
Input Torque [ft-lb]		**Input Speed [rpm]**	
Target	***70 ± 5***	***Target***	***3350***
Avg	**69.9**	**Avg**	**3346**
Min	48.9	Min	3343
Max	82.0	Max	3349

Conditioning 4—01-0001



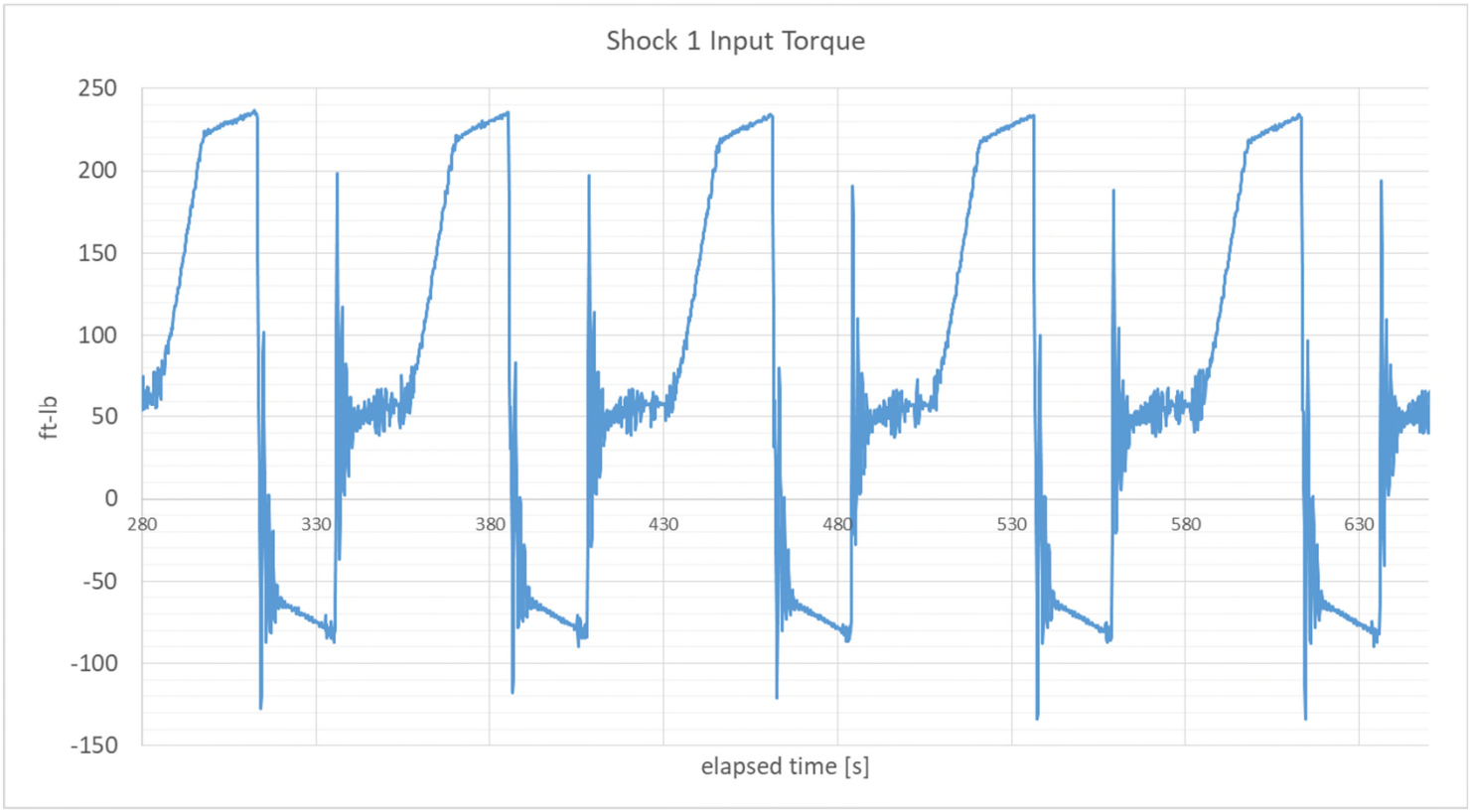
Conditioning 4			
Peak Input Torque Drive [ft-lb]		Peak Input Torque Coast [ft-lb]	
Target		***Target***	
Avg	**115.0**	**Avg**	**-66.8**
Min	114.3	Min	-74.3
Max	115.5	Max	-63.6

Conditioning 4—01-0001



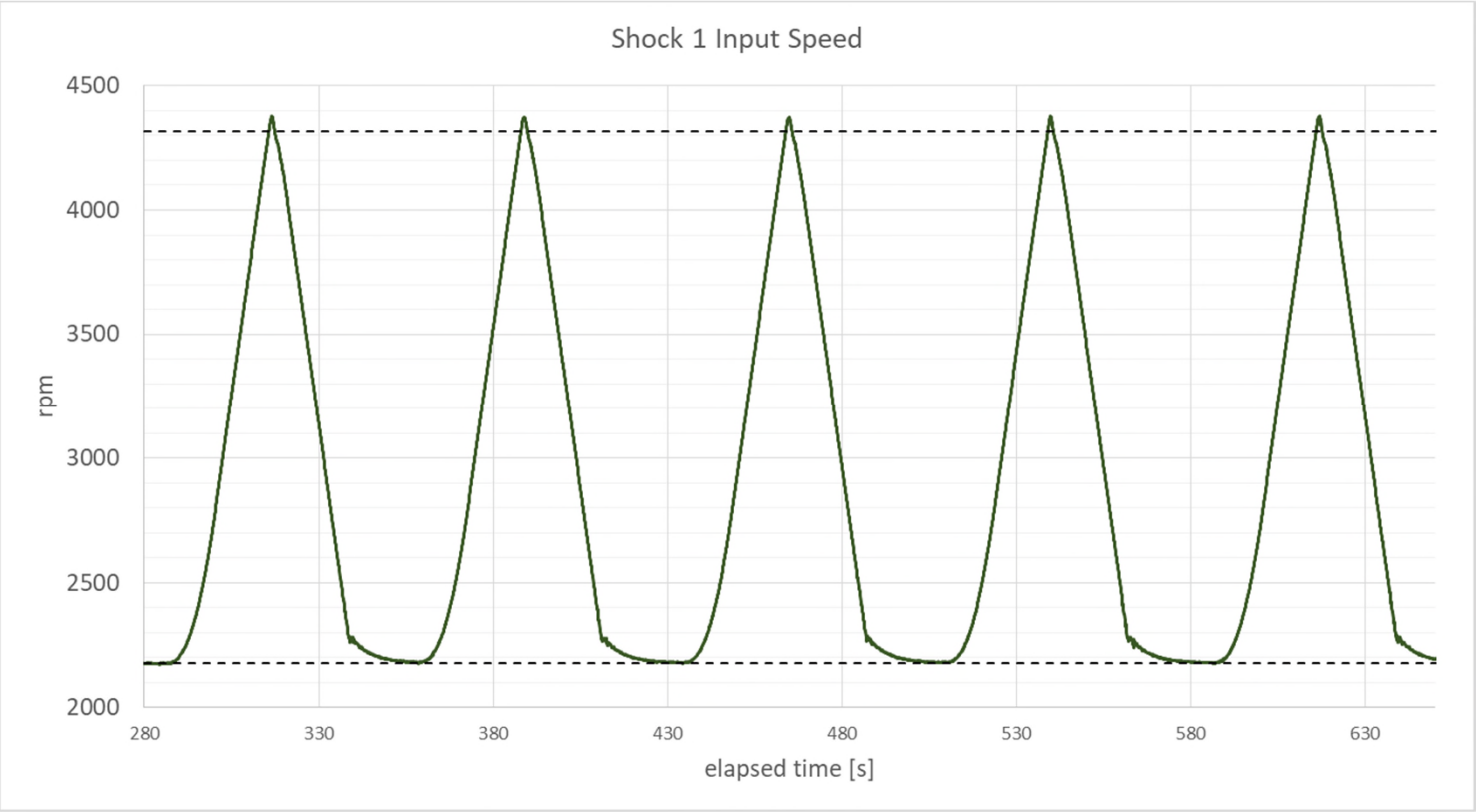
Conditioning 4			
Maximum Input Speed [rpm]		Minimum Input Speed [rpm]	
Target	***3350***	***Target***	***2754***
Avg	**3354**	**Avg**	**2753**
Min	3352	Min	2753
Max	3355	Max	2754

Shock 1—01-0001



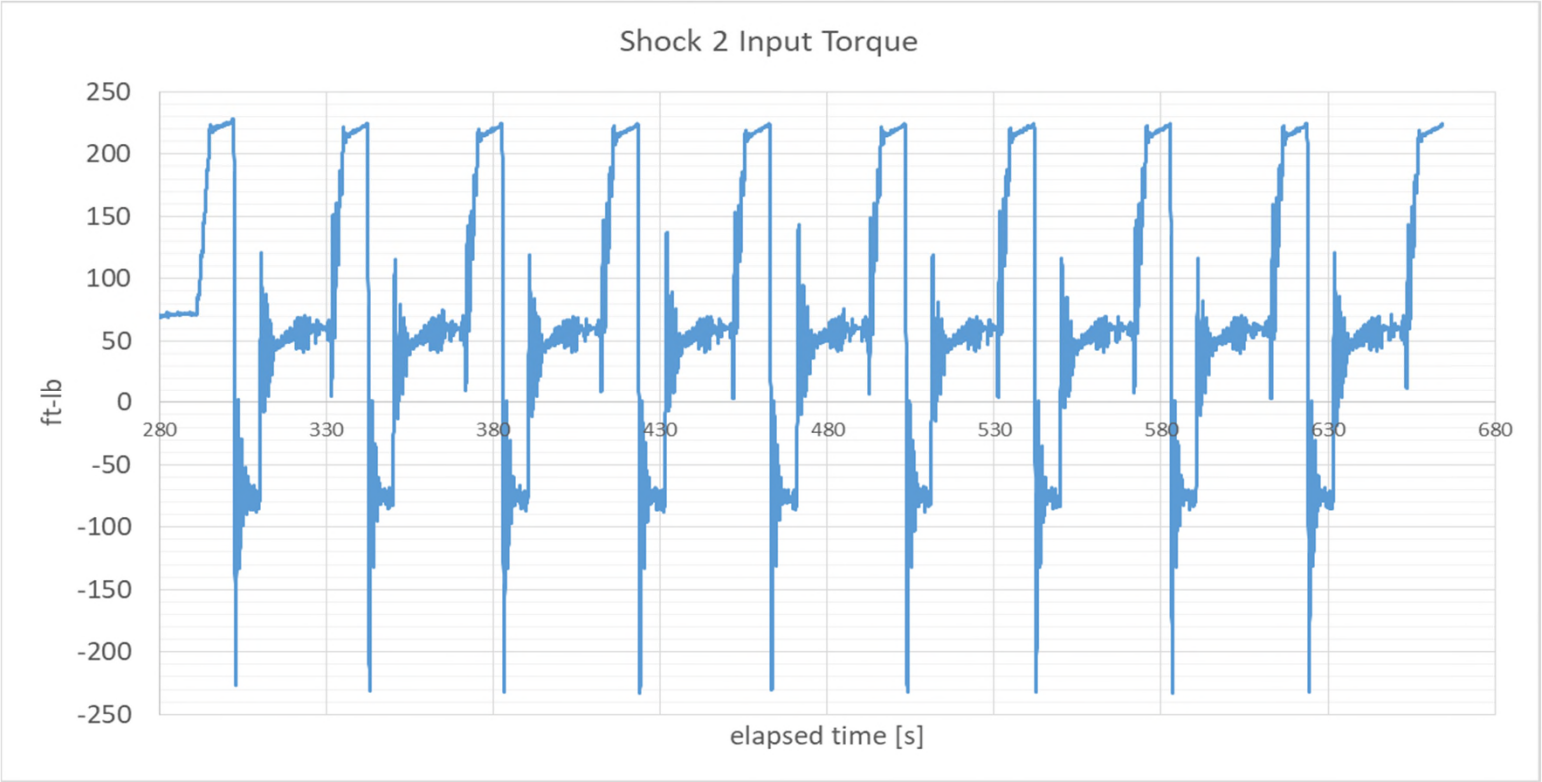
Shock 1			
Peak Input Torque Drive [ft-lb]		Peak Input Torque Coast [ft-lb]	
Target		*Target*	
Avg	**235.0**	**Avg**	**-126.8**
Min	233.9	Min	-133.7
Max	236.7	Max	-118.2

Shock 1—01-0001



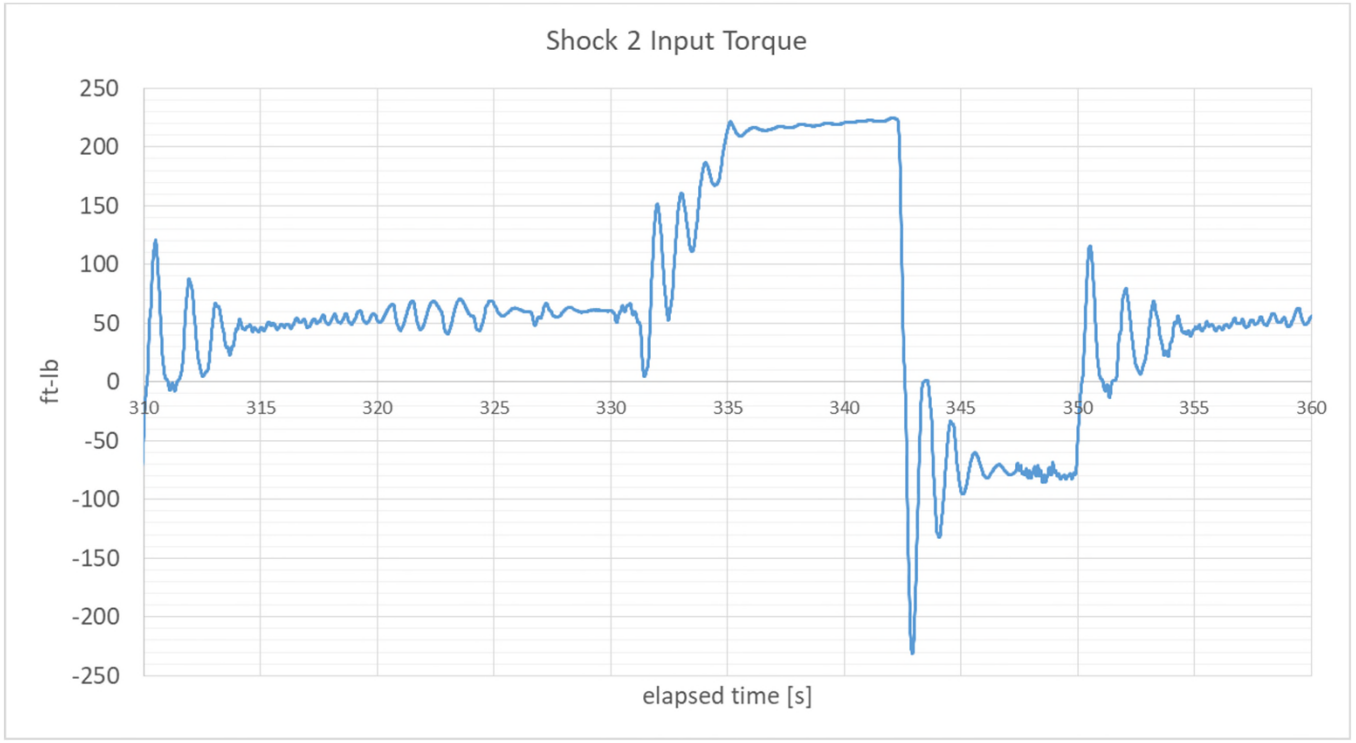
Shock 1			
Maximum Input Speed [rpm]		Minimum Input Speed [rpm]	
Target	***4316***	***Target***	***2178***
Avg	**4377**	**Avg**	**2177**
Min	4375	Min	2176
Max	4380	Max	2178

Shock 2—01-0001

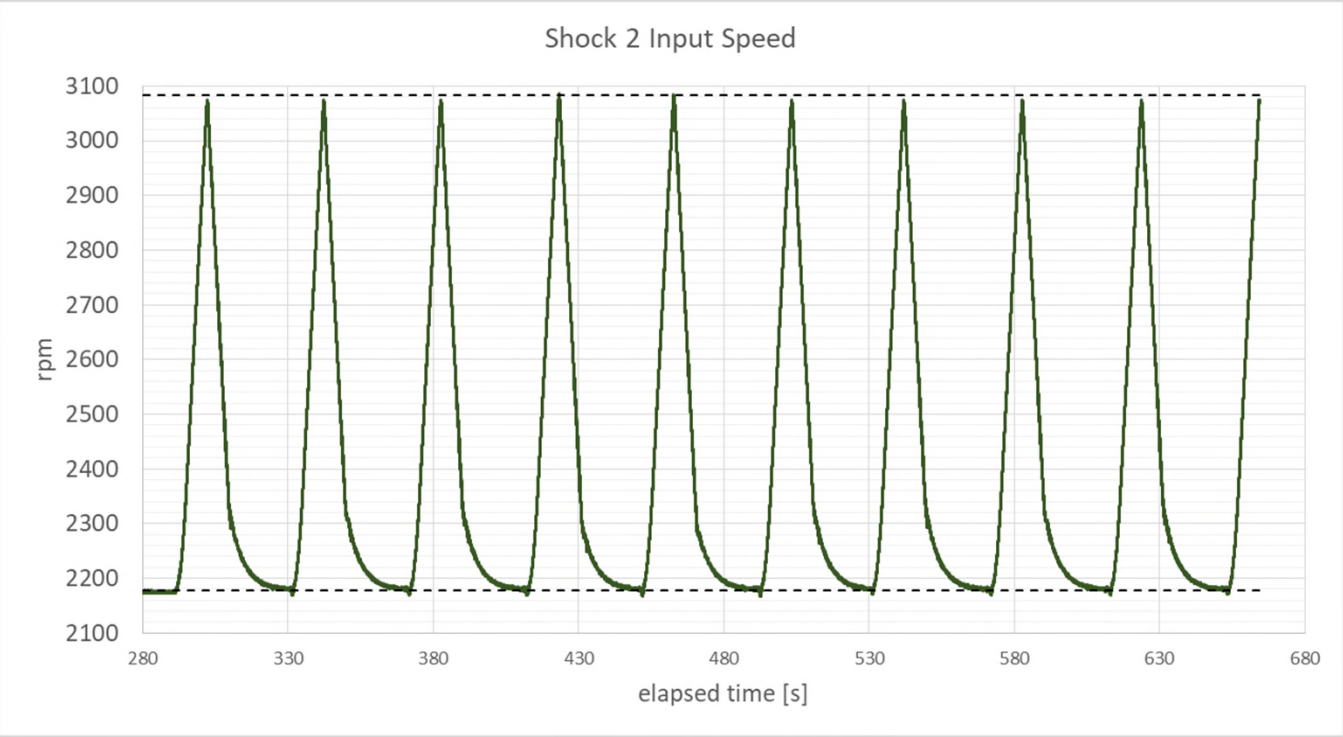


Shock 2			
Peak Input Torque Drive [ft-lb]		Peak Input Torque Coast [ft-lb]	
Target		***Target***	
Avg	**225.3**	**Avg**	**-231.7**
Min	224.3	Min	-232.9
Max	228.6	Max	-226.6

Shock 2—01-0001



Shock 2—01-0001



Shock 2			
Maximum Input Speed [rpm]		**Minimum Input Speed [rpm]**	
Target	***3082.5***	***Target***	***2178.3***
Avg	**3077**	**Avg**	**2170**
Min	3075	Min	2167
Max	3086	Max	2173

Operational Data
01-0002 (TMC 117)

Stats—Conditioning 01-0002

Conditioning 1			
Input Torque [ft-lb]		Input Speed [rpm]	
Target	*60 ± 5*	*Target*	*2363*
Avg	60.0	Avg	2360
Min	58.4	Min	2357
Max	61.0	Max	2363

Conditioning 3			
Input Torque [ft-lb]		Input Speed [rpm]	
Target	*70 ± 5*	*Target*	*3350*
Avg	70.0	Avg	3345
Min	52.1	Min	3342
Max	78.5	Max	3347.5

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*	*1582*
Avg	112.6	Avg	-55.55	Avg	2366	Avg	1582
Min	111.5	Min	-57.9	Min	2364	Min	1580
Max	113	Max	-52.3	Max	2367	Max	1582

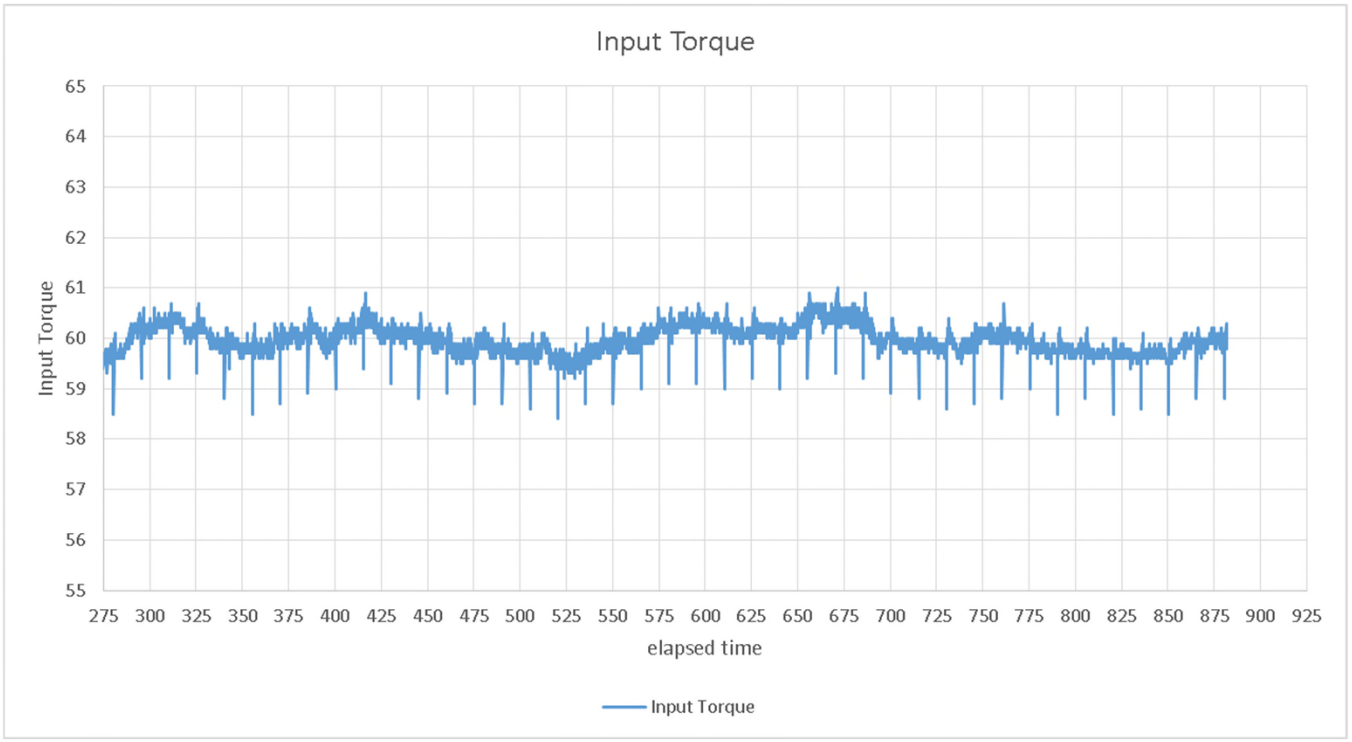
Conditioning 4							
Peak Input Torque Drive [ft-lb]		Peak Input Torque Coast [ft-lb]		Maximum Input Speed [rpm]		Minimum Input Speed [rpm]	
Target		*Target*		*Target*	*3350*	*Target*	*2754*
Avg	100.9	Avg	-67.1	Avg	3352	Avg	2753
Min	113.3	Min	-77.7	Min	3349	Min	2753
Max	115.5	Max	-61.5	Max	3353	Max	2754

Stats—Shocks 01-0002

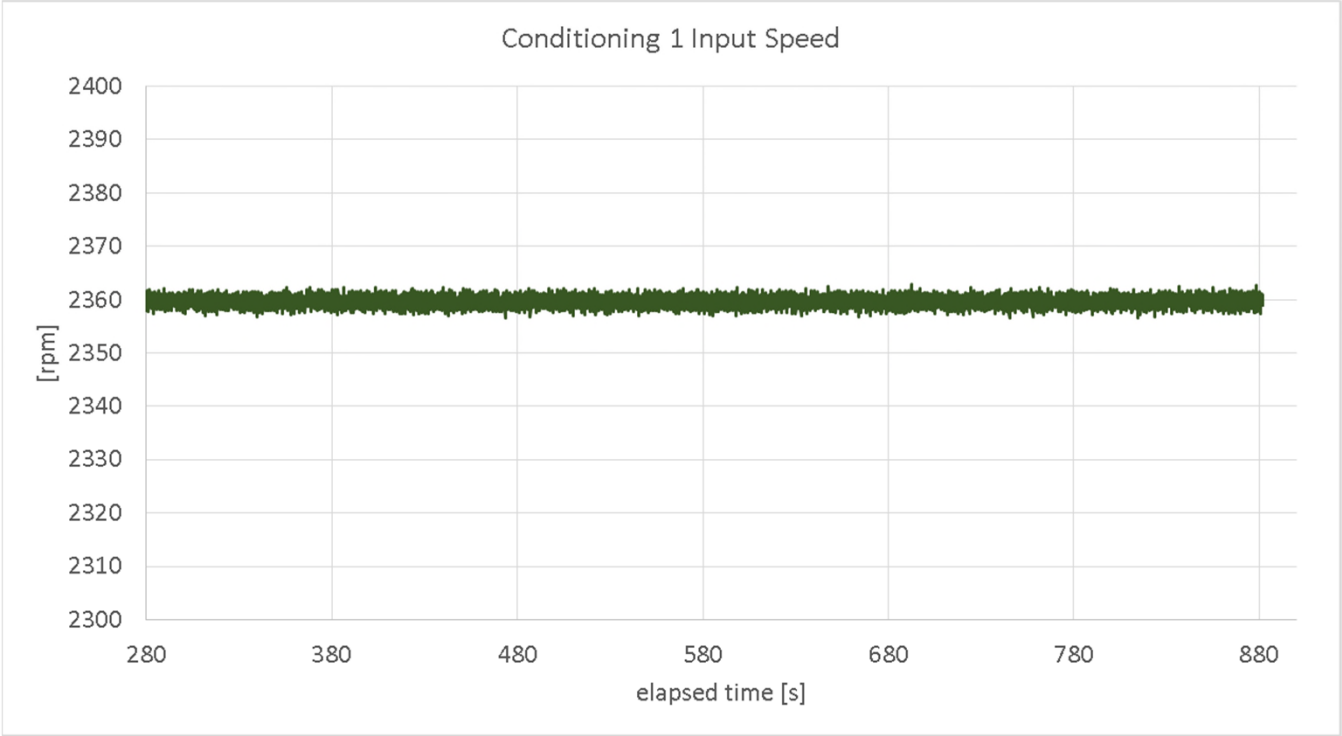
Shock 1							
Peak Input Torque Drive [ft-lb]		Peak Input Torque Coast [ft-lb]		Maximum Input Speed [rpm]		Minimum Input Speed [rpm]	
Target		*Target*		*Target*	*4316*	*Target*	*2178*
Avg	235.4	Avg	-88.92	Avg	4374	Avg	2177
Min	234.0	Min	-91.1	Min	4372	Min	2174
Max	236.9	Max	-87.3	Max	4379	Max	2178

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	226.6	Avg	-221.7	Avg	3071	Avg	2171
Min	225.6	Min	-223.4	Min	3070	Min	2169
Max	228.6	Max	-214.0	Max	3072	Max	2173

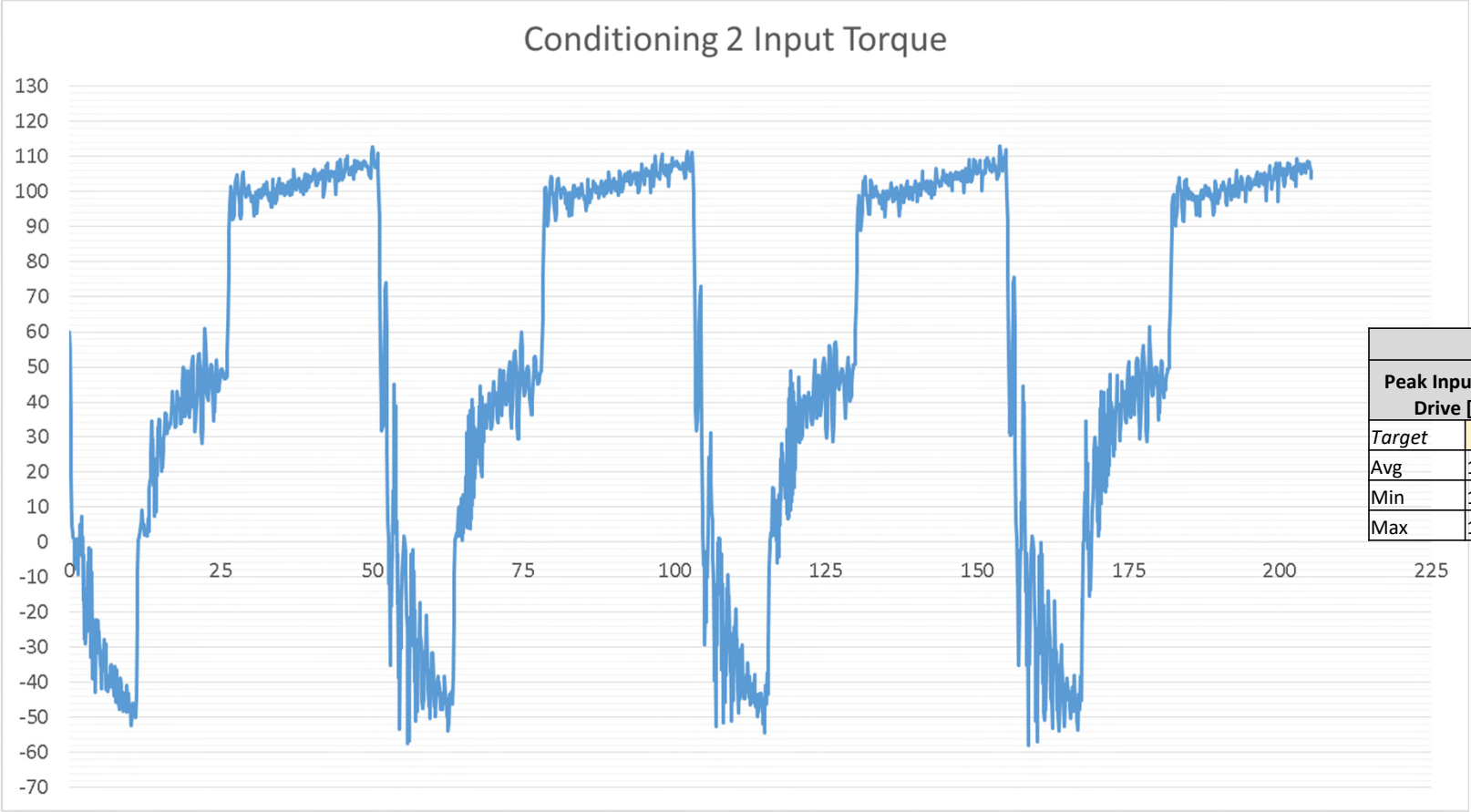
Conditioning 1—01-0002



Conditioning 1—01-0002



Conditioning 2—01-0002

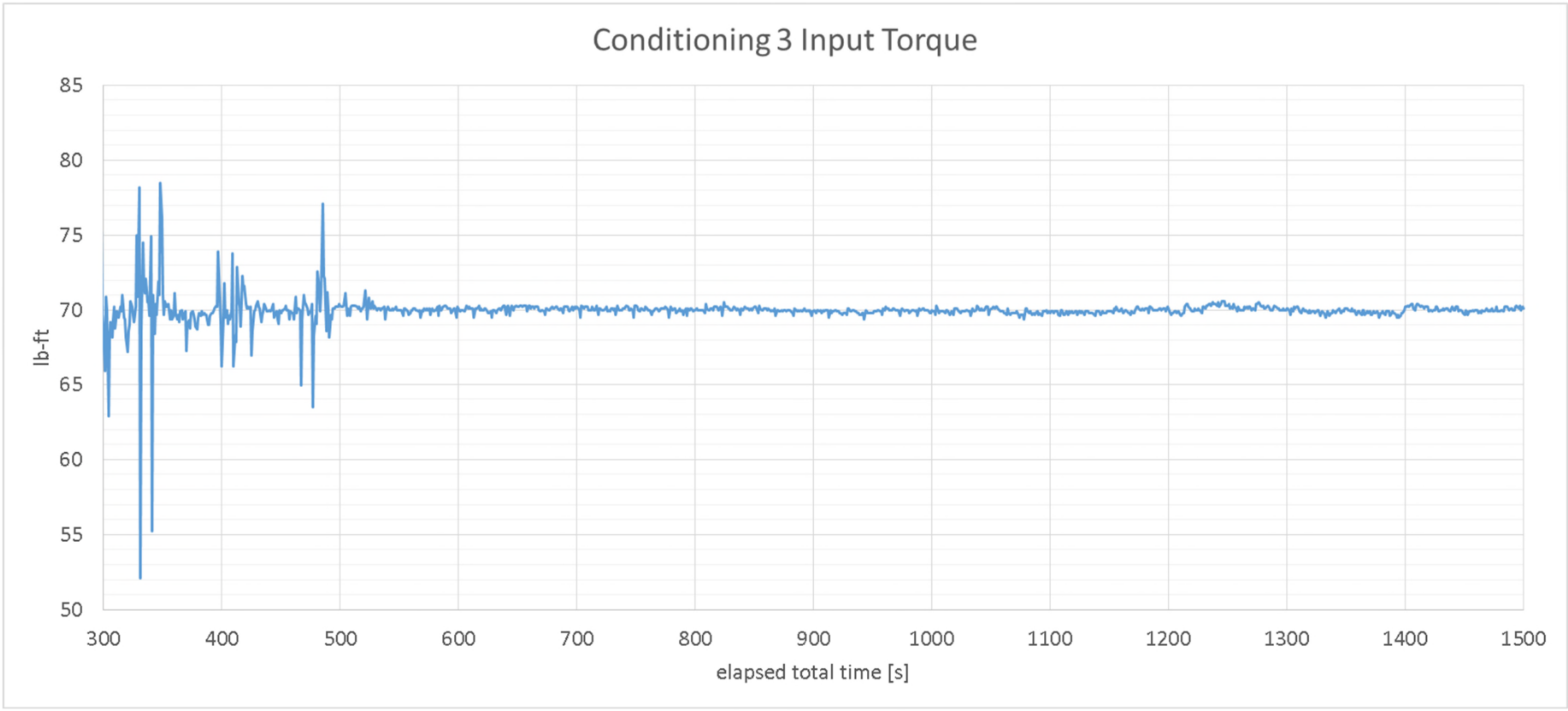


Conditioning 2			
Peak Input Torque Drive [ft-lb]		Peak Input Torque Coast [ft-lb]	
Target		*Target*	
Avg	112.6	Avg	-55.55
Min	111.5	Min	-57.9
Max	113	Max	-52.3

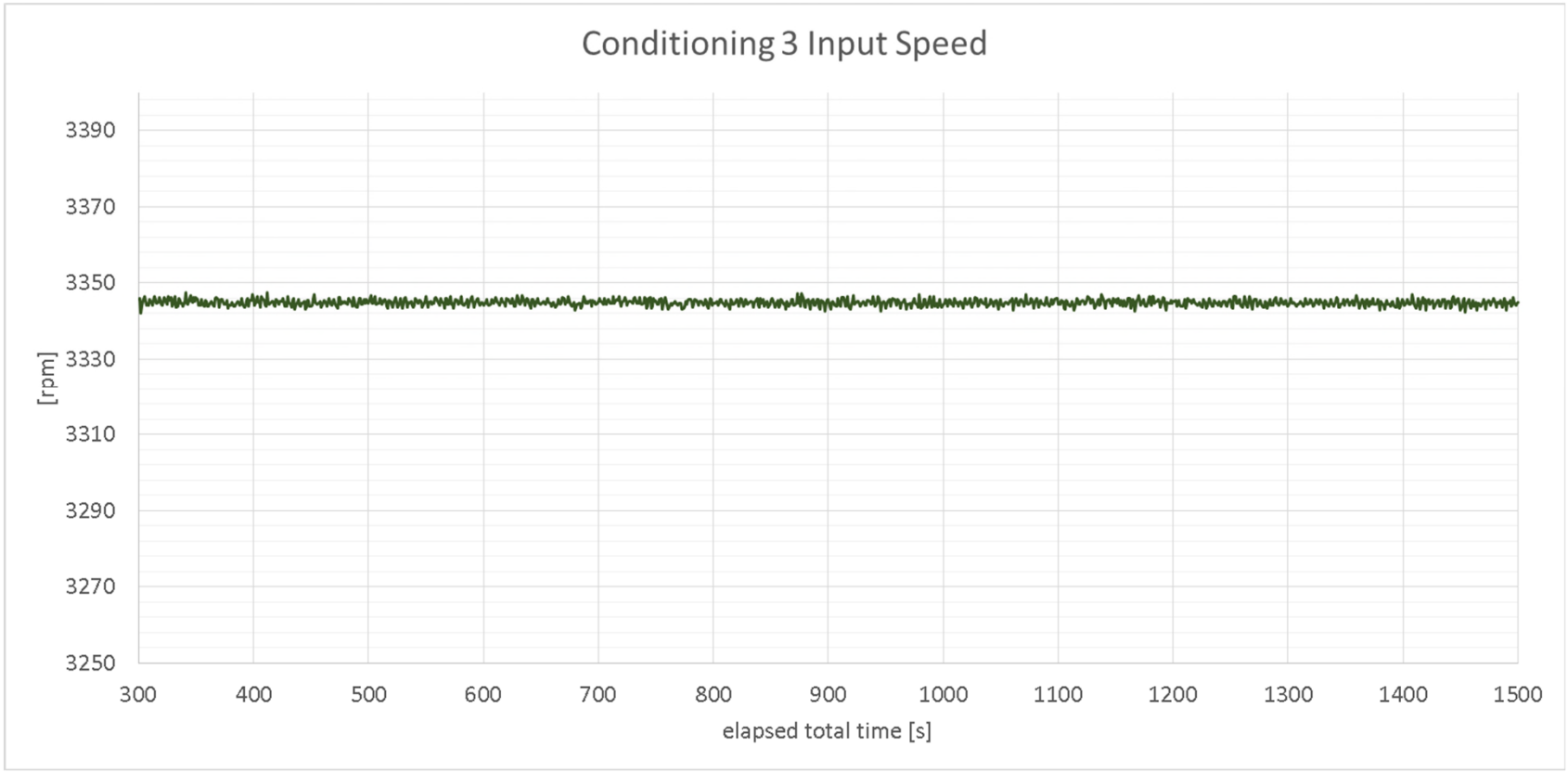
Conditioning 2—01-0002

Conditioning 2			
Maximum Input Speed [rpm]		Minimum Input Speed [rpm]	
Target	*2363*	*Target*	*1582*
Avg	2366	Avg	1582
Min	2364	Min	1580
Max	2367	Max	1582

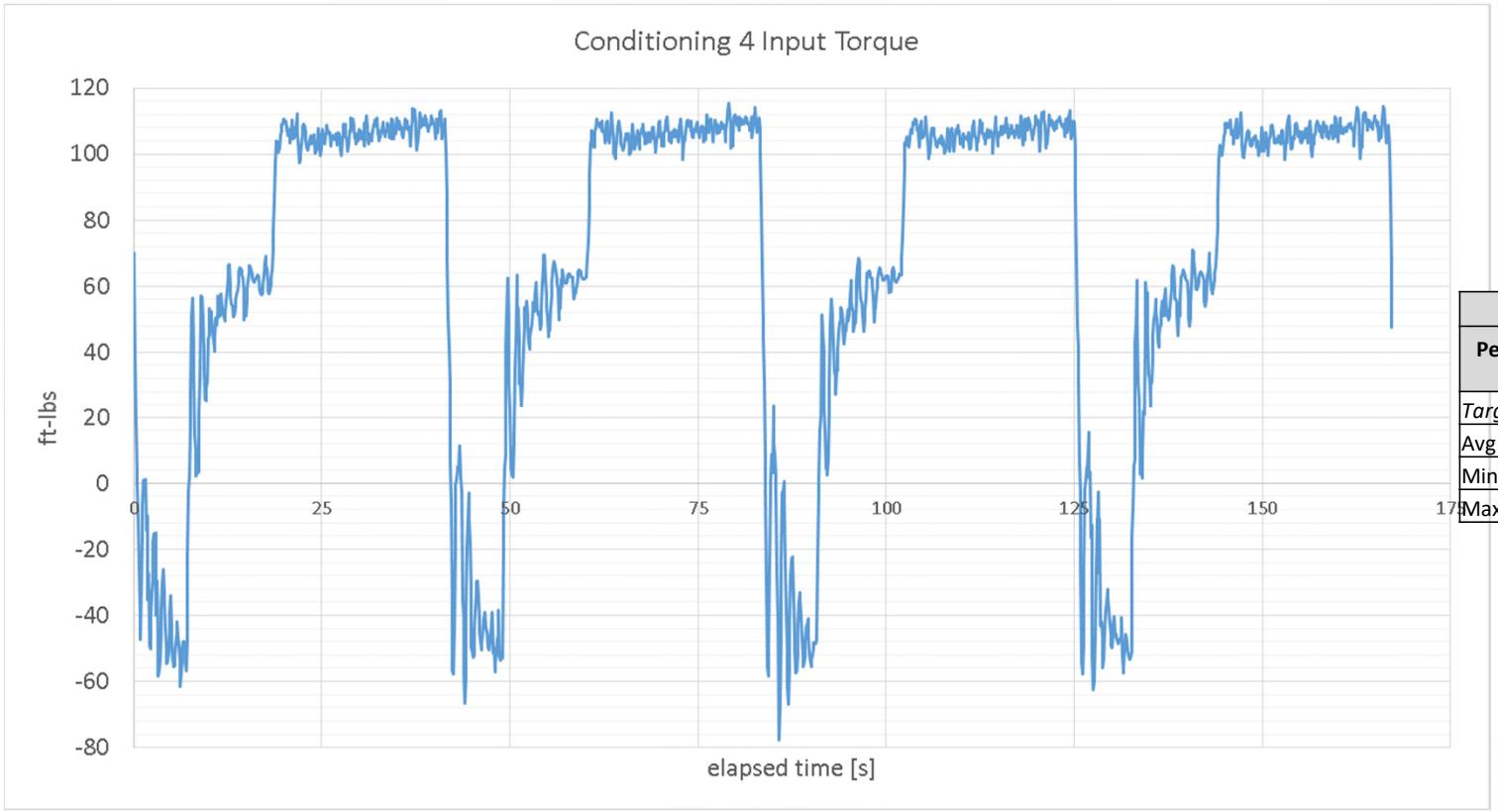
Conditioning 3—01-0002



Conditioning 3—01-0002

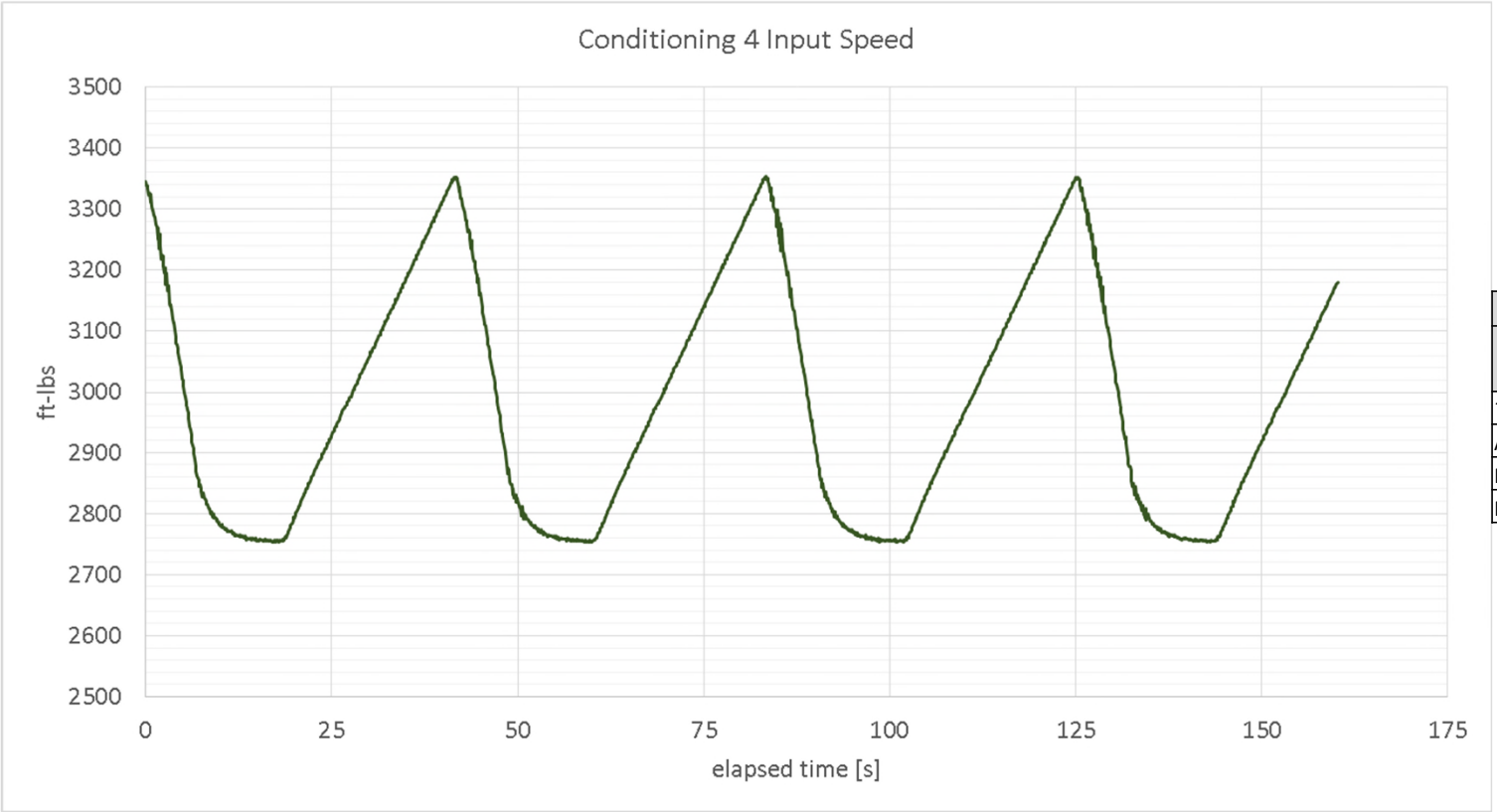


Conditioning 4—01-0002



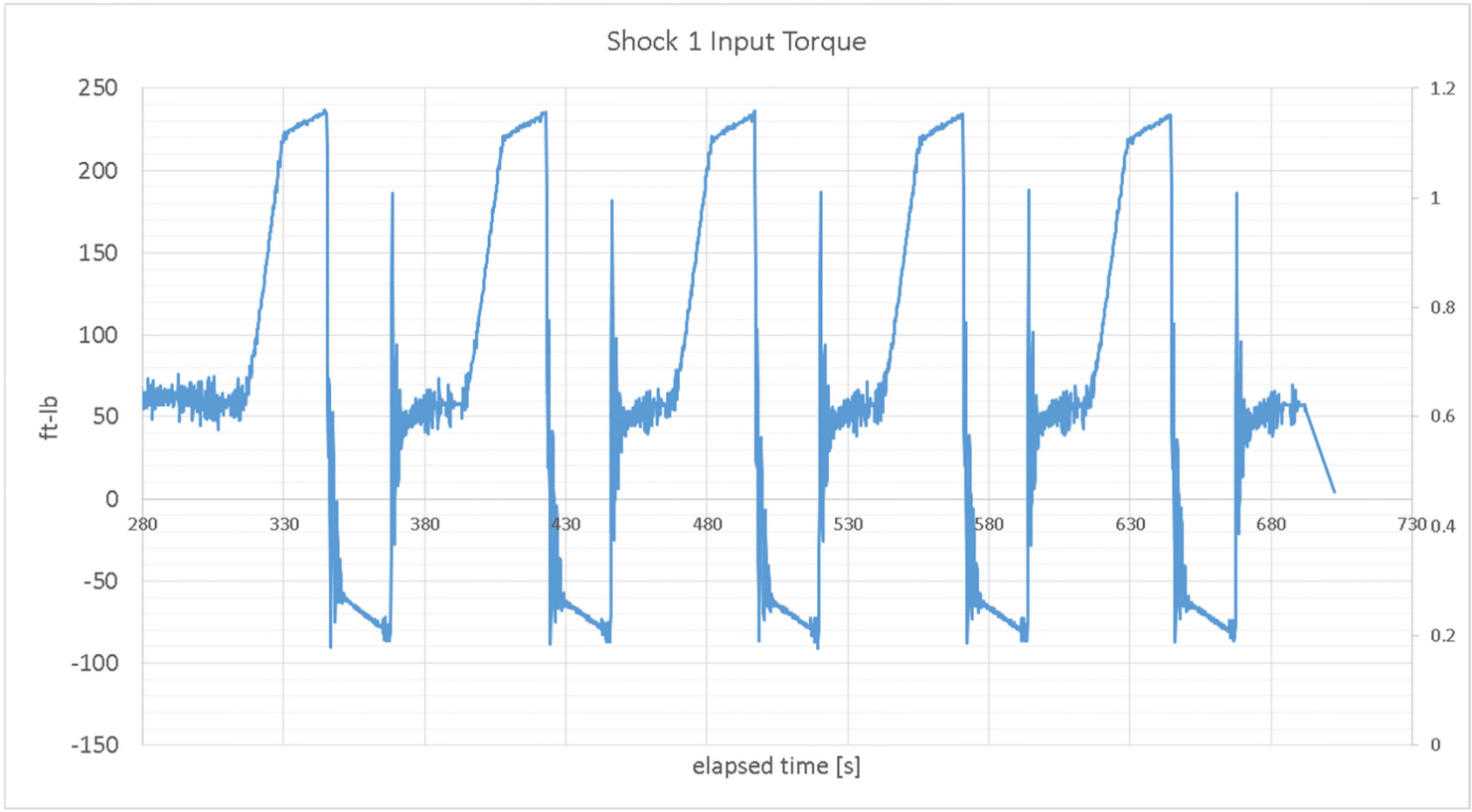
Conditioning 4			
Peak Input Torque Drive [ft-lb]		Peak Input Torque Coast [ft-lb]	
Target		*Target*	
Avg	100.9	Avg	-67.1
Min	113.3	Min	-77.7
Max	115.5	Max	-61.5

Conditioning 4—01-0002



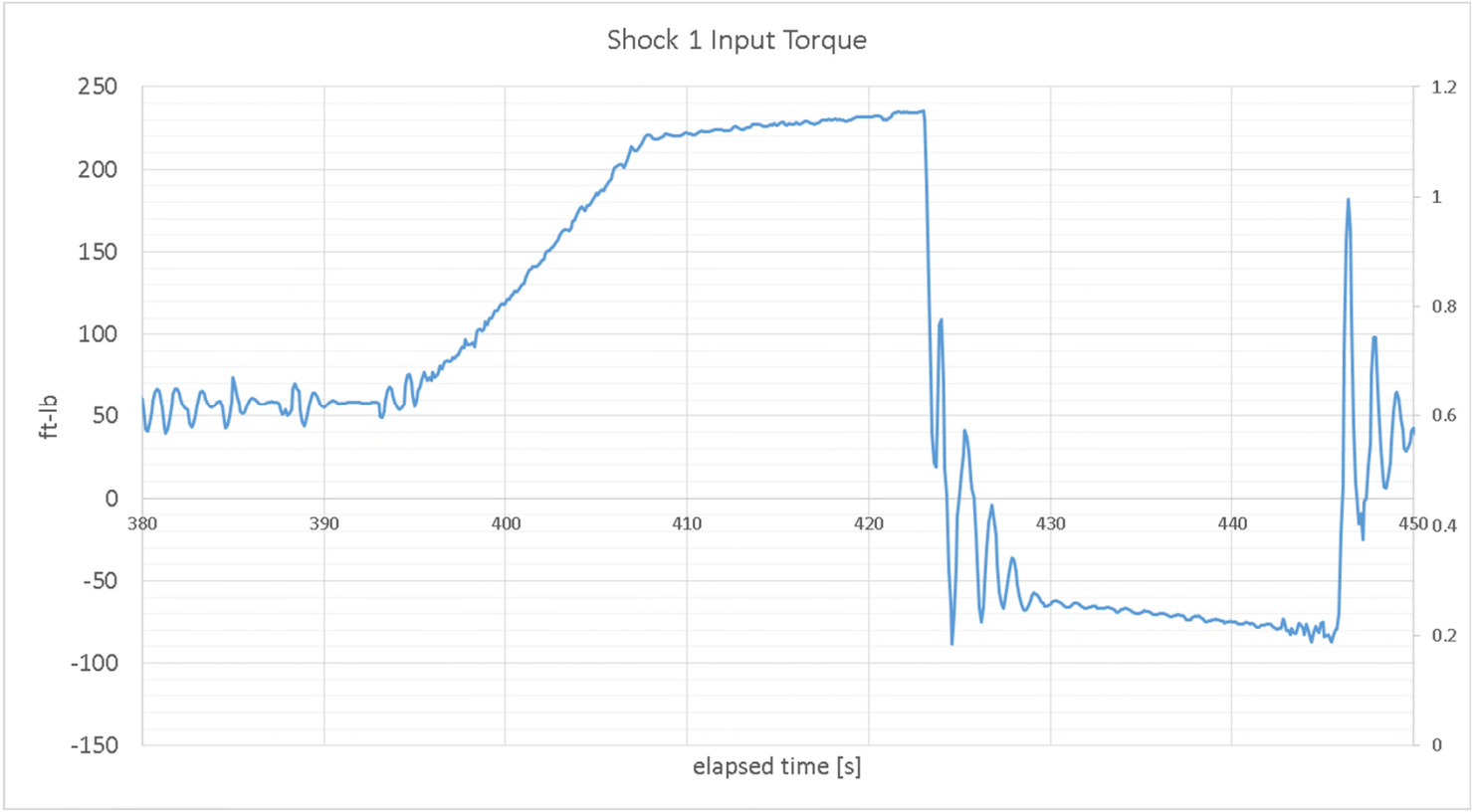
Conditioning 4			
Maximum Input Speed [rpm]		Minimum Input Speed [rpm]	
Target	*3350*	*Target*	*2754*
Avg	3352	Avg	2753
Min	3349	Min	2753
Max	3353	Max	2754

Shock 1—01-0002

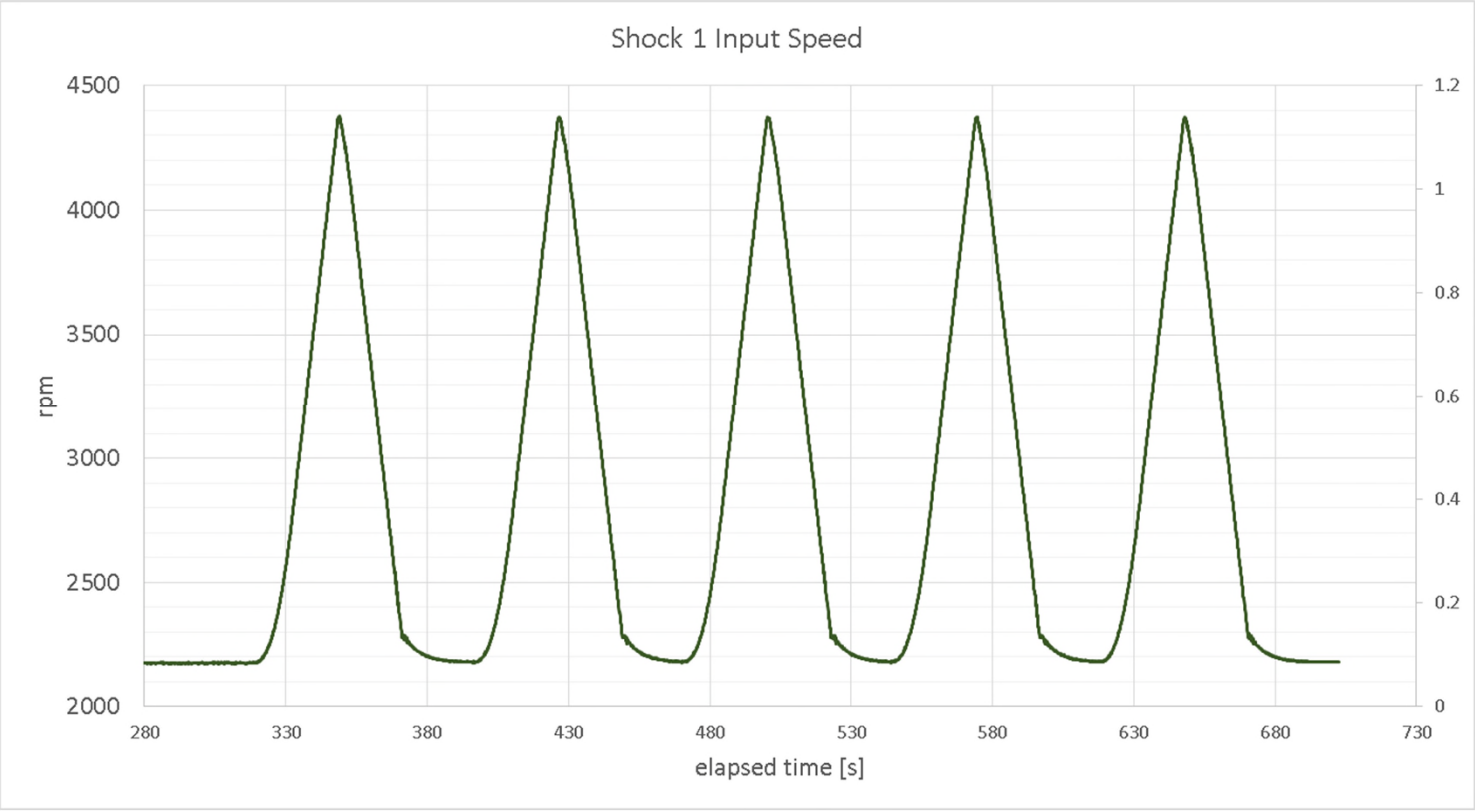


Shock 1			
Peak Input Torque Drive [ft-lb]		Peak Input Torque Coast [ft-lb]	
Target		*Target*	
Avg	235.4	Avg	-88.92
Min	234.0	Min	-91.1
Max	236.9	Max	-87.3

Shock 1—01-0002

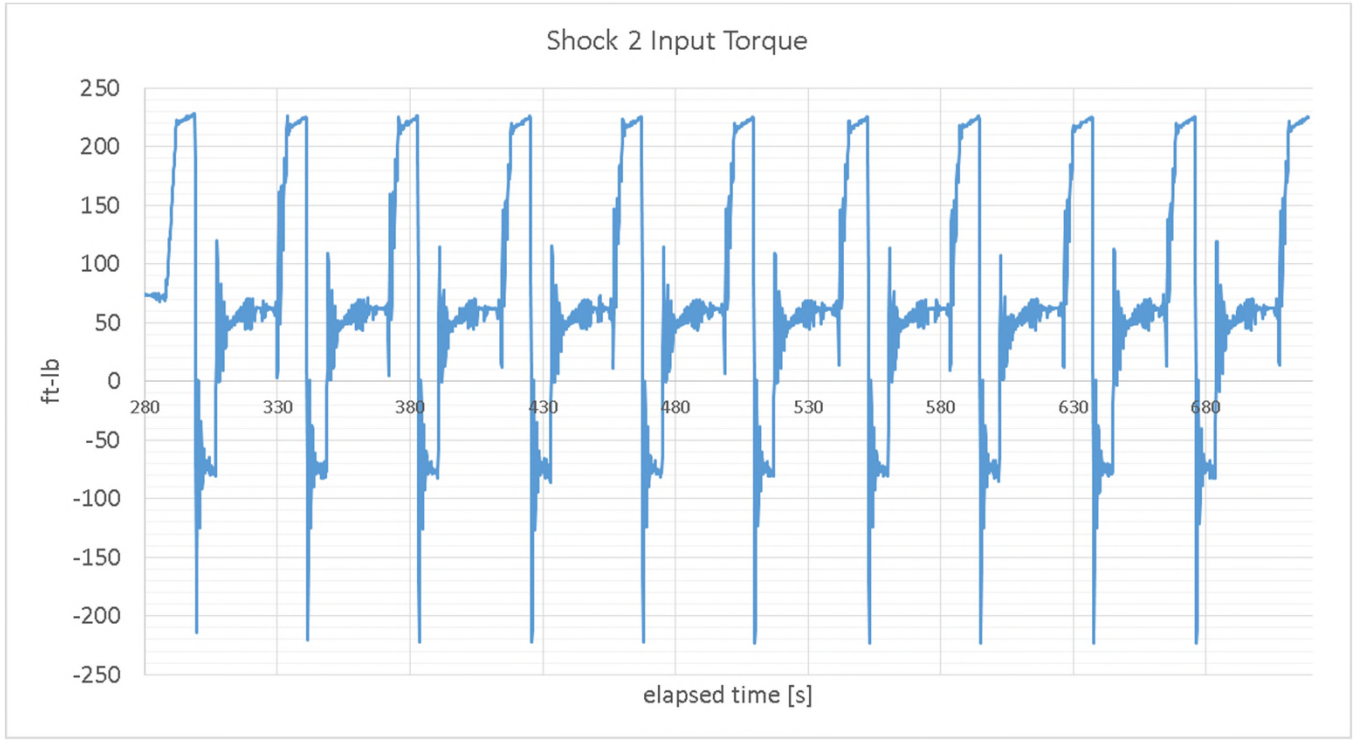


Shock 1—01-0002



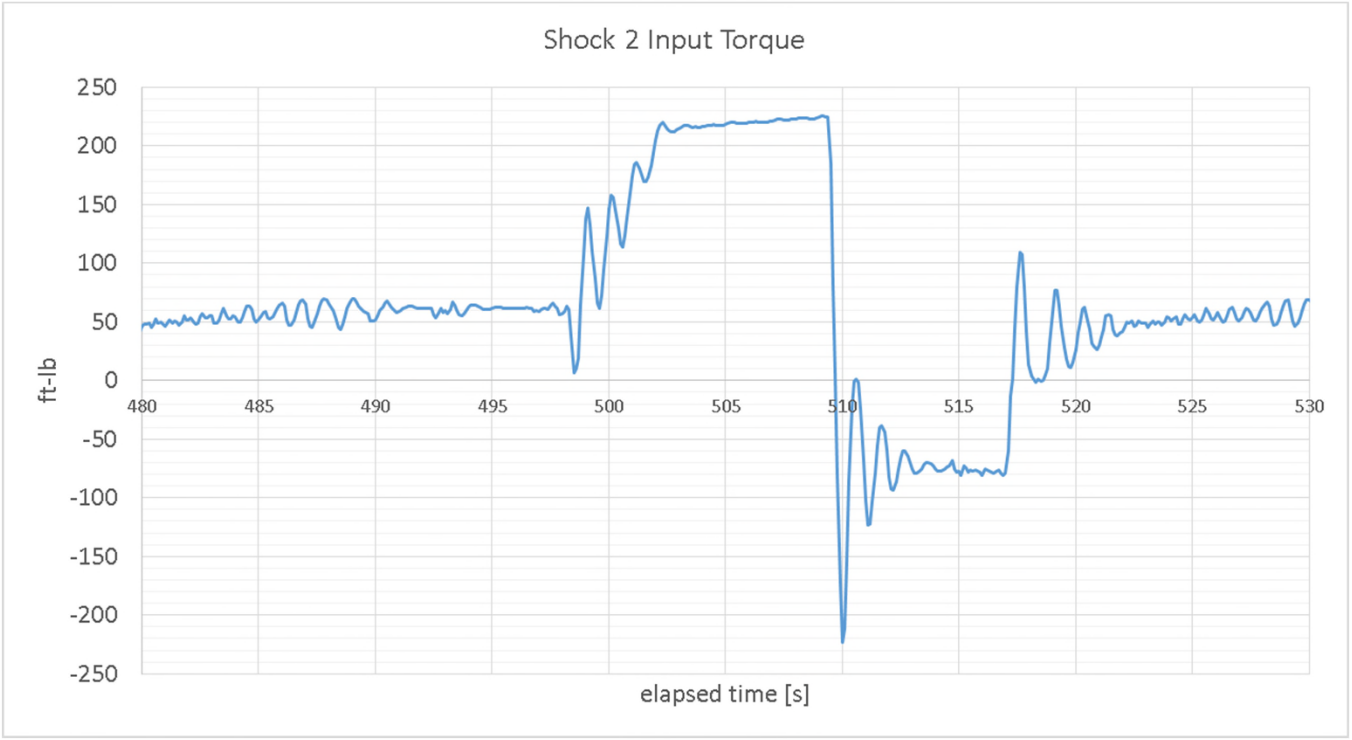
Shock 1			
Peak Input Torque Drive [ft-lb]		Peak Input Torque Coast [ft-lb]	
Target		*Target*	
Avg	4374.5	Avg	2177
Min	4372.4	Min	2174.4
Max	4379.2	Max	2178.3

Shock 2—01-0002

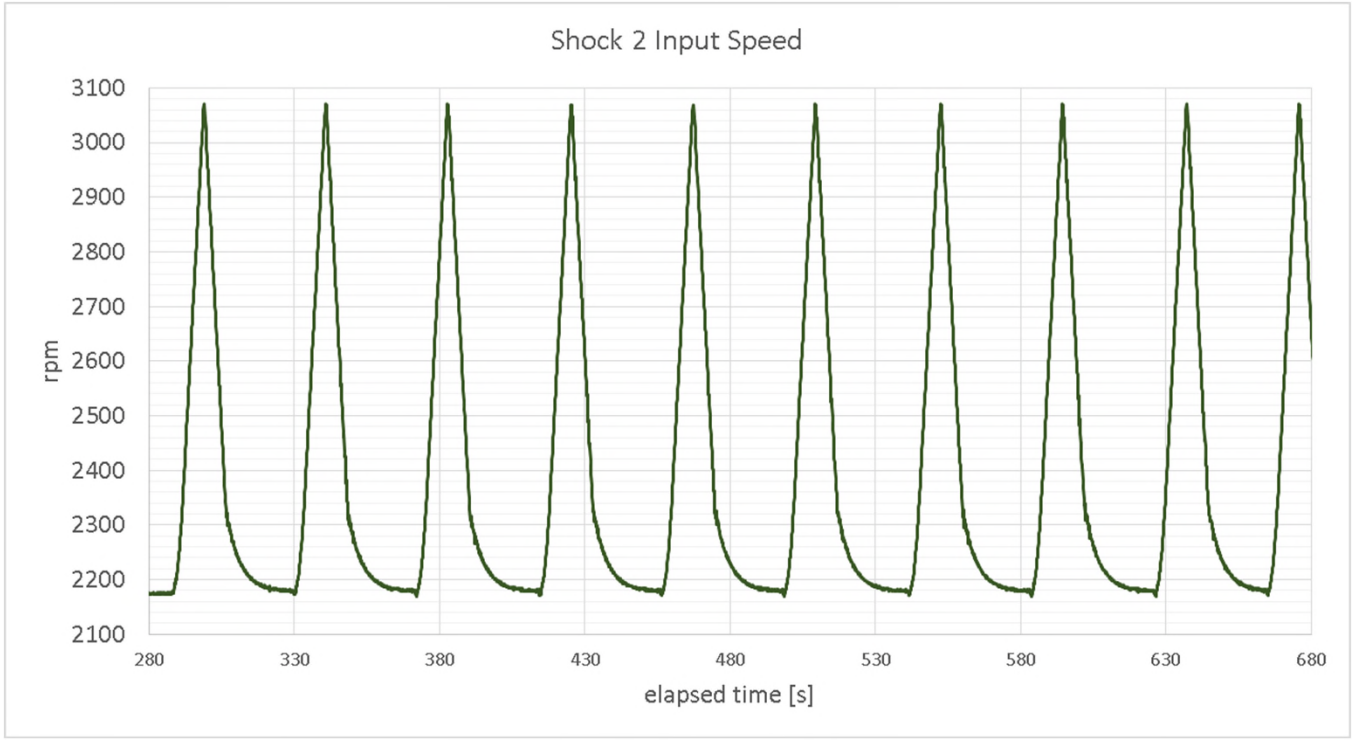


Shock 2			
Peak Input Torque Drive [ft-lb]		Peak Input Torque Coast [ft-lb]	
Target		*Target*	
Avg	226.6	Avg	-221.7
Min	225.6	Min	-223.4
Max	228.6	Max	-214.0

Shock 2—01-0002

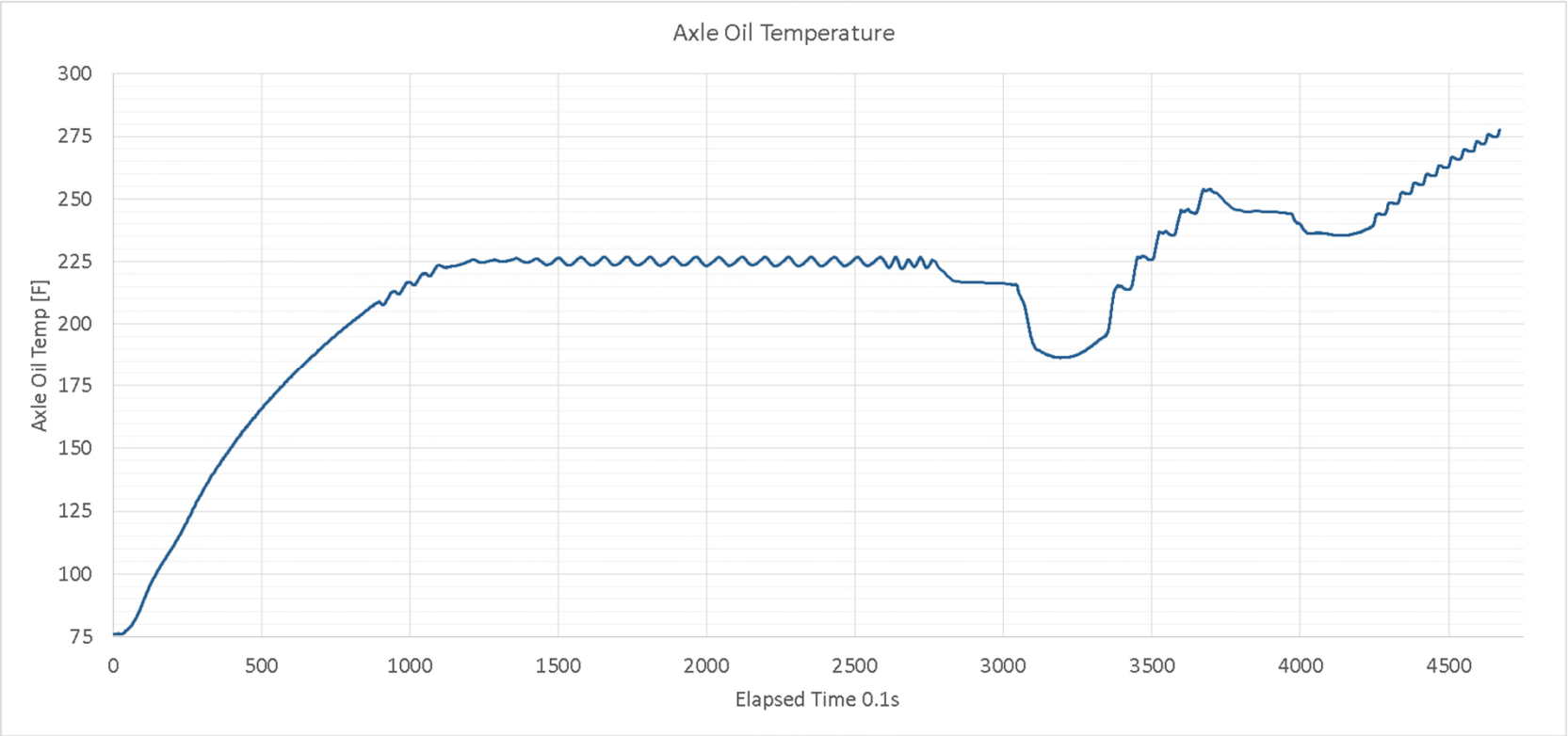


Shock 2—01-0002



Shock 2			
Maximum Input Speed [rpm]		Minimum Input Speed [rpm]	
Target	*3083*	*Target*	*2178*
Avg	3071	Avg	2171
Min	3070	Min	2169
Max	3072	Max	2173

Temperature Plot—01-0002



Phase	Min Temp	Max Temp
Shock 1	196.7	252.9
Shock 2	240.0	277.4

Operational Data
01-0003 (TMC 117)

Stats—Conditioning 01-0003

Conditioning 1			
Input Torque [ft-lb]		Input Speed [rpm]	
Target	*60 ± 5*	*Target*	*2363*
Avg	60.0	Avg	2360
Min	45.8	Min	2356
Max	75.3	Max	2365

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*	*575*	*Target*	*1582*
Avg	113.0	Avg	-62.9	Avg	2366	Avg	1581
Min	110.9	Min	-66.7	Min	2364	Min	1581
Max	115.6	Max	-60.9	Max	2367	Max	1582

Conditioning 3			
Input Torque [ft-lb]		Input Speed [rpm]	
Target	*70 ± 5*	*Target*	*3350*
Avg	69.8	Avg	3345
Min	56.4	Min	3342
Max	84.9	Max	3350.7

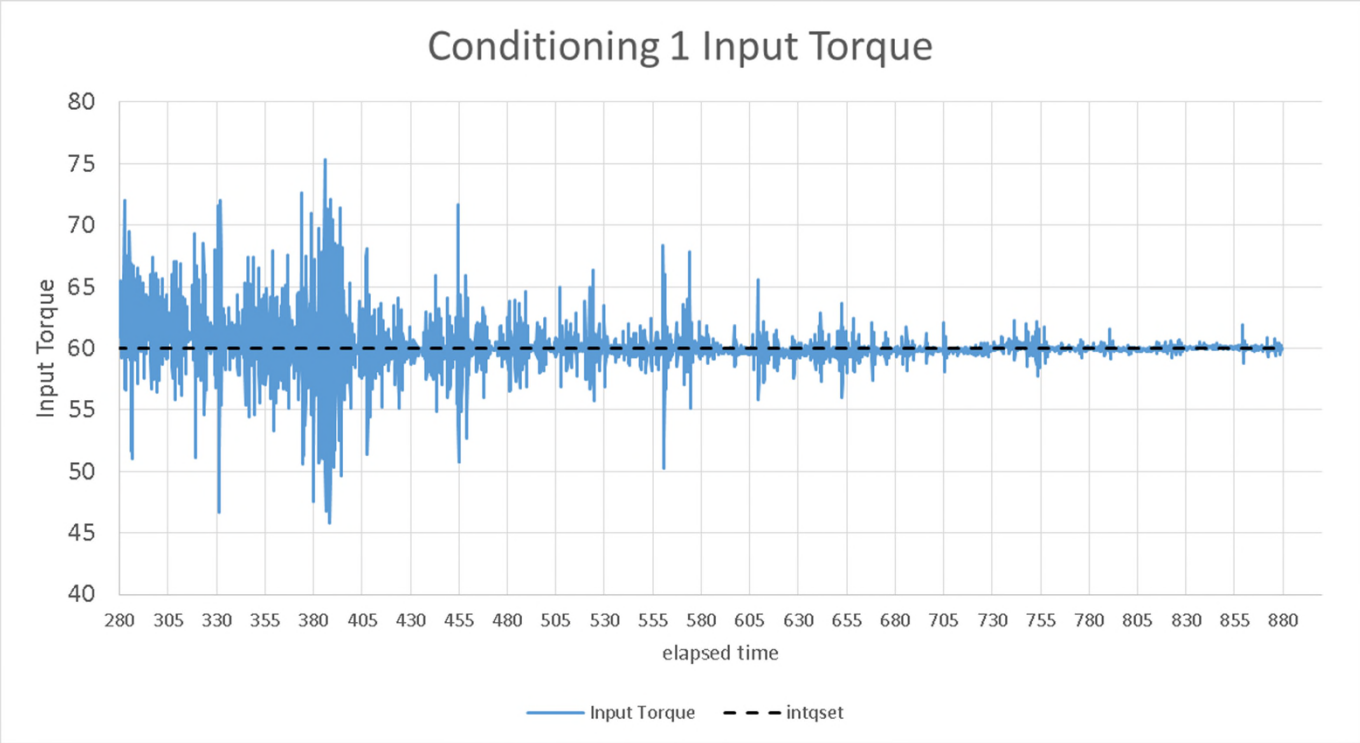
Conditioning 4							
Peak Input Torque Drive [ft-lb]		Peak Input Torque Coast [ft-lb]		Maximum Input Speed [rpm]		Minimum Input Speed [rpm]	
Target		*Target*		*Target*	*815*	*Target*	*2754*
Avg	101.3	Avg	-67.1	Avg	3353	Avg	2753
Min	114.5	Min	-72.9	Min	3352	Min	2752
Max	115.5	Max	-56.9	Max	3355	Max	2754

Stats—Shocks 01-0003

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	233.9	Avg	-63.4	Avg	4350	Avg	2191
Min	233.0	Min	-76.7	Min	4348	Min	2173
Max	236.4	Max	-58.4	Max	4353	Max	2196

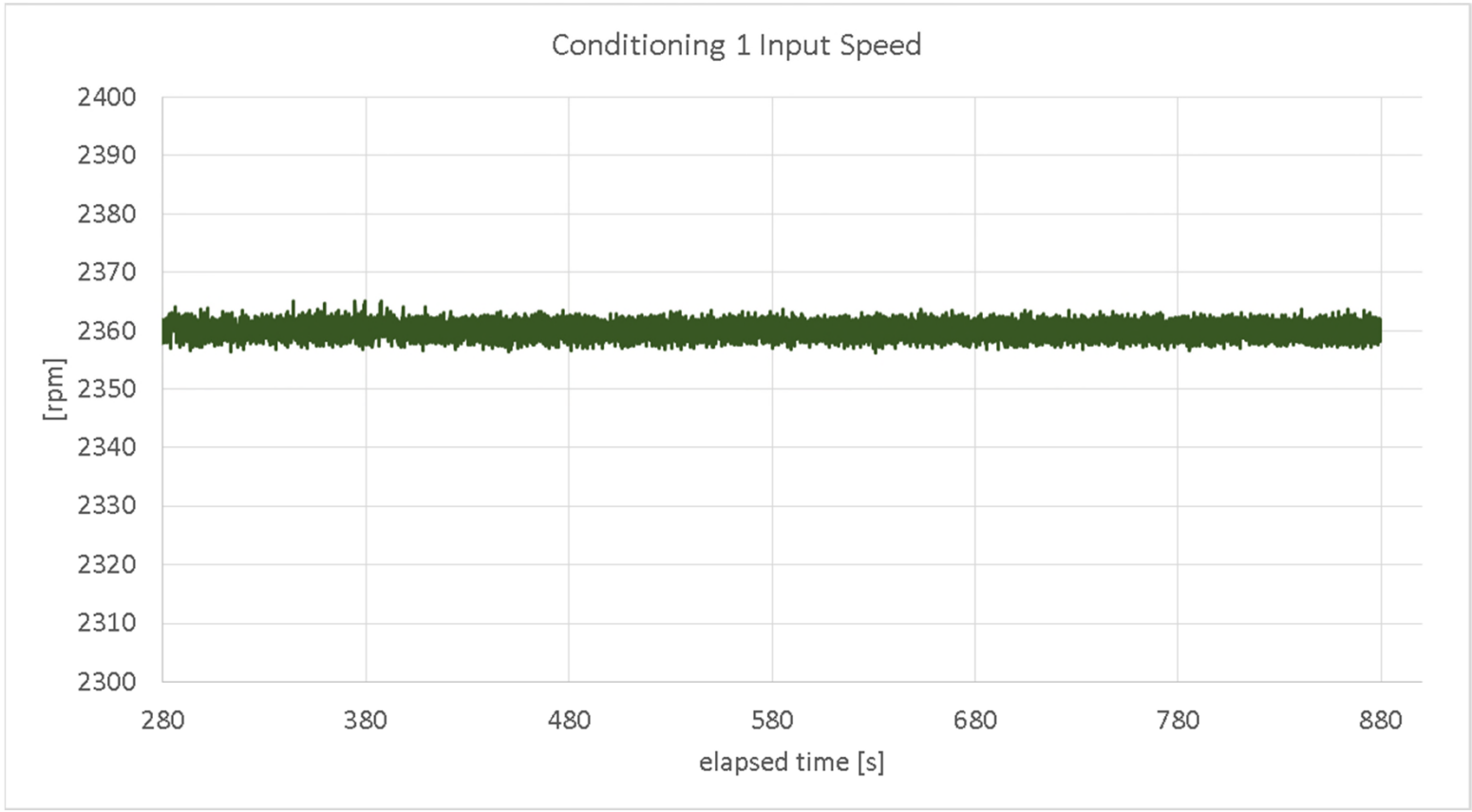
Shock 2							
Peak Input Torque Drive [ft-lb]		**Peak Input Torque Coast [ft-lb]**		**Maximum Input Speed [rpm]**		**Minimum Input Speed [rpm]**	
Target		*Target*		*Target*	*750*	*Target*	*2178*
Avg	225.8	Avg	-229.5	Avg	3075	Avg	2169
Min	224.5	Min	-233.0	Min	3074	Min	2168
Max	228.8	Max	-217.3	Max	3076	Max	2171

Conditioning 1—01-0003

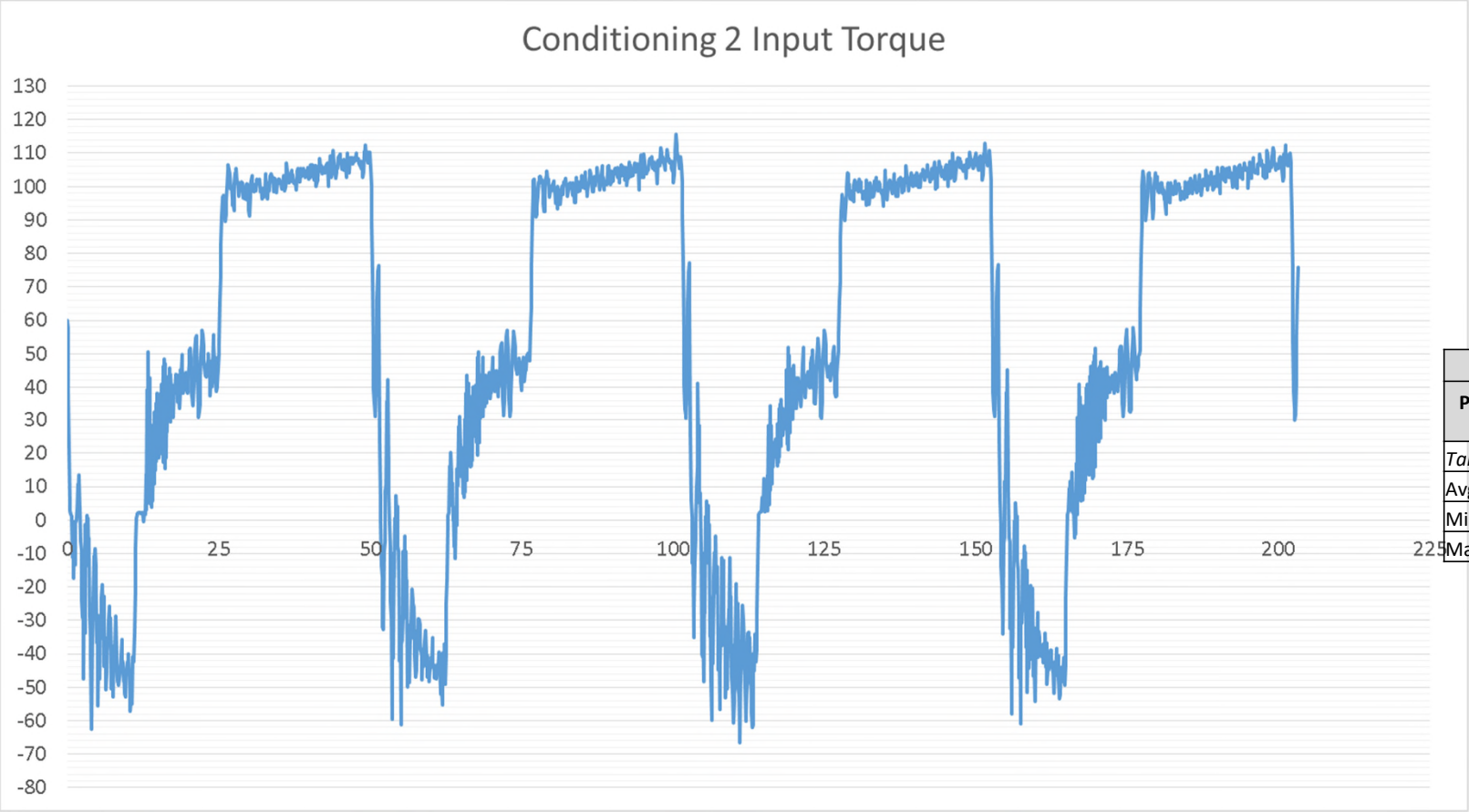


Conditioning 1			
Input Torque [ft-lb]		**Input Speed [rpm]**	
Target	*60 ± 5*	*Target*	*2363*
Avg	60.0	Avg	2360
Min	45.8	Min	2356
Max	75.3	Max	2365

Conditioning 1—01-0003



Conditioning 2—01-0003

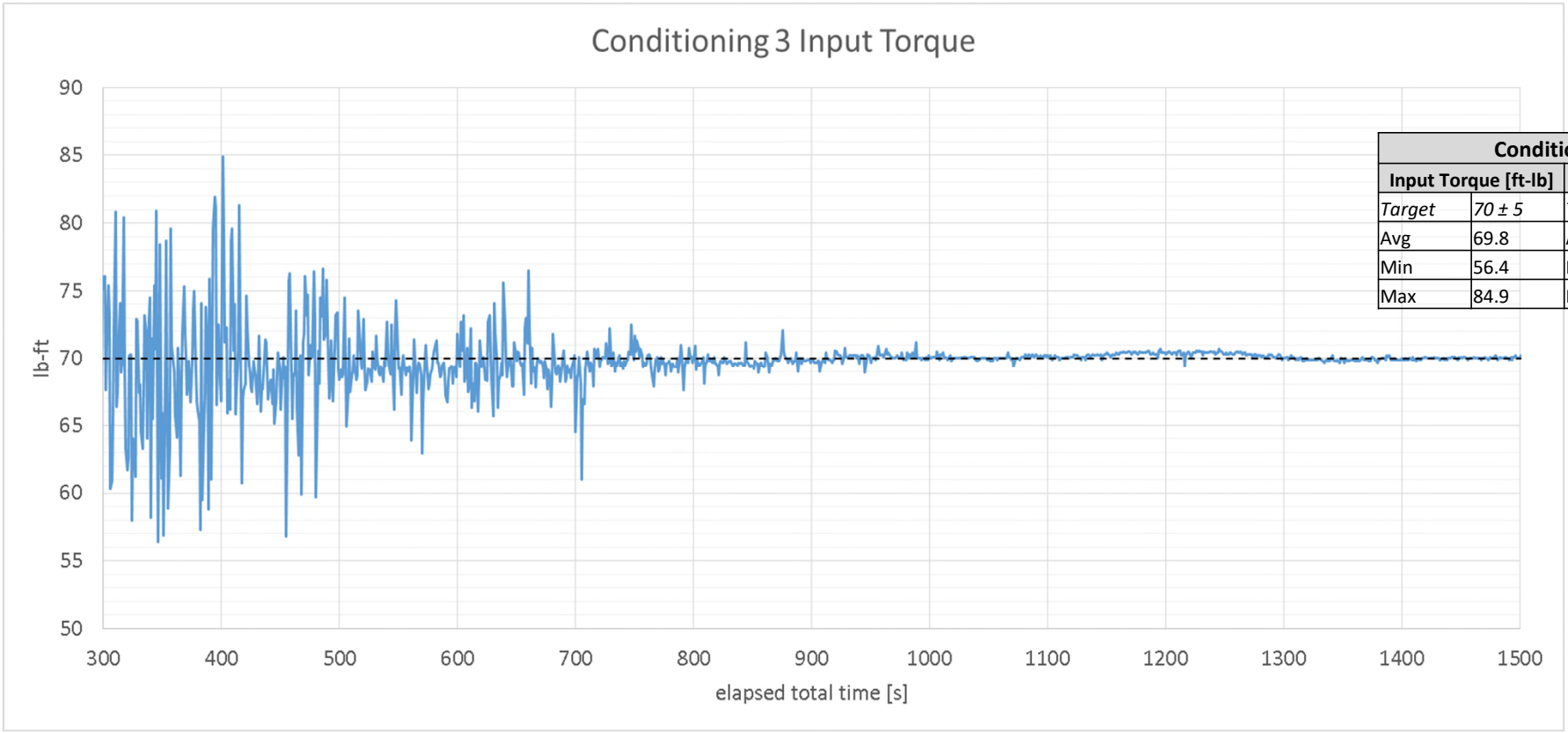


Conditioning 2			
Peak Input Torque Drive [ft-lb]		Peak Input Torque Coast [ft-lb]	
Target		*Target*	
Avg	113.0	Avg	-62.9
Min	110.9	Min	-66.7
Max	115.6	Max	-60.9

Conditioning 2—01-0003

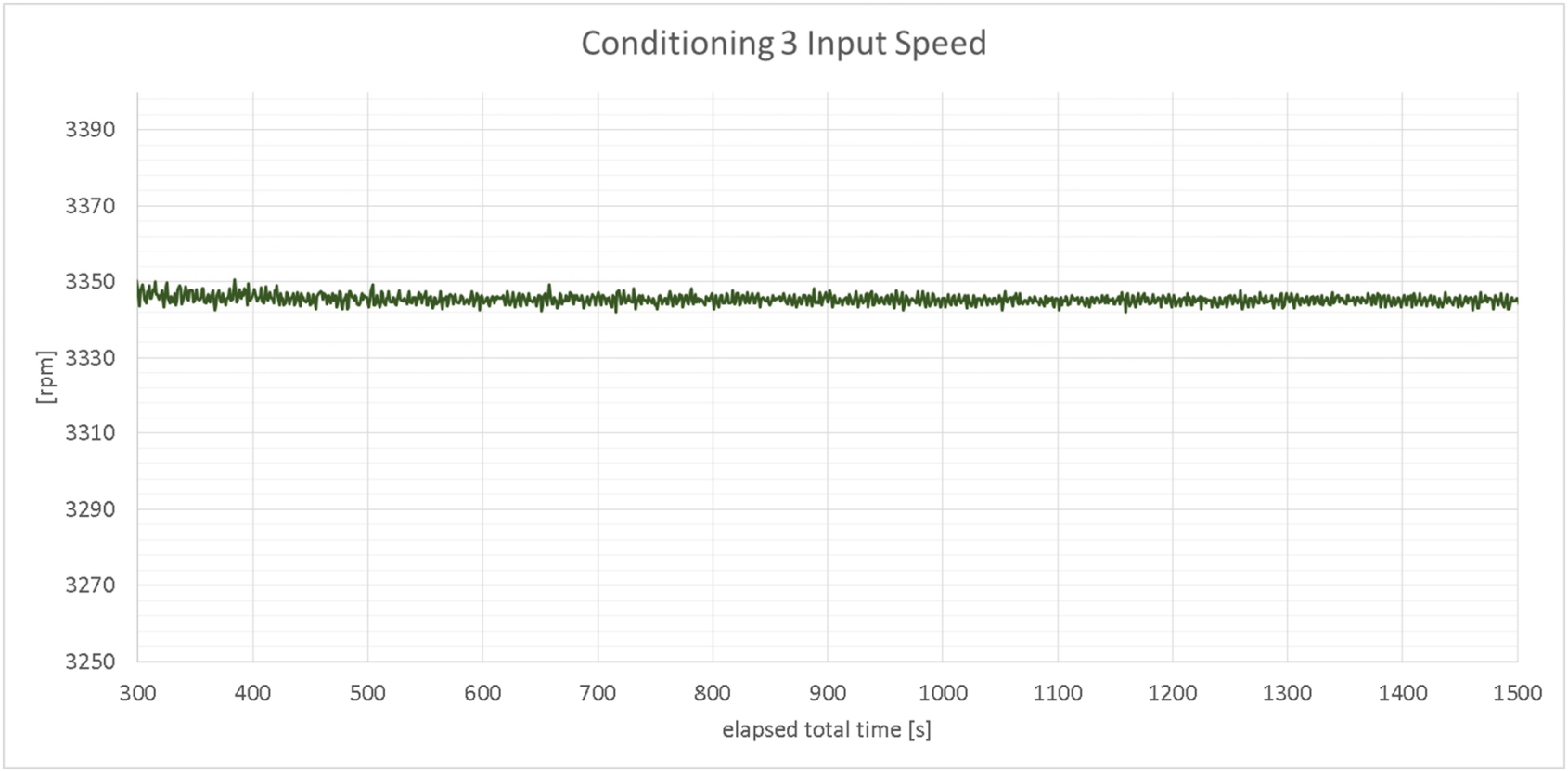
Conditioning 2			
Maximum Input Speed [rpm]		Minimum Input Speed [rpm]	
Target	*575*	*Target*	*1582*
Avg	2366	Avg	1581
Min	2364	Min	1581
Max	2367	Max	1582

Conditioning 3—01-0003

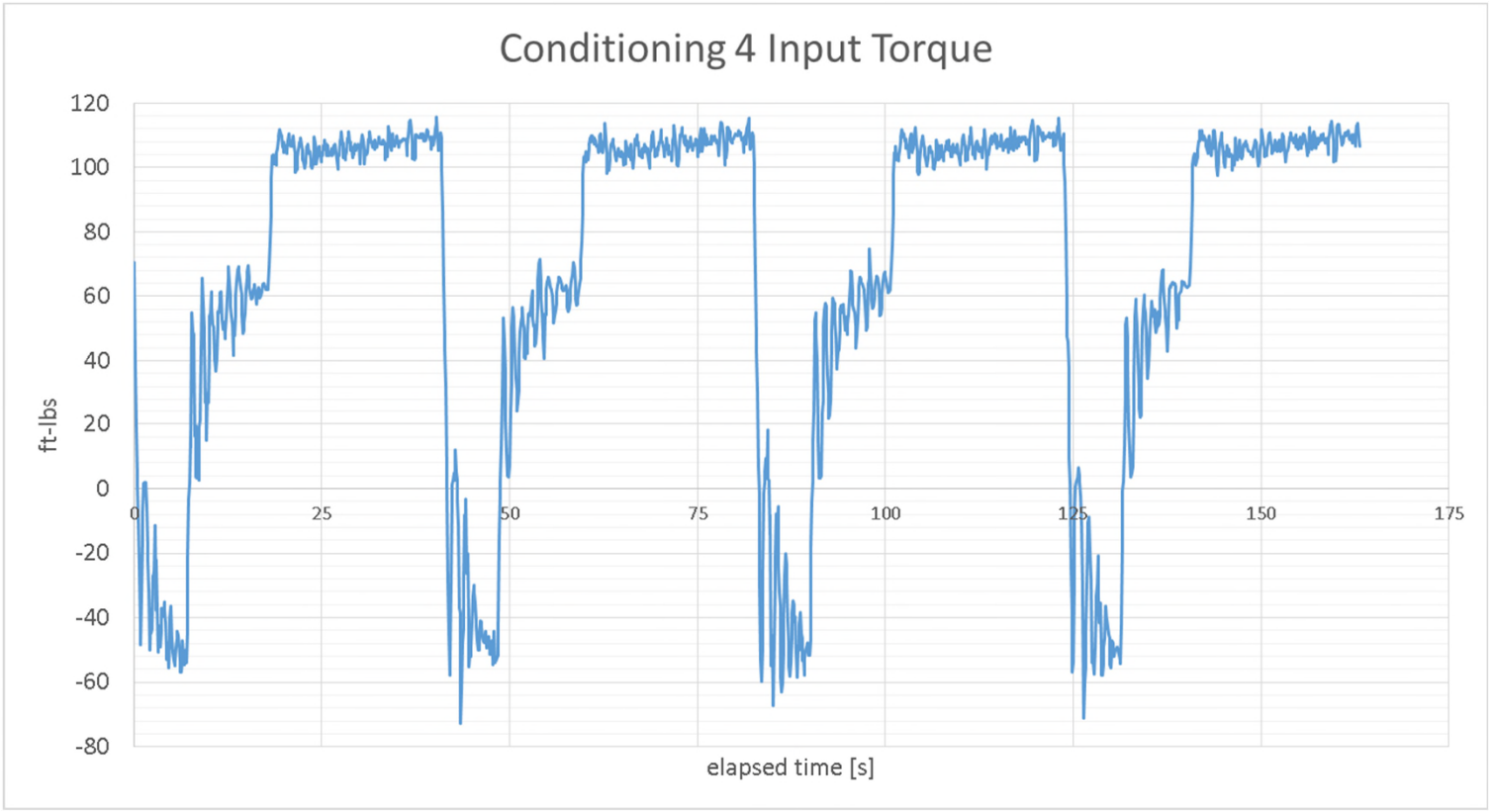


Conditioning 3			
Input Torque [ft-lb]		**Input Speed [rpm]**	
Target	*70 ± 5*	*Target*	*3350*
Avg	69.8	Avg	3345
Min	56.4	Min	3342
Max	84.9	Max	3350.7

Conditioning 3—01-0003

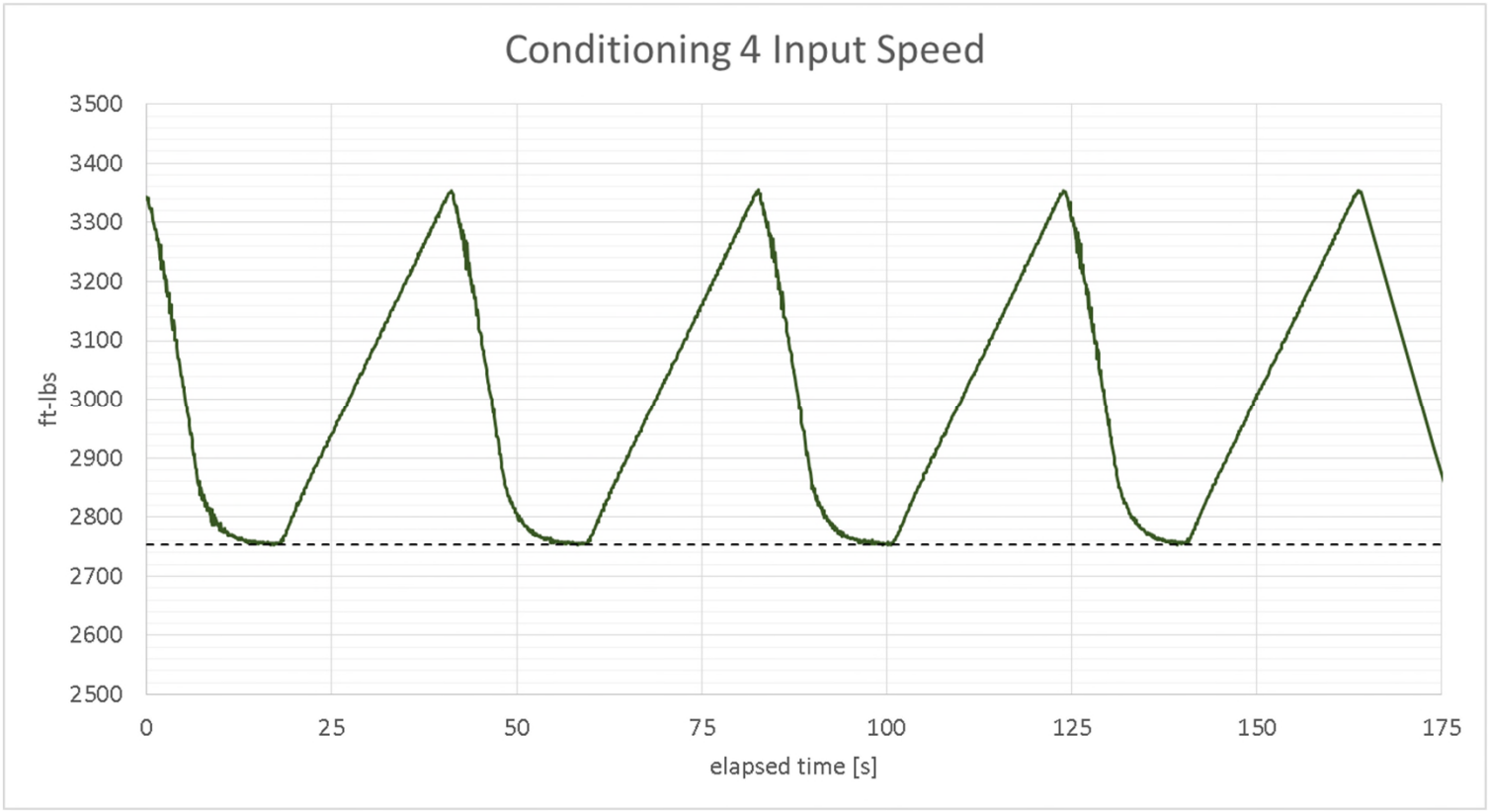


Conditioning 4—01-0003



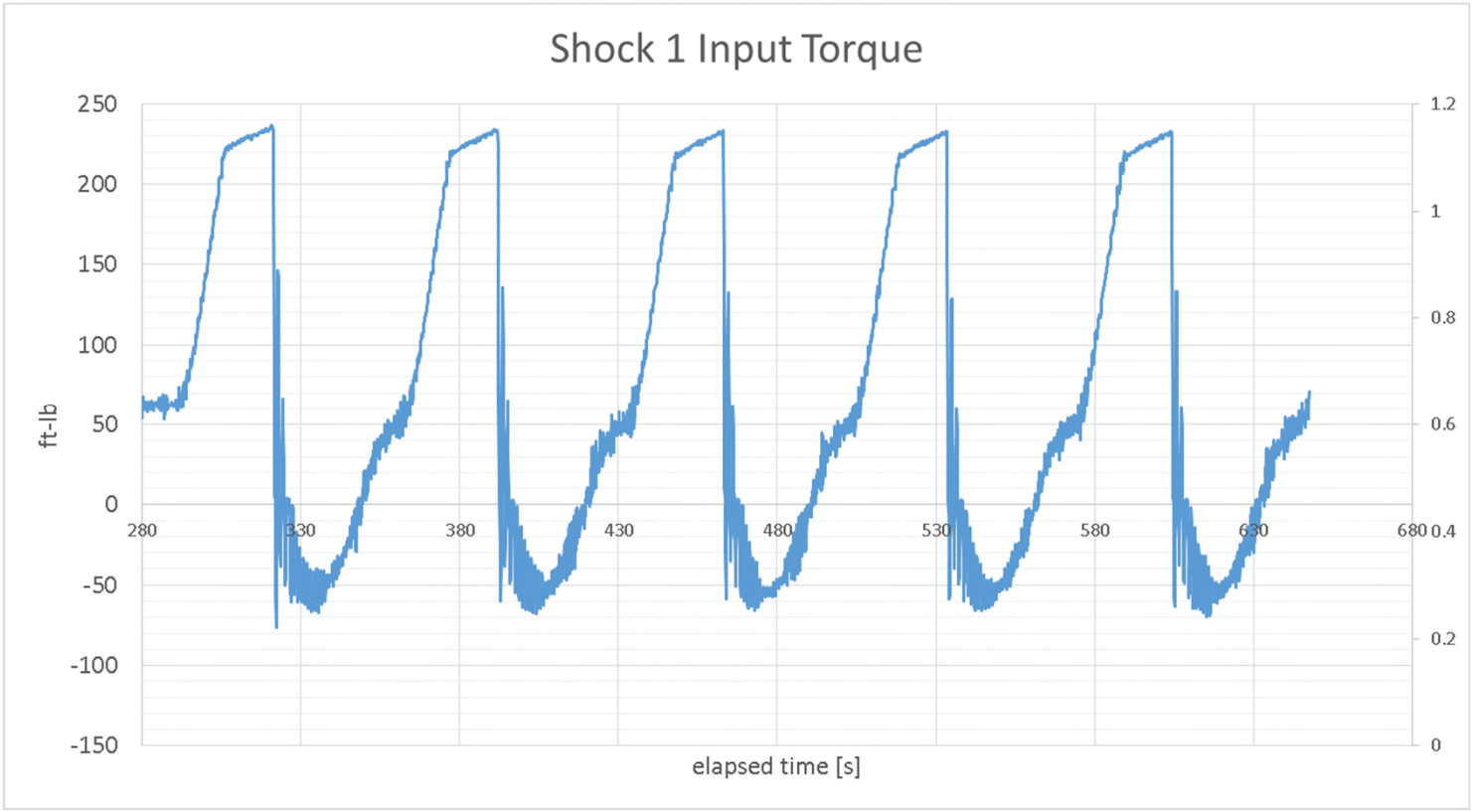
Conditioning 4			
Peak Input Torque Drive [ft-lb]		Peak Input Torque Coast [ft-lb]	
Target		*Target*	
Avg	101.3	Avg	-67.1
Min	114.5	Min	-72.9
Max	115.5	Max	-56.9

Conditioning 4—01-0003



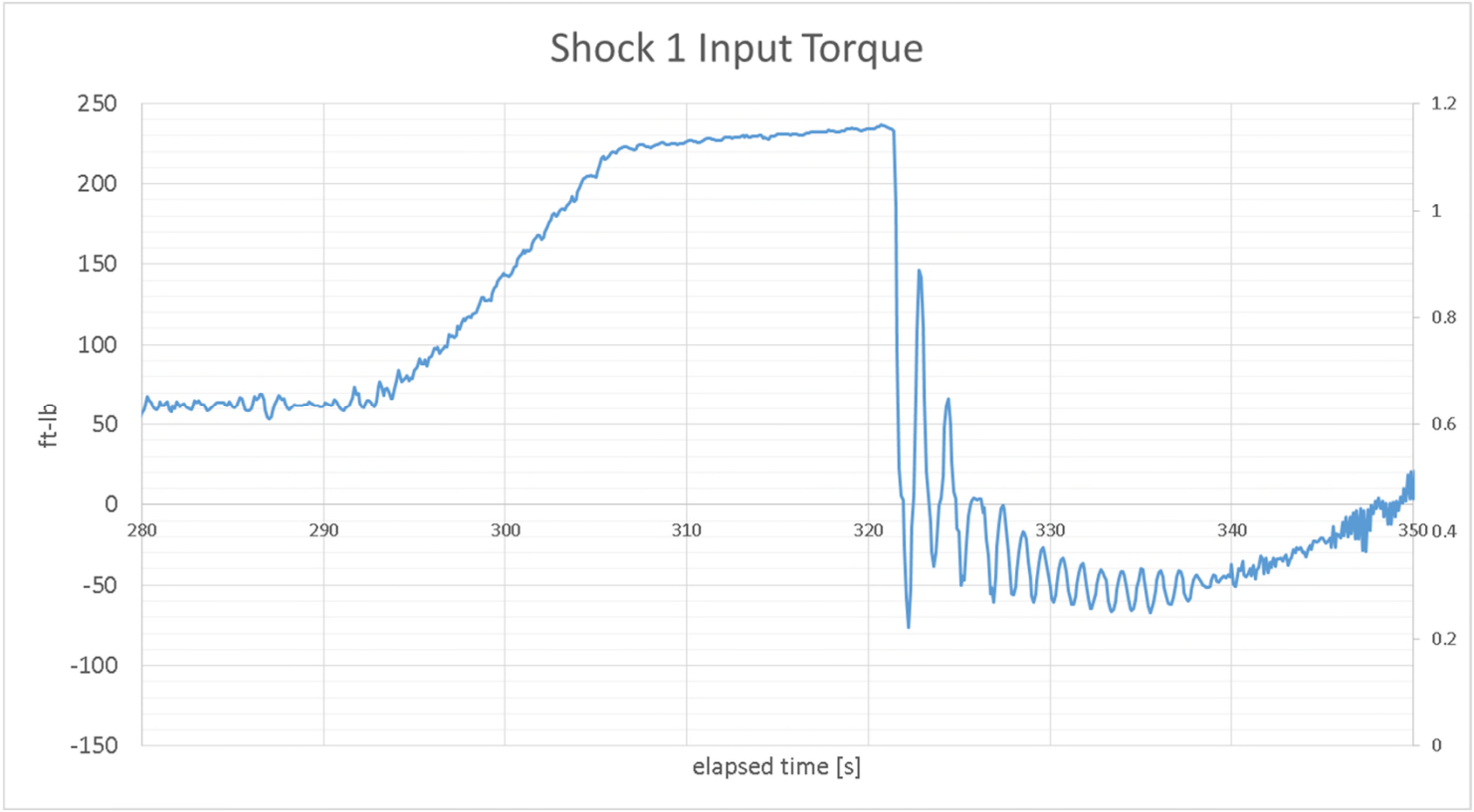
Conditioning 4			
Maximum Input Speed [rpm]		Minimum Input Speed [rpm]	
Target	*815*	*Target*	*2754*
Avg	3353	Avg	2753
Min	3352	Min	2752
Max	3355	Max	2754

Shock 1—01-0003

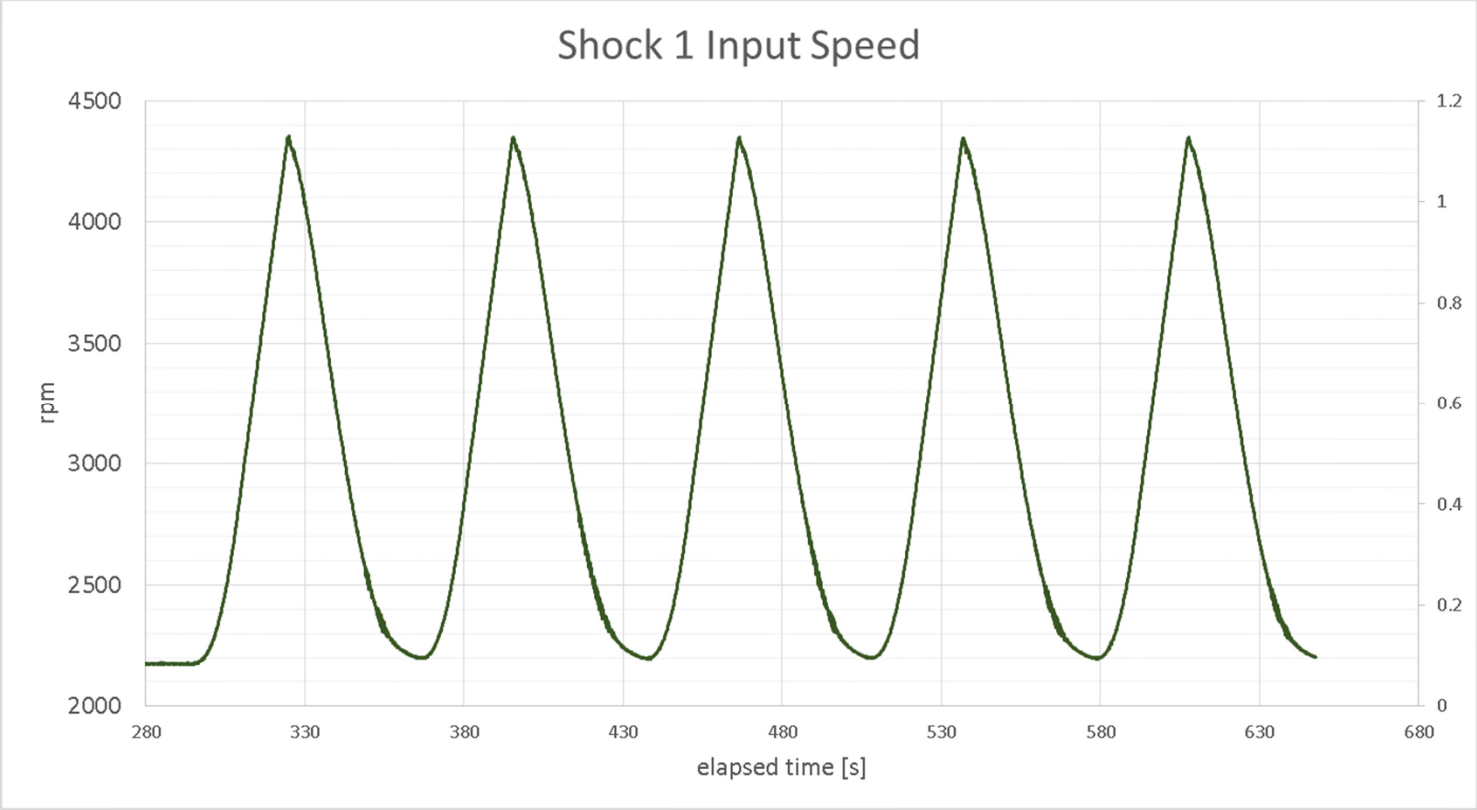


Shock 1			
Peak Input Torque Drive [ft-lb]		Peak Input Torque Coast [ft-lb]	
Target		*Target*	
Avg	233.9	Avg	-63.4
Min	233.0	Min	-76.7
Max	236.4	Max	-58.4

Shock 1—01-0003

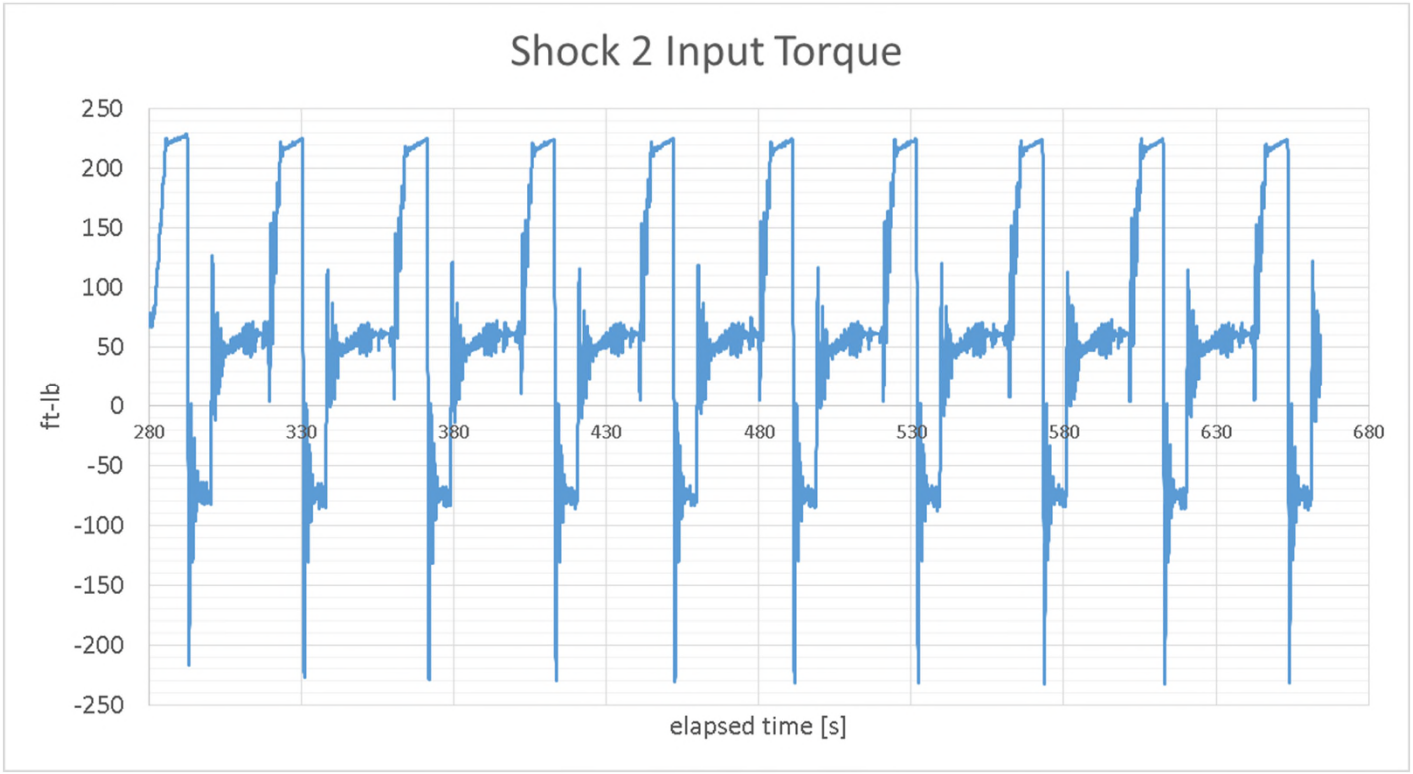


Shock 1—01-0003



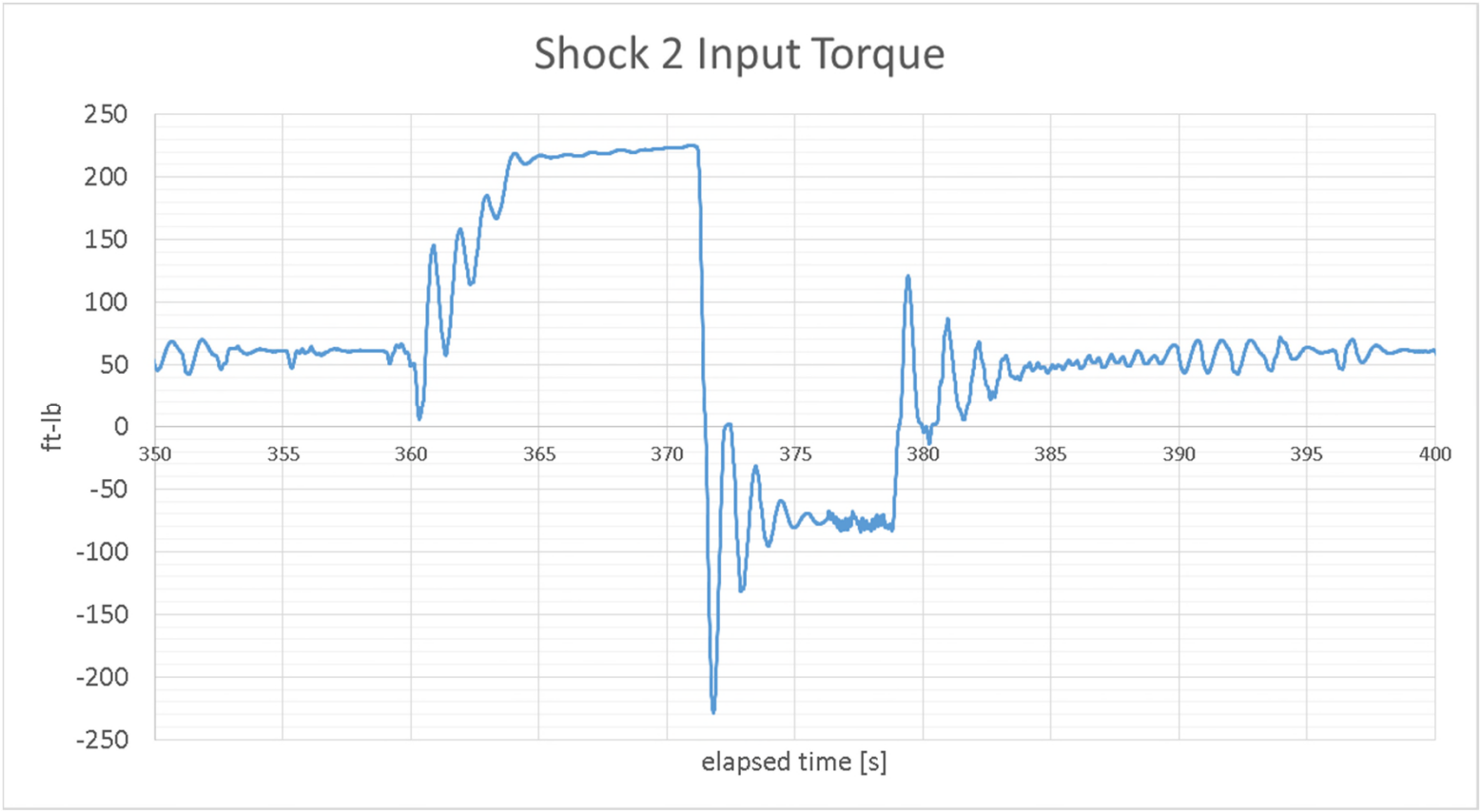
Shock 1			
Maximum Input Speed [rpm]		Minimum Input Speed [rpm]	
Target	*4316*	*Target*	*2178*
Avg	4350	Avg	2191
Min	4348	Min	2173
Max	4353	Max	2196

Shock 2—01-0003

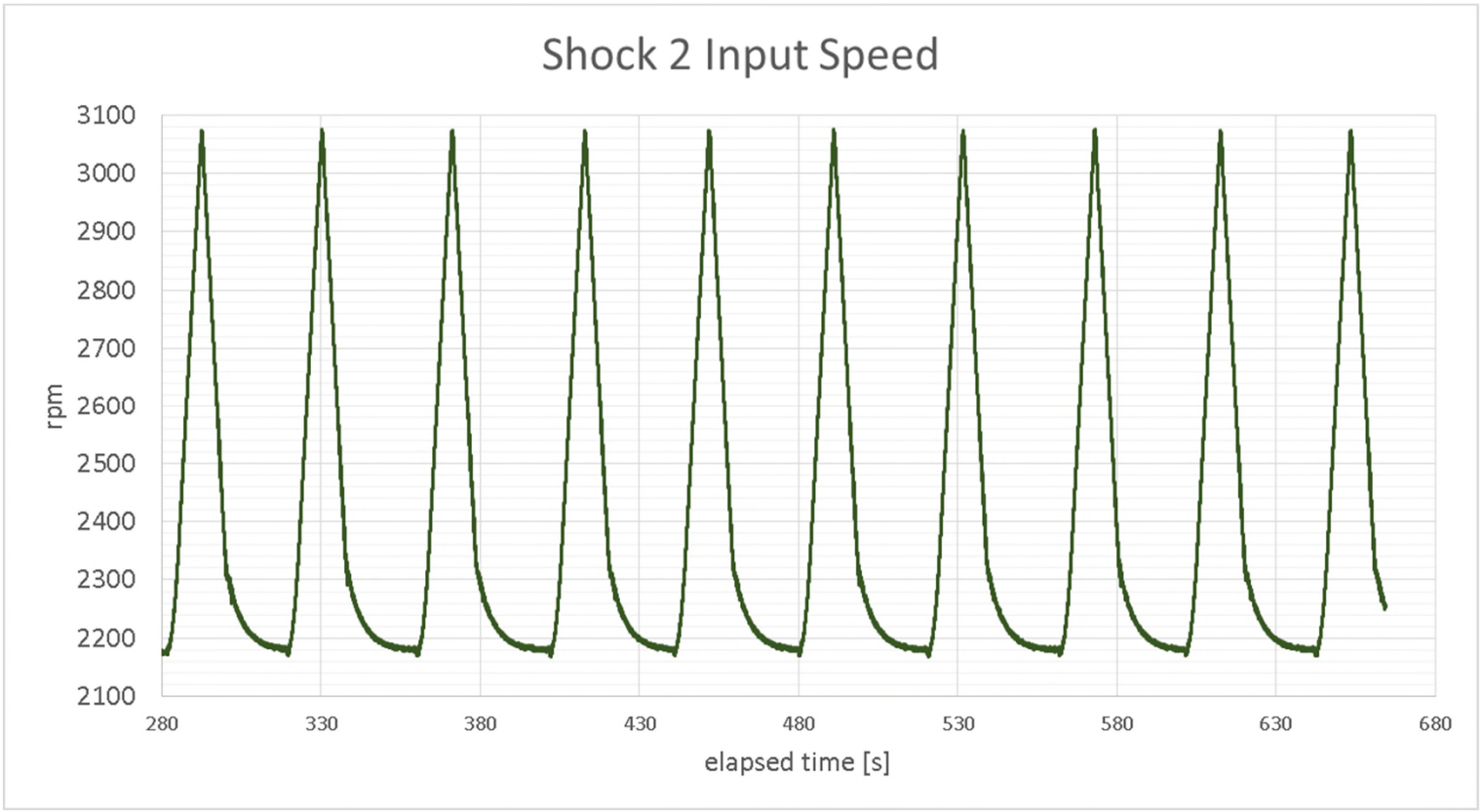


Shock 2			
Peak Input Torque Drive [ft-lb]		Peak Input Torque Coast [ft-lb]	
Target		*Target*	
Avg	225.8	Avg	-229.5
Min	224.5	Min	-233.0
Max	228.8	Max	-217.3

Shock 2—01-0003

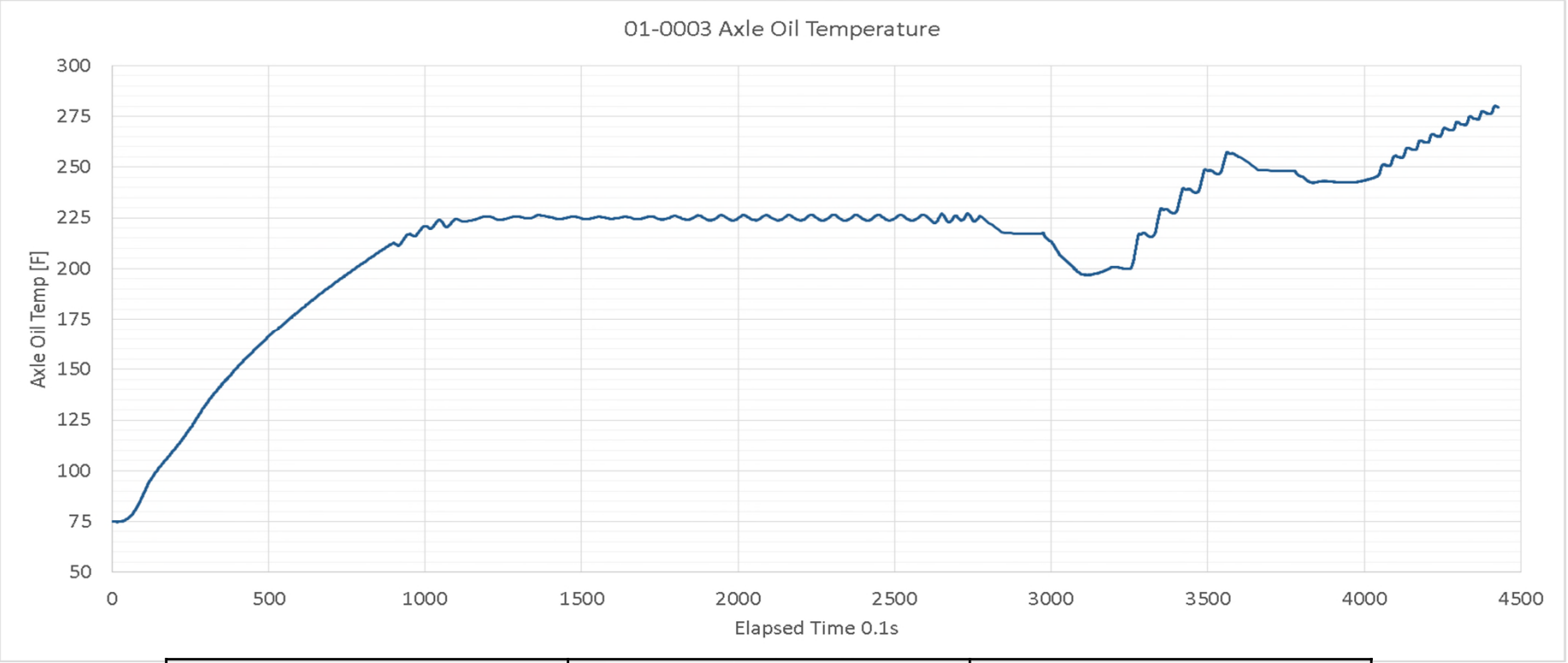


Shock 2—01-0003



Shock 2			
Maximum Input Speed [rpm]		**Minimum Input Speed [rpm]**	
Target	*750*	*Target*	*2178*
Avg	3075	Avg	2169
Min	3074	Min	2168
Max	3076	Max	2171

Temperature Plot—01-0003



Phase	Min Temp	Max Temp
Shock 1	200.1	257.1
Shock 2	246.4	279.8

Operational Data
01-0004 (TMC 119)

Stats—Conditioning 01-0004

Conditioning 1			
Input Torque [ft-lb]		Input Speed [rpm]	
Target	*60 ± 5*	*Target*	*2363*
Avg	60.0	Avg	2360
Min	58.5	Min	2356
Max	62.2	Max	2364

Conditioning 3			
Input Torque [ft-lb]		Input Speed [rpm]	
Target	*70 ± 5*	*Target*	*3350*
Avg	69.9	Avg	3346
Min	49.7	Min	3342.6
Max	86.4	Max	3350.8

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*	*575*	*Target*	*1582*
Avg	111.3	Avg	-59.9	Avg	2364	Avg	1581
Min	110.9	Min	-61	Min	2364	Min	1581
Max	112.2	Max	-58.4	Max	2365	Max	1582

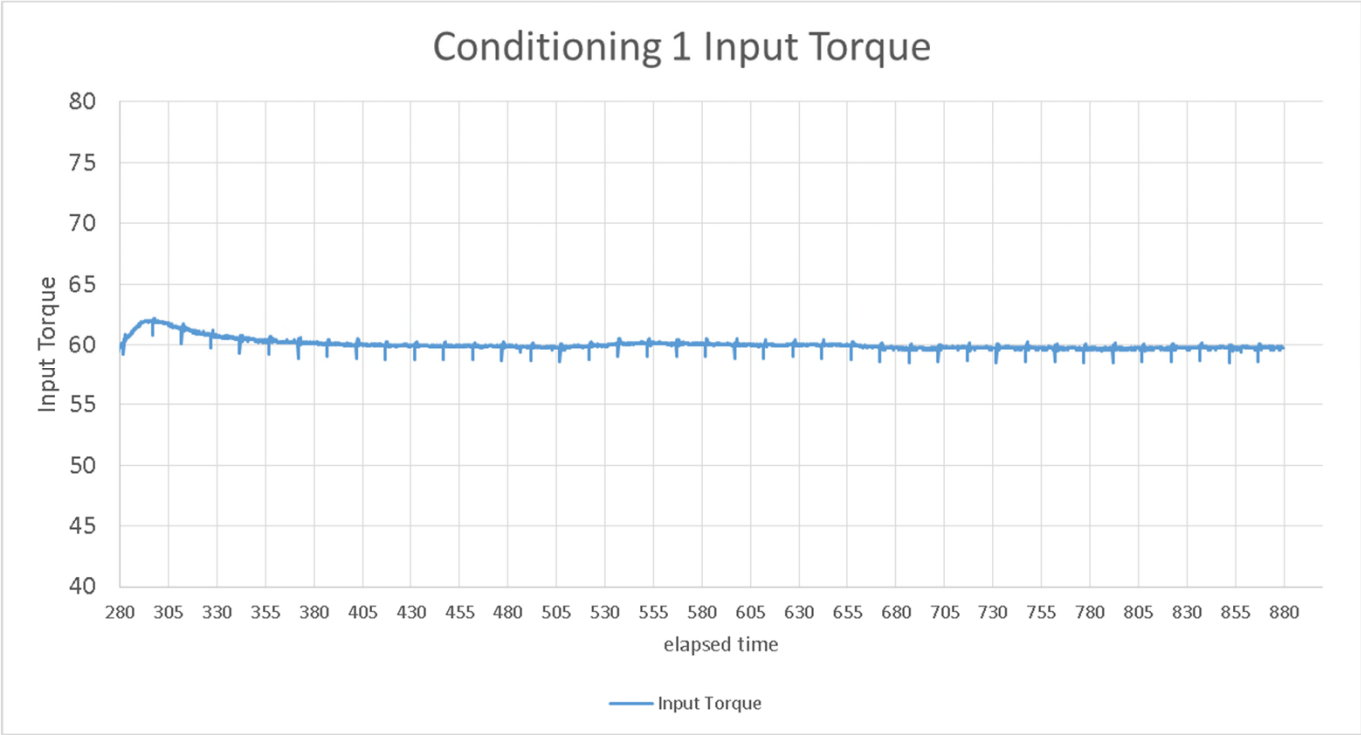
Conditioning 4							
Peak Input Torque Drive [ft-lb]		Peak Input Torque Coast [ft-lb]		Maximum Input Speed [rpm]		Minimum Input Speed [rpm]	
Target		*Target*		*Target*	*815*	*Target*	*2754*
Avg	100.5	Avg	-66.7	Avg	3353	Avg	2753
Min	113.8	Min	-74.0	Min	3352	Min	2752
Max	114.5	Max	-57.9	Max	3354	Max	2753

Stats—Shocks 01-0004

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	235.7	Avg	-59.0	Avg	4350	Avg	2191
Min	234.8	Min	-72.3	Min	4349	Min	2173
Max	237.3	Max	-52.9	Max	4353	Max	2197

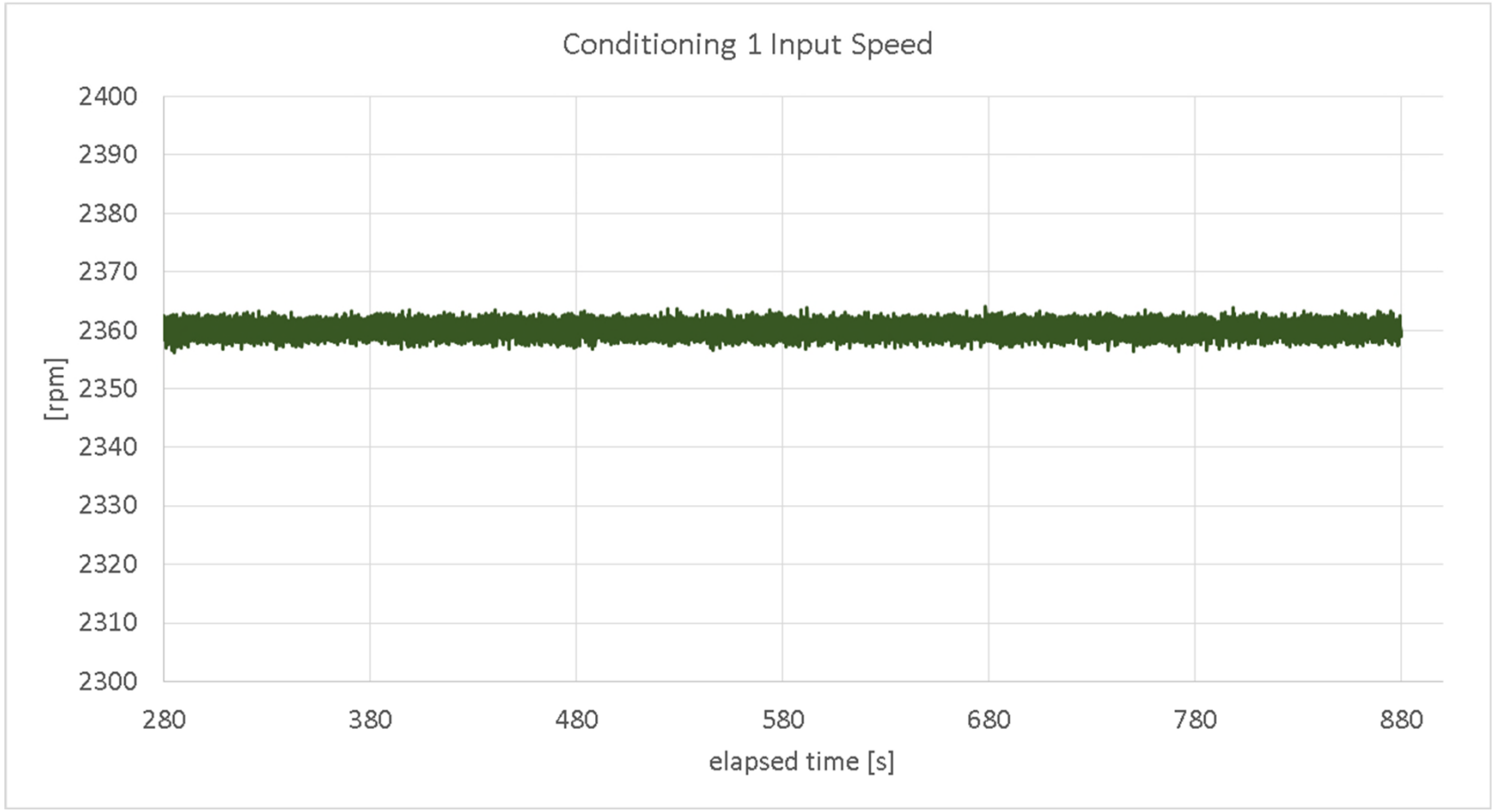
Shock 2							
Peak Input Torque Drive [ft-lb]		Peak Input Torque Coast [ft-lb]		Maximum Input Speed [rpm]		Minimum Input Speed [rpm]	
Target		*Target*		*Target*	*750*	*Target*	*2178*
Avg	227.0	Avg	-224.0	Avg	3078	Avg	2169
Min	225.2	Min	-228.5	Min	3072	Min	2166
Max	229.3	Max	-212.2	Max	3086	Max	2172

Conditioning 1—01-0004

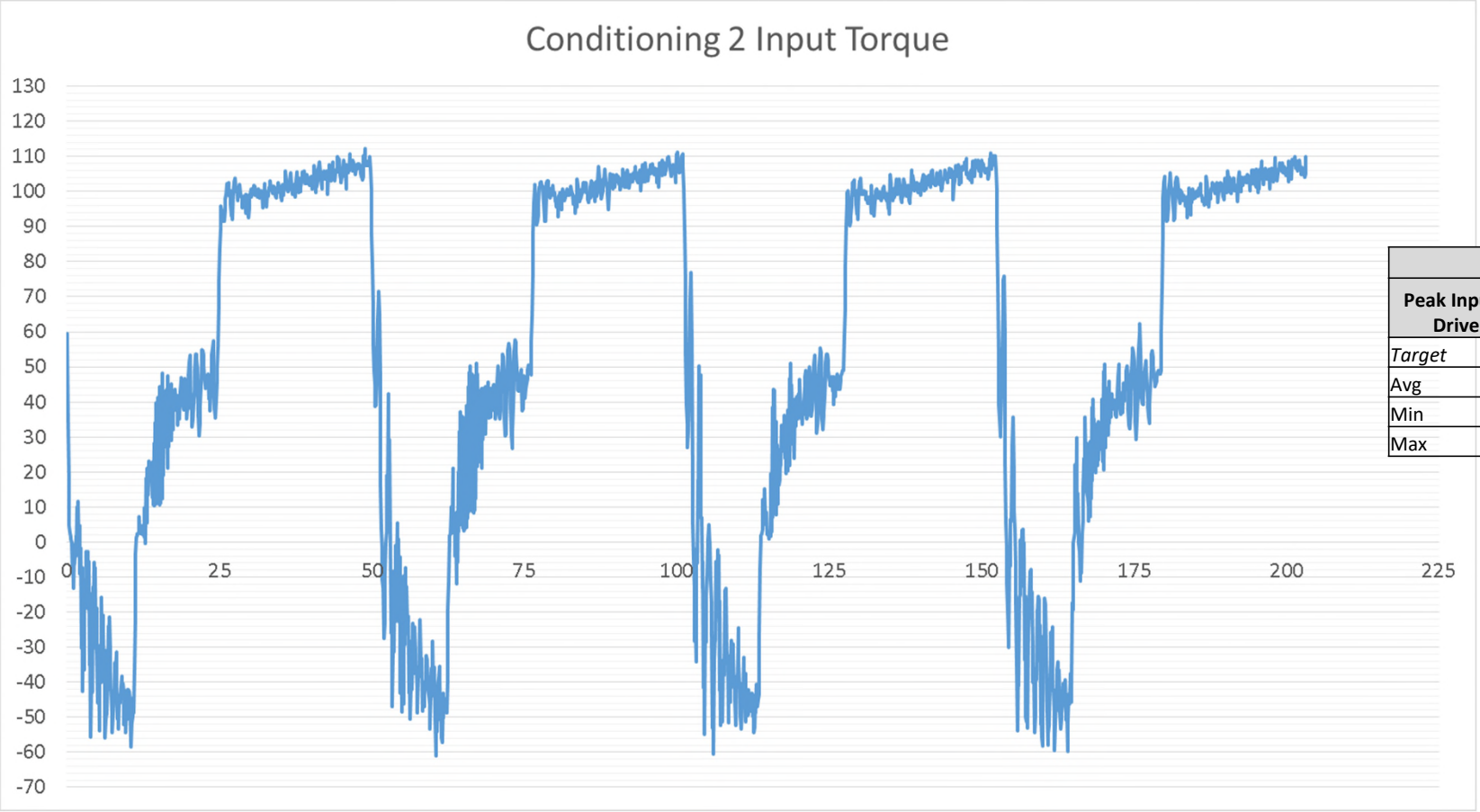


Conditioning 1			
Input Torque [ft-lb]		**Input Speed [rpm]**	
Target	*60 ± 5*	*Target*	*2363*
Avg	60.0	Avg	2360
Min	58.5	Min	2356
Max	62.2	Max	2364

Conditioning 1—01-0004

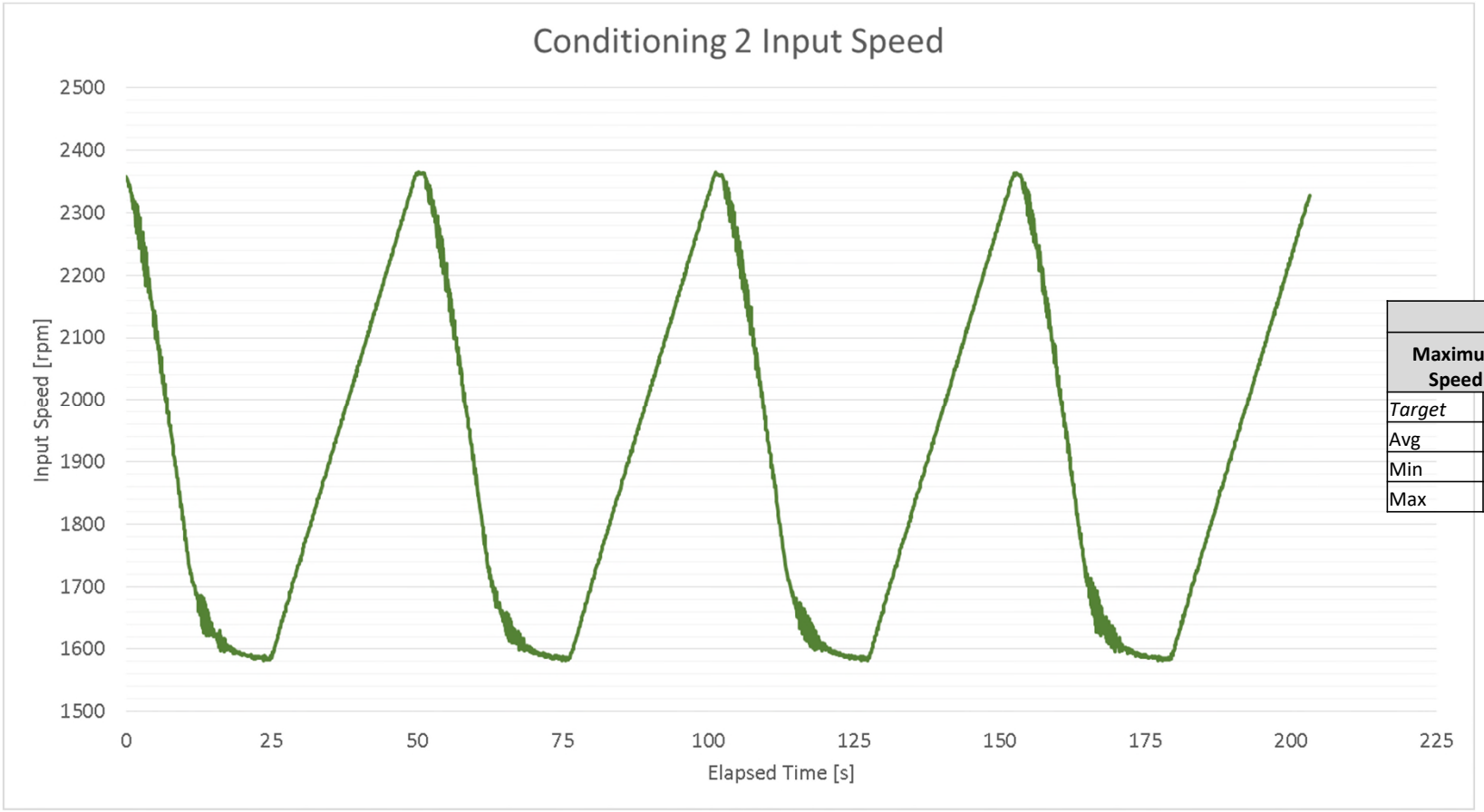


Conditioning 2—01-0004



Conditioning 2			
Peak Input Torque Drive [ft-lb]		Peak Input Torque Coast [ft-lb]	
Target		*Target*	
Avg	111.3	Avg	-59.9
Min	110.9	Min	-61
Max	112.2	Max	-58.4

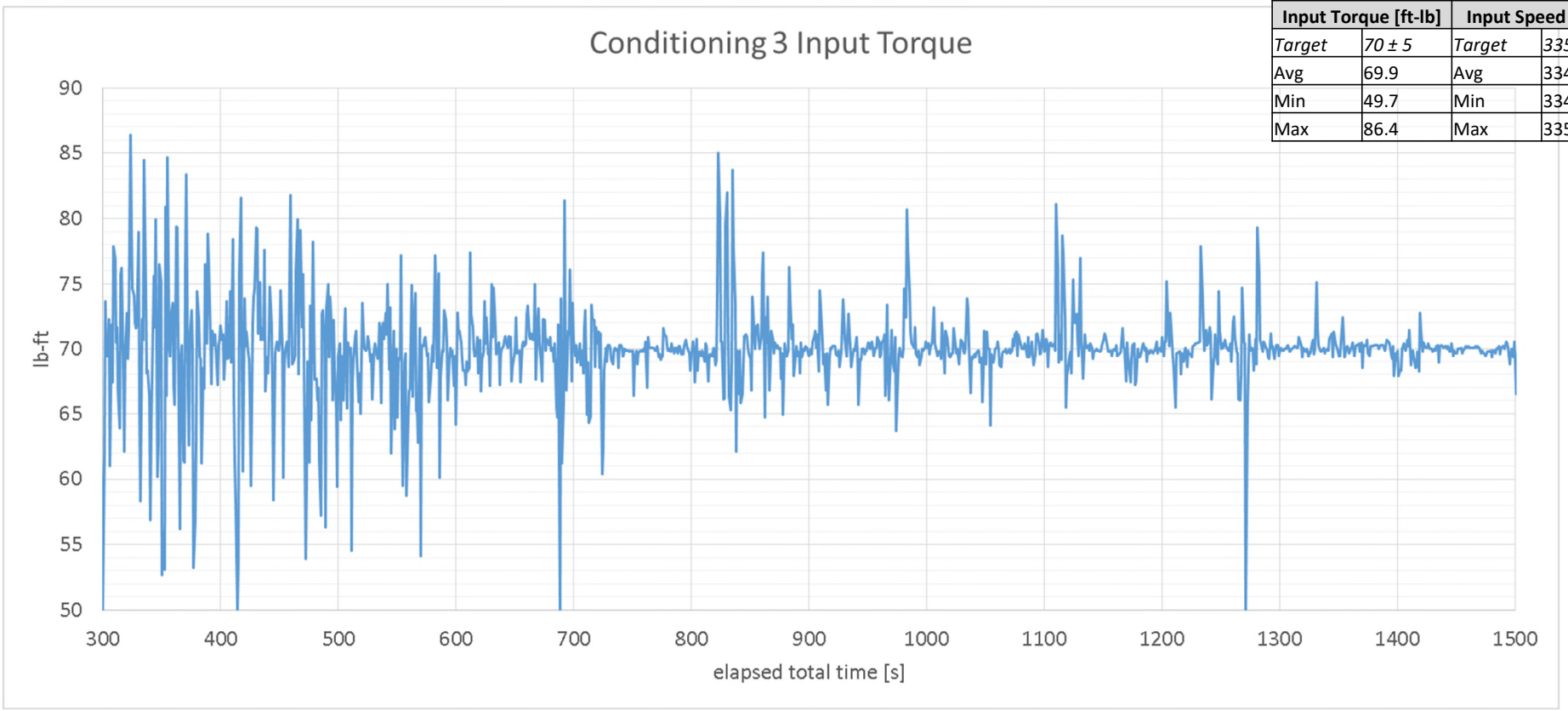
Conditioning 2—01-0004



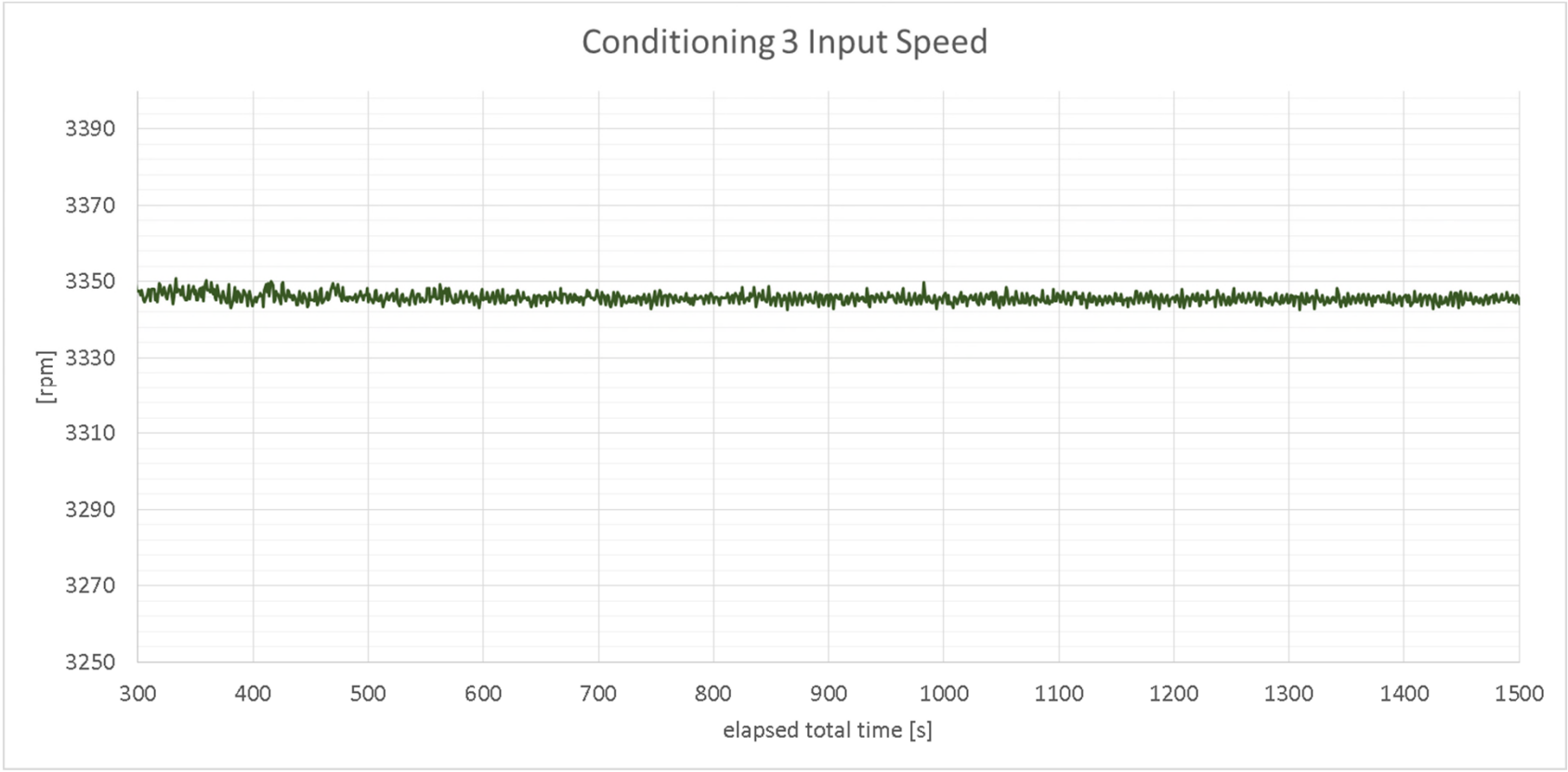
Conditioning 2			
Maximum Input Speed [rpm]		Minimum Input Speed [rpm]	
Target	*2363*	*Target*	*1582*
Avg	2364	Avg	1581
Min	2364	Min	1581
Max	2365	Max	1582

Conditioning 3—01-0004

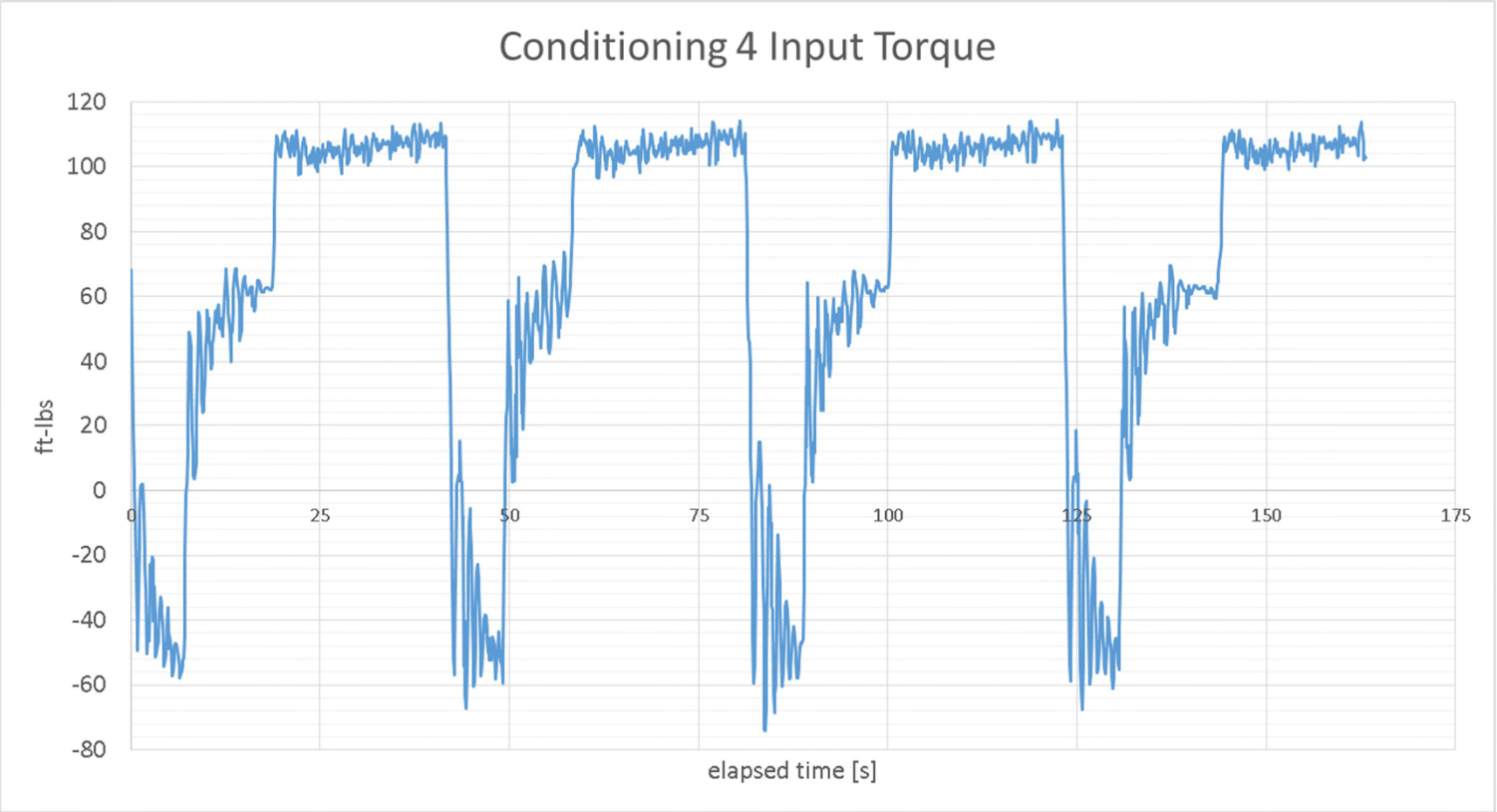
Conditioning 3			
Input Torque [ft-lb]		**Input Speed [rpm]**	
Target	*70 ± 5*	*Target*	*3350*
Avg	69.9	Avg	3346
Min	49.7	Min	3342.6
Max	86.4	Max	3350.8



Conditioning 3—01-0004

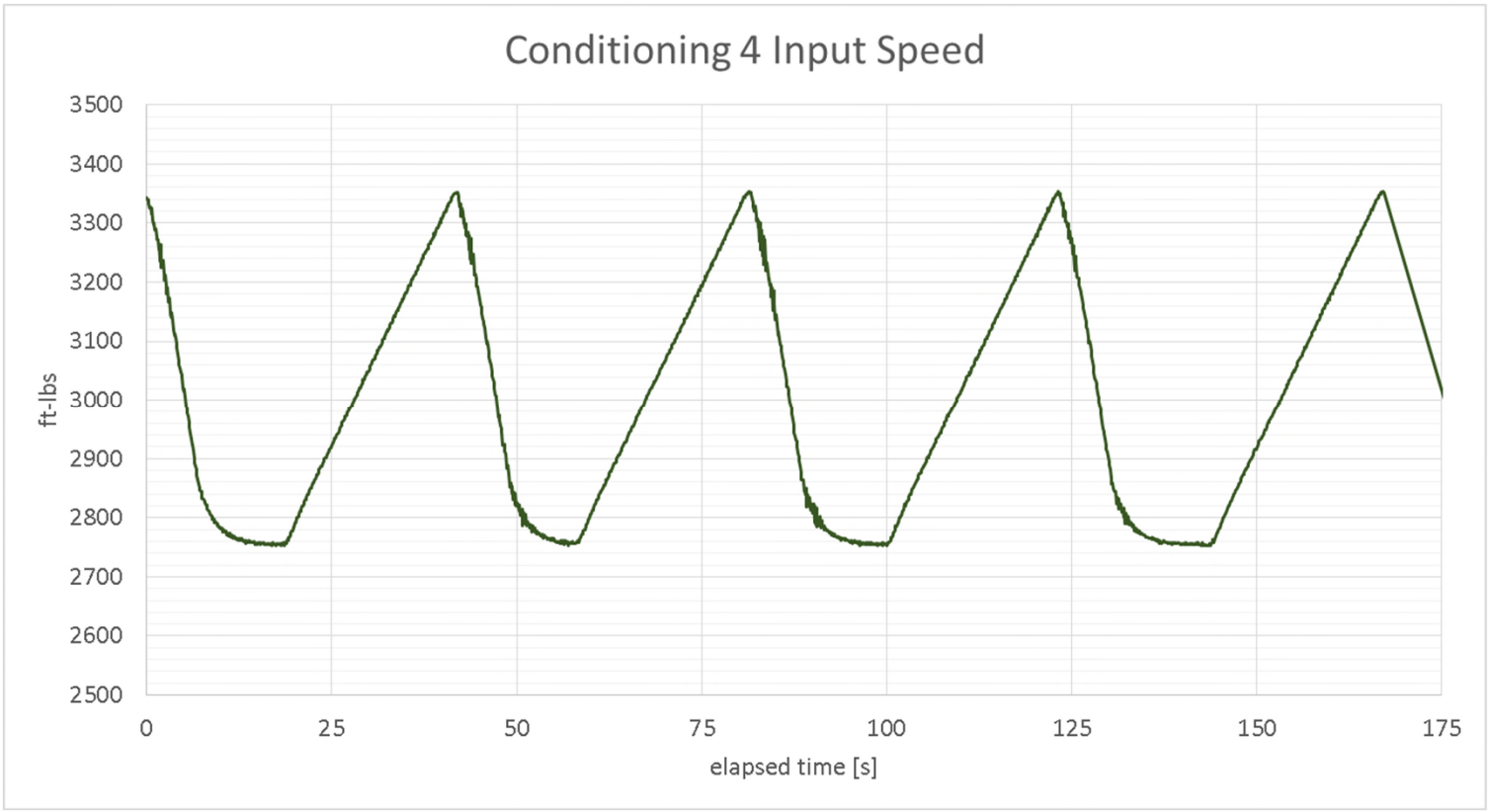


Conditioning 4—01-0004



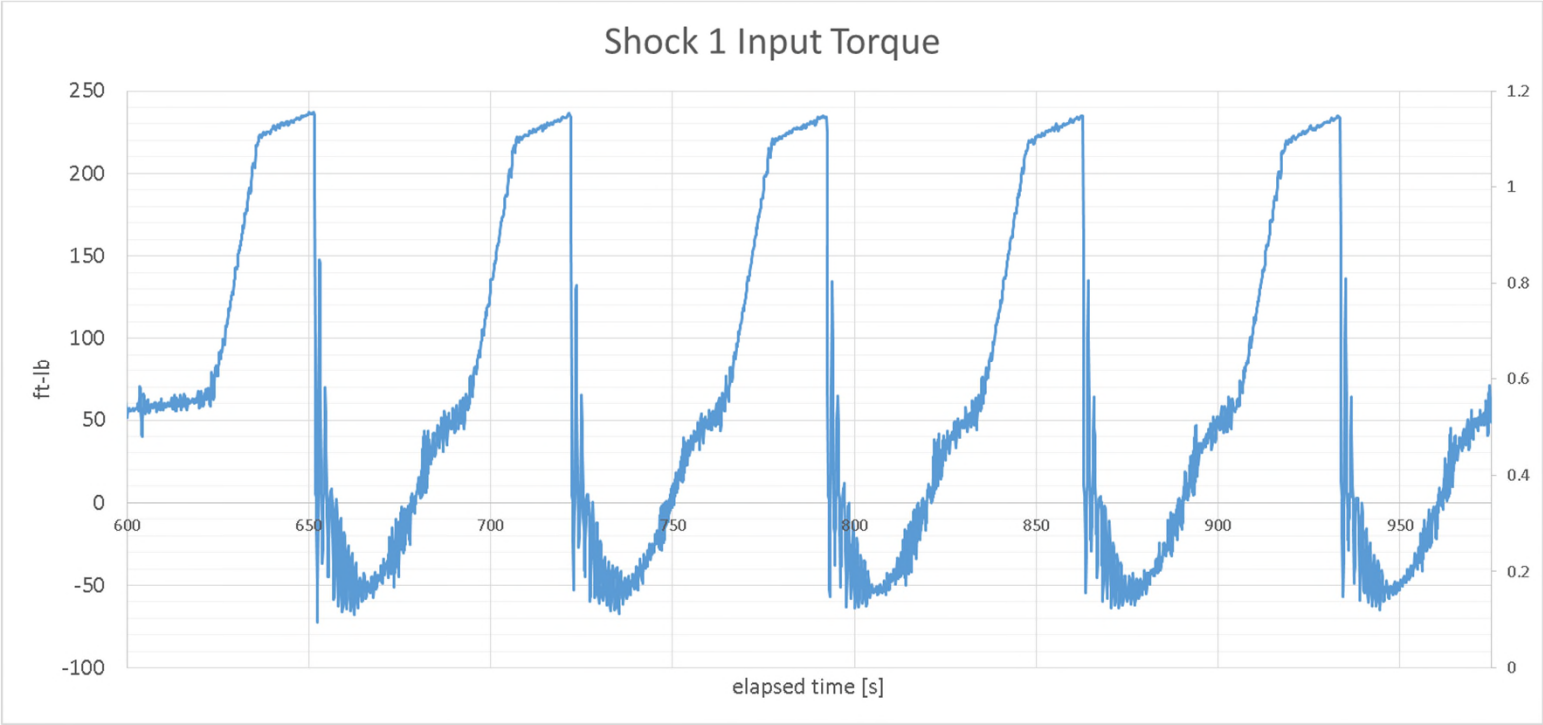
Conditioning 4			
Peak Input Torque Drive [ft-lb]		Peak Input Torque Coast [ft-lb]	
Target		*Target*	
Avg	100.5	Avg	-66.7
Min	113.8	Min	-74.0
Max	114.5	Max	-57.9

Conditioning 4—01-0004



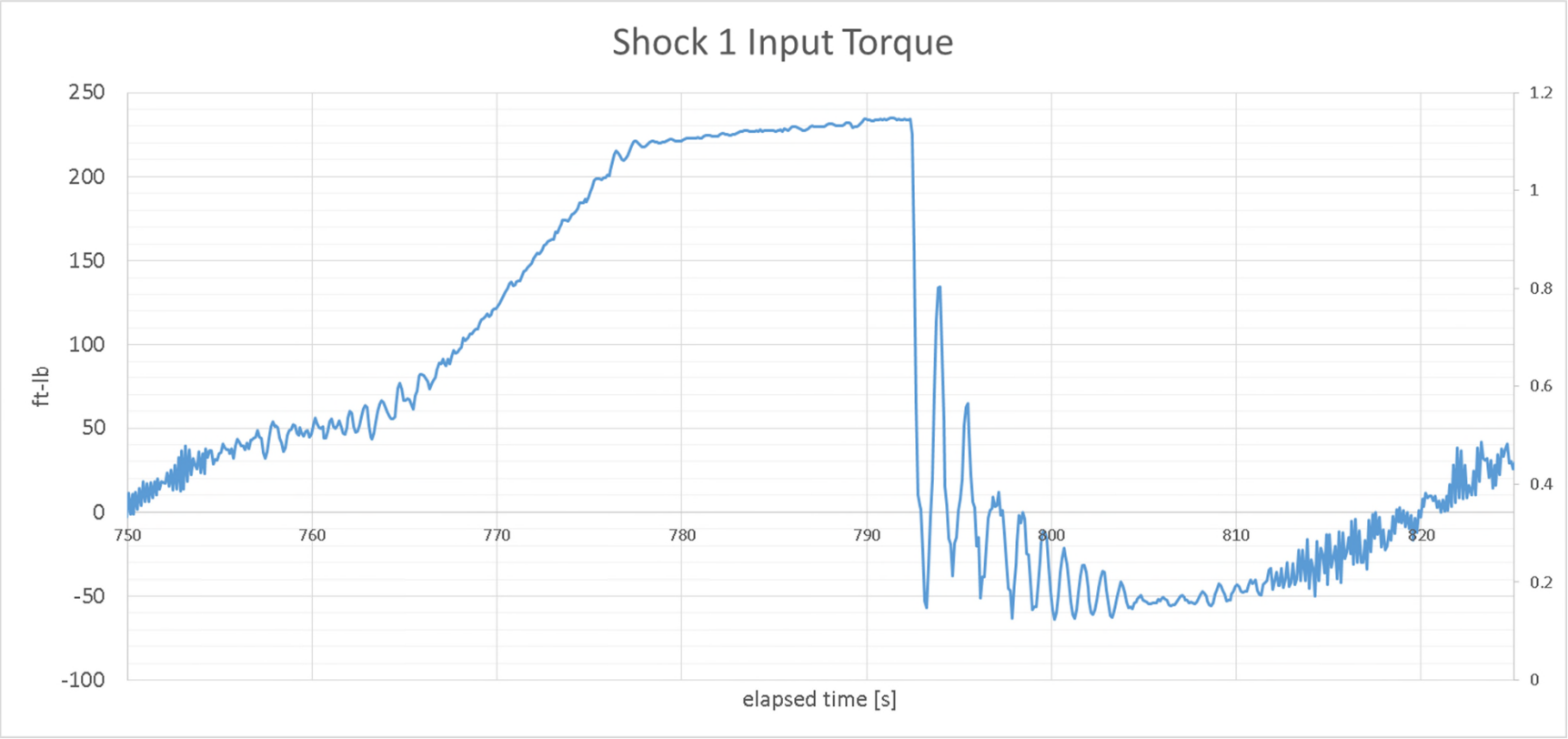
Conditioning 4			
Maximum Input Speed [rpm]		Minimum Input Speed [rpm]	
Target	*815*	*Target*	*2754*
Avg	3353	Avg	2753
Min	3352	Min	2752
Max	3354	Max	2753

Shock 1—01-0004

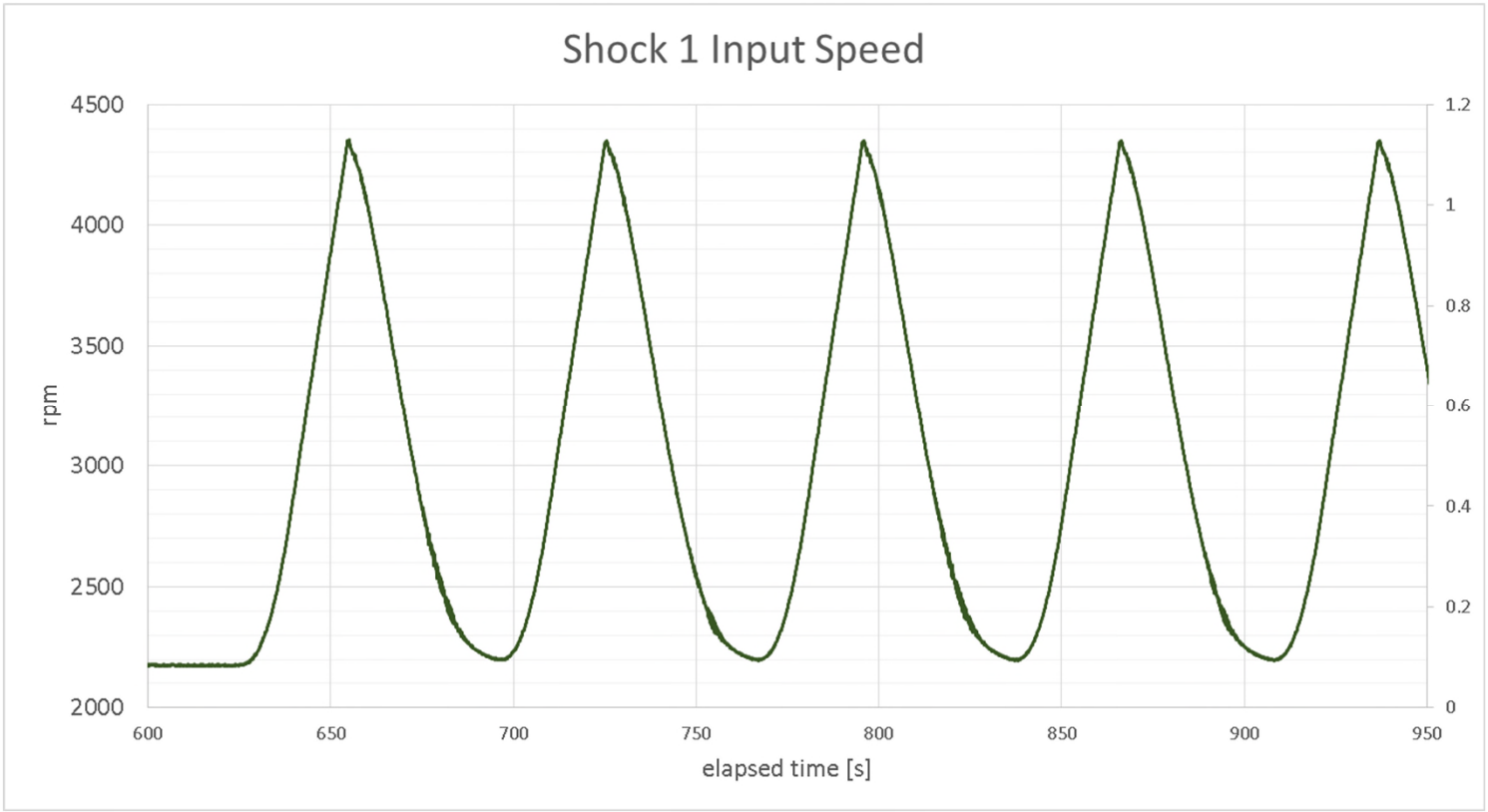


Shock 1			
Peak Input Torque Drive [ft-lb]		Peak Input Torque Coast [ft-lb]	
Target		*Target*	
Avg	235.7	Avg	-59.0
Min	234.8	Min	-72.3
Max	237.3	Max	-52.9

Shock 1—01-0004

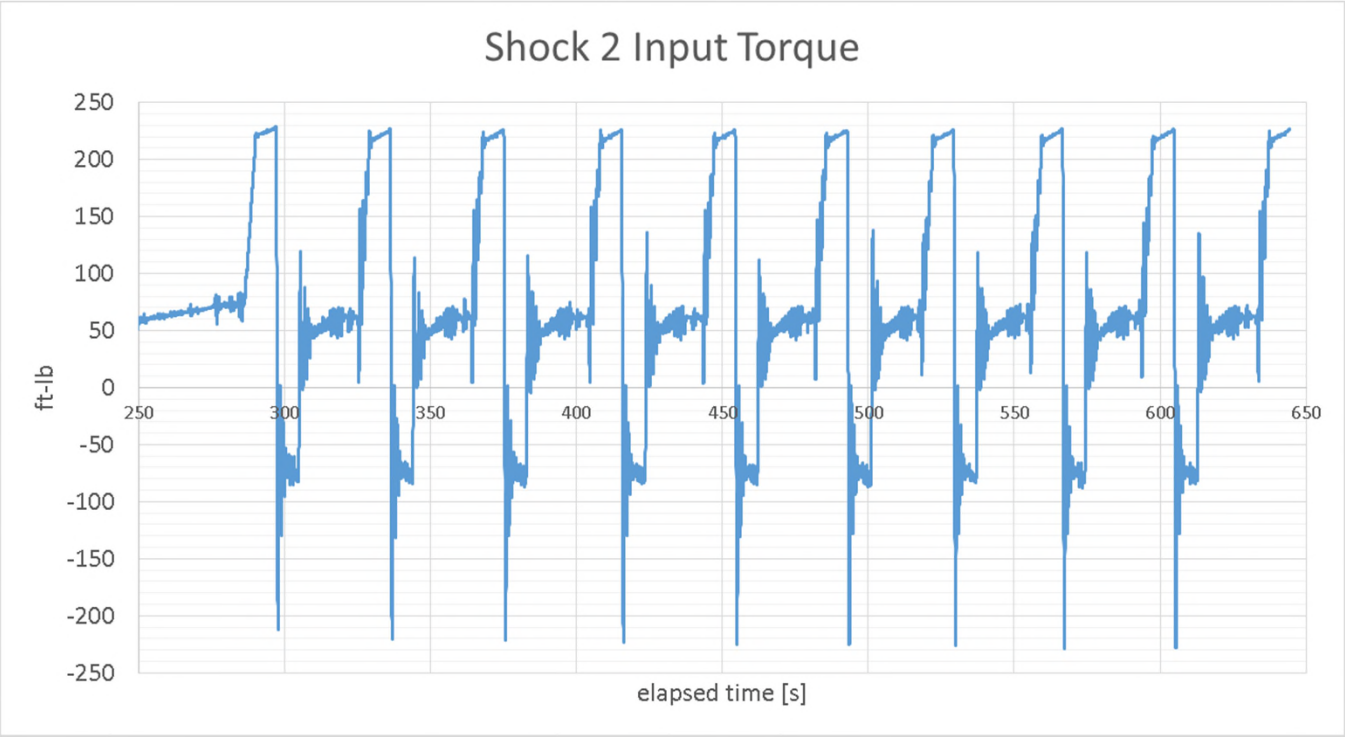


Shock 1—01-0004



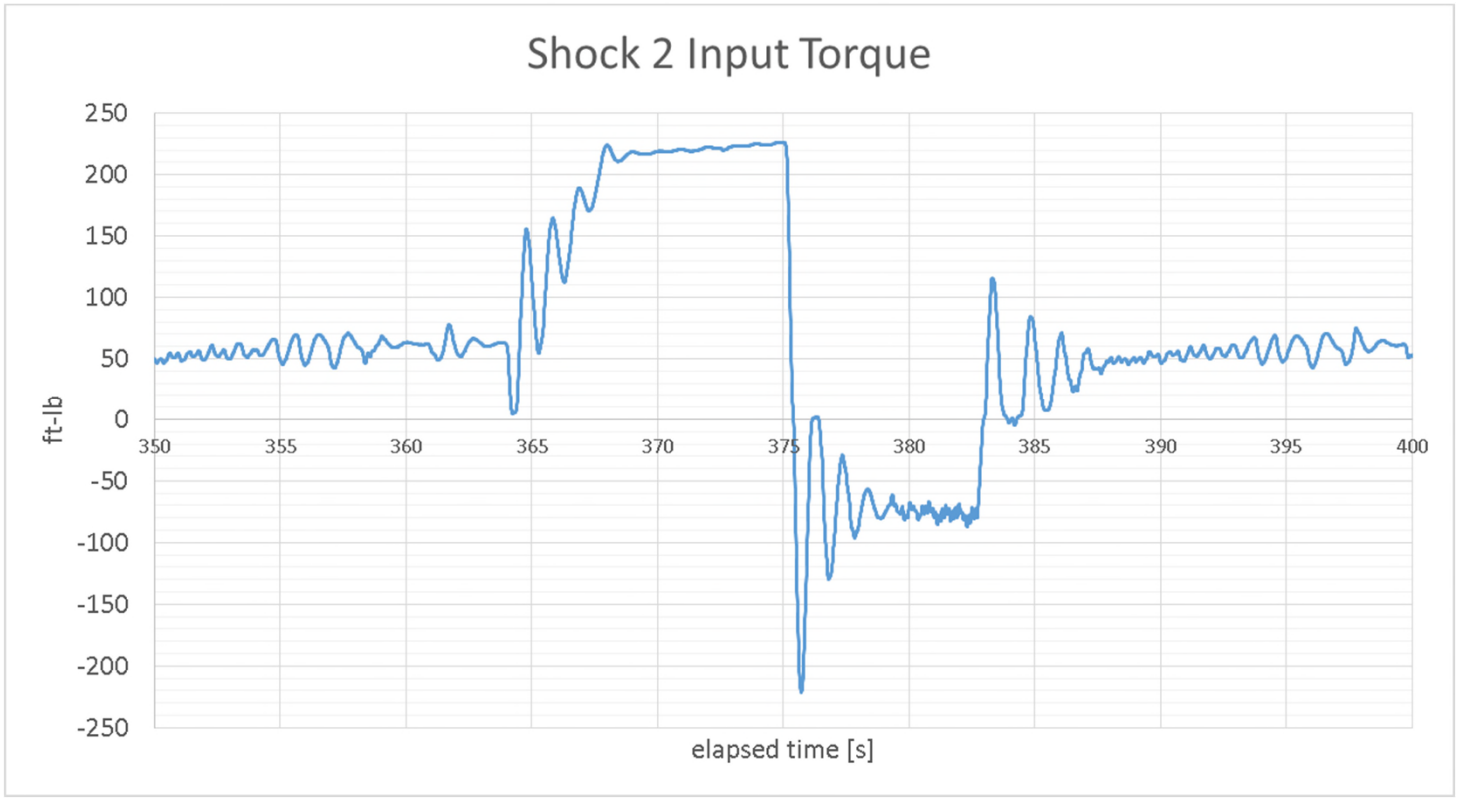
Shock 1			
Maximum Input Speed [rpm]		Minimum Input Speed [rpm]	
Target	*4316*	*Target*	*2178*
Avg	4350	Avg	2191
Min	4349	Min	2173
Max	4353	Max	2197

Shock 2—01-0004

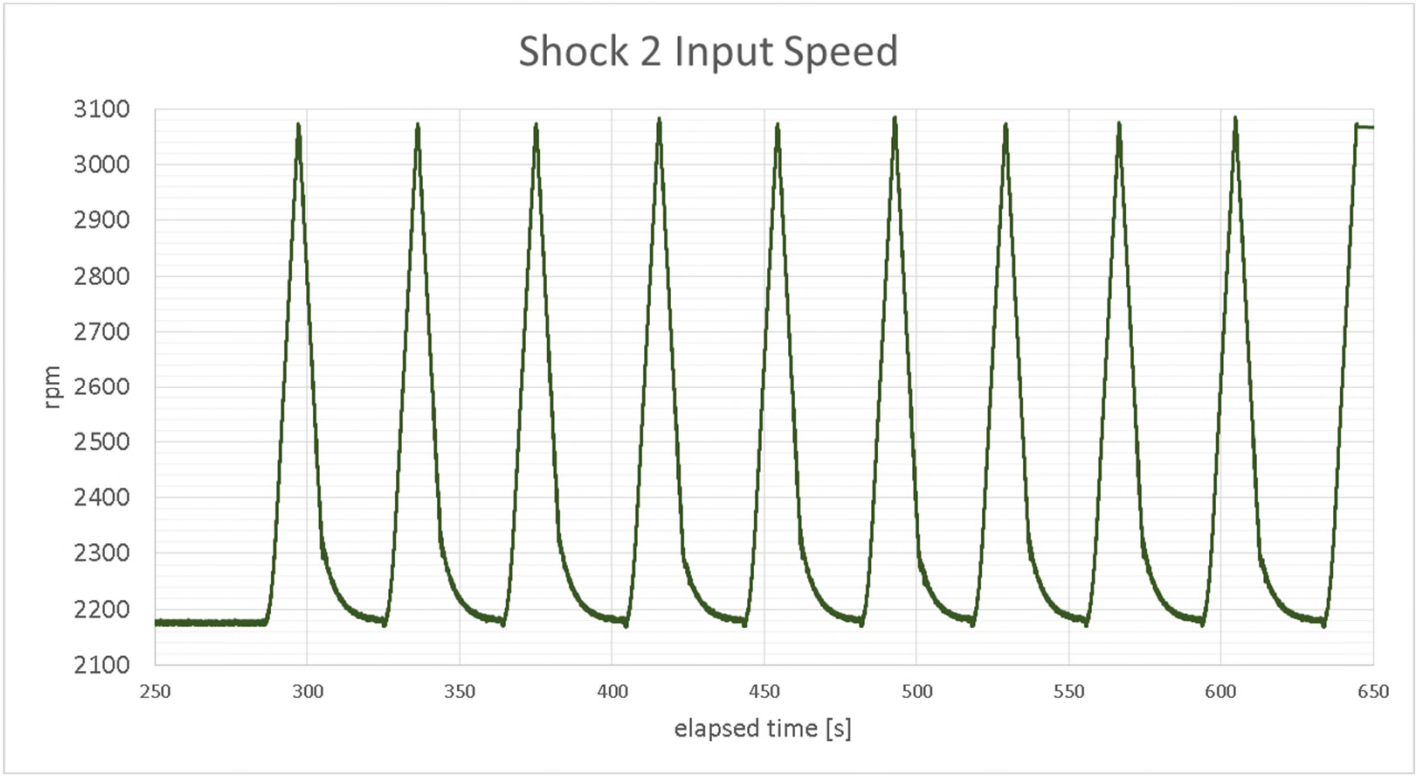


Shock 2			
Peak Input Torque Drive [ft-lb]		Peak Input Torque Coast [ft-lb]	
Target		*Target*	
Avg	227.0	Avg	-224.0
Min	225.2	Min	-228.5
Max	229.3	Max	-212.2

Shock 2—01-0004

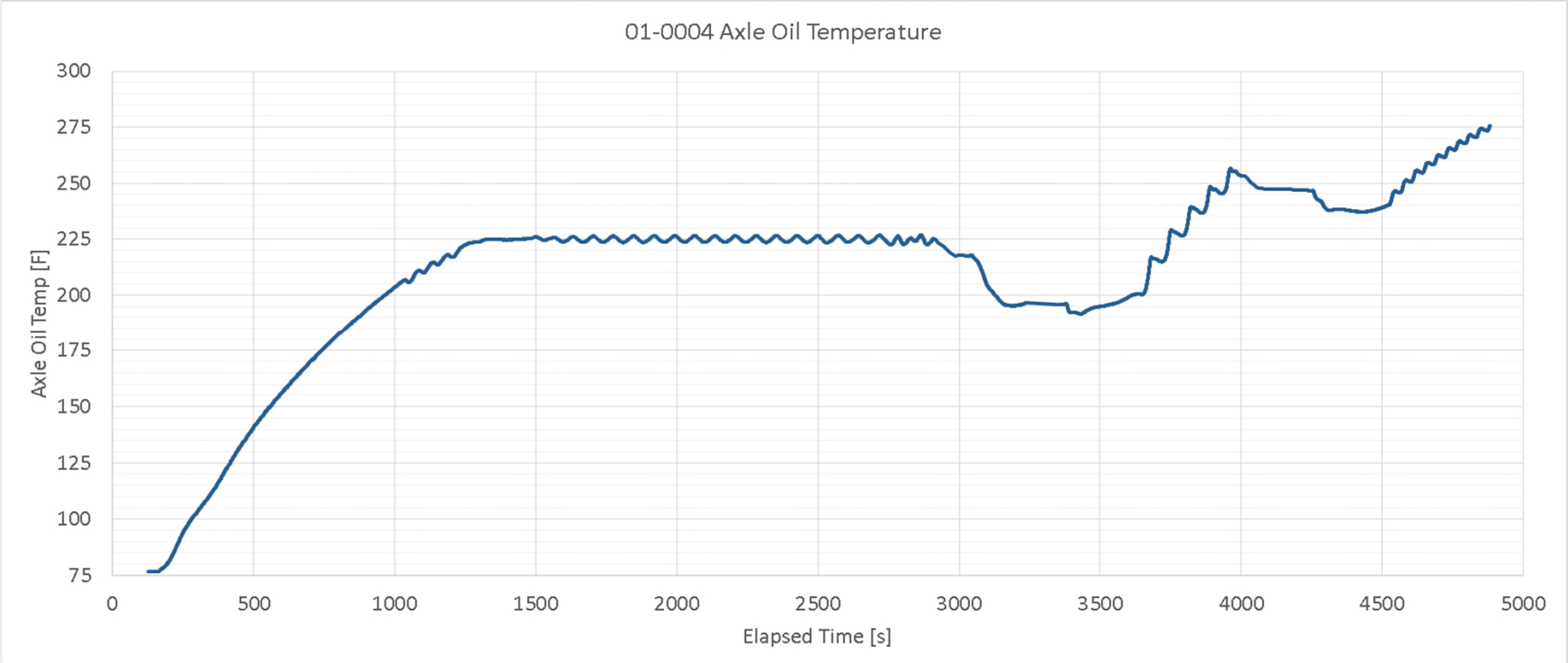


Shock 2—01-0004



Shock 2			
Maximum Input Speed [rpm]		**Minimum Input Speed [rpm]**	
Target	*3083*	*Target*	*2178*
Avg	3078	Avg	2169
Min	3072	Min	2166
Max	3086	Max	2172

Temperature Plot—01-0004



Phase	Min Temp	Max Temp
Shock 1	200.9	256.2
Shock 2	241.0	275.2

L-42-1 Development Hardware Donation

- **Current batch at 2 of the 4 labs is C1L446 / P8AD132**
- **Development should ideally be done all on same batch**
- **Ready for more?**

Hardware Inventory Check

- **When do other labs anticipate they will need more axles?**

LRI 205 Surveillance Panel Meetings
L-42 Test Method Revision

May 11, 2022

Sections 9.9 and 11.3 of the Test Procedure Contradict Each Other

Section 9.9 of the procedure reads as follows:

9.9 For all reference oil tests, the end-of-test coast side pinion scoring shall be equal to or greater than the end-of-test
ring coast side scoring for the test to be acceptable.

Note: The TMC considers discrimination oil reference oils

Section 11.3 of the procedure reads as follows:

11.3 Reference oil tests, other than a discrimination oil test, and non-reference oil tests that exhibit end of test ring coast side scoring greater than end of test pinion coast side scoring are non-interpretable.

Are Discrimination oil tests that exhibit ring scoring greater than pinion scoring considered valid?

Historically Results

Historically discrimination runs that exhibit higher ring scoring than pinion scoring have been reported as invalid.

VIEWTABLE: sasuser.ALLltmsL42

	testkey	ltmslab	val	ind	ltmsdate	dtcomp	CHART	com1	com2	com3	com4	ECSP	LTMSAPP	STRUN	PINBAT	RINGBAT	ECSPrate	ECSRrate	ECSRFNL
4	152500-L42	G	AS	113	20220403	20220403	N					50	1	0431	C1L925	P8AD078X	50	68	68
199	153768-L42	A	MS	113	20210210	20210210	N	RINGSCOR	>PINSCOR			53	2A	0911	C1L446	P8AD132	53	55	55
246	144486-L42	A	MS	113	20200121	20200121	N	RINGSCOR	>PINSCOR			48	2A	0778	C1L446	P8AD132	48	53	53
247	144485-L42	A	MS	113	20200120	20200120	N	RINGSCOR	>PINSCOR			46	2A	0777	C1L446	P8AD132	46	60	60
342	142243-L42	G	LS	113	20181211	20181211	N	NOT	1_OF_4			55	1	0302	C1L925	P8AD078X	55	63	63
344	139987-L42	G	LS	113	20181210	20181210	N	NOT	1_OF_4			59	1	0300	C1L925	P8AD078X	59	67	67
346	139986-L42	G	LS	113	20181209	20181209	N	NOT	1_OF_4			48	1	0297	C1L925	P8AD078X	48	56	56
389	119560-L42	A	NI	113	20171009	20171009	N	INFO RUN				58	2A	0634	C1L446	P8ADI32	58	68	68
392	123425-L42	D	NI	113	20171002	20171002	N	INFO RUN				37	3	1869	C1L446	P8AD132	37	61	61
401	117582-L42	D	MS	113	20170911	20170911	N	RINGSCOR	>PINSCOR			49	3	1838	C1L925	P8AD078X	49	69	69
591	91094-L42	G	LS	113	20131114	20131114	N	RING>PIN	POLISHNG			70	1	0211	B6L544	P4L806	70	76	76
697	90801-L42	G	MS	113	20121030	20121030	N	LOW	TORQUE			47	1	0154	B6L544	P4L806	47	51	51
722	87865-L42	B	NI	113	20120627	20120627	N	HARDWAR	RUN			43	3	596	C1L691	P8T025A	43	58	58
738	83909-L42	B	NI	113	20120522	20120522	N	HARDWAR	RUN			30	3	571	C1L691	P8T025A	30	50	50
797	70116-L42	B	MS	113	20110817	20110817	N	MILD	DESCRIM	RUN		47	3	520	C1L446	P8L119	47	50	50
939	70106-L42	A	MS	113	20090518	20090518	N					45	2	0448	C1L446	P8L119	45	65	65
956	46676-L42	D	AG	113	20090325	20090325	N	MATRIX	TEST			51	3	308	C1L446	P8L119	51	68	68
959	70030-L42	D	AS	113	20090325	20090325	N	MATRIX	TEST	USED FOR	STD CAL	66	3	311	C1L446	P8L119	66	68	68
1125	46683-L42	A	AG	113	20070330	20070330	N	NEW	GEAR	BATCH	MATRIX	50	2	0191	B6L544	P4L806	50	53	53
1139	46675-L42	D	AG	113	20070321	20070321	N	NEW	GEAR	BATCH	MATRIX	50	3	130	B6L544	P4L806	59	63	63

Information Letter History

- Sections 11 and 9 have both been revised over the years, but from reviewing a 2008 version of the test method (D7452-08), there have always been two contradicting statements in the procedure.

From Section 9.2 (D7452-08)

For all reference oil tests, the end of test coast side pinion scoring shall be equal to or greater than the end of test ring coast side scoring for the test to be acceptable.

From Section 11.4 (D7452-08)

Reference oil tests, other than the discrimination oil tests, and non-reference oil tests that exhibit drive side scoring shall be considered non-interpretable.

Panel Task

- **The L42 surveillance panel should decide if discrimination oils that exhibit ring scoring greater than pinion scoring are considered valid**

Panel Task

- **If valid, then remove section 9.9 from the test procedure and keep only section 11.3**

~~9.9 For all reference oil tests, the end-of-test coast side pinion scoring shall be equal to or greater than the end-of-test ring coast side scoring for the test to be acceptable.~~

11.3 Reference oil tests, other than a discrimination oil test, and non-reference oil tests that exhibit end of test ring coast side scoring greater than end of test pinion coast side scoring are non-interpretable.

Panel Task

- **If not valid, then remove section 11.3 from the test procedure and modify section 9.9**

9.9 For all reference oil tests (including discrimination oil tests), and non-reference oil tests, the end-of-test coast side pinion scoring shall be equal to or greater than the end-of-test ring coast side scoring for the test to be acceptable.

~~11.3 Reference oil tests, other than a discrimination oil test, and non-reference oil tests that exhibit end of test ring coast side scoring greater than end of test pinion coast side scoring are non-interpretable.~~

New Issues

- ?

Thanks!

L-42 Surveillance Panel Membership/Attendance
IAR, Plymouth, MI and Microsoft Teams Virtual Meeting
May 11, 2022

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May 11, 2022

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May 11, 2022

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May 11, 2022

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	Haynes, Troy	NV	IPAC Inc.	Phone:	
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May 11, 2022

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				E-mail:	travis.kostan@swri.org
JJ	LaBond, Jessica	NV	Meritor	Phone:	248-872-3055
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May 11, 2022

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May 11, 2022

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IAR, Plymouth, MI and Microsoft Teams Virtual Meeting
May 11, 2022

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L-42 Surveillance Panel Membership/Attendance
IAR, Plymouth, MI and Microsoft Teams Virtual Meeting
May 11, 2022

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L-42 Surveillance Panel Membership/Attendance
IAR, Plymouth, MI and Microsoft Teams Virtual Meeting
May 11, 2022

Present	Name	Voting Non-Voting	Company Name Company Address	Contact information	
				Phone:	
				E-mail:	
				Phone:	
				E-mail:	
				Phone:	
				E-mail:	
				Phone:	
				E-mail:	
				Phone:	
				E-mail:	

L-42 Surveillance Panel Membership/Attendance IAR, Plymouth, MI and Microsoft Teams Virtual Meeting May 11, 2022					
Present	**Name**	**Voting Non-Voting**	**Company Name Company Address**	**Contact information**	
				Phone:	
				E-mail:	