

**Report of Meeting**  
**L-37/L-37-1 Surveillance Panel Teleconference**

*May 3<sup>rd</sup>, 2017*

**Attendees:**

SwRI -	<b>Warden</b> , Stevens
Lubrizol -	<b>Venhoff</b> , Drlja, Marsic, Ebner, Prengaman
Afton -	<b>Donovan</b> , Bell
Intertek -	<b>Smith</b> , Trader, Rettmann
TMC -	<b>Parke</b>
ExxonMobil -	<b>Banas</b> , Kanga
AAM -	<b>Dharte</b>
BASF -	Joy
Dana -	<b>Guzikowski</b>
Gleason -	<i>Dennis</i>
Linamar	<i>Chambers</i>

Voting Members in **BOLD**

Members joining on the phone in *italics*

The meeting was called to order at 1:00pm EST.

Minutes include discussions at April 17, 2017 SP teleconference

### **1.0 Gleason Hardware Approval Matrix**

**Motion # 1** → W. Venhoff / 2<sup>nd</sup> E. Donovan to approve the Gleason non-lubrited hardware for Standard test conditions. Motion was passed with a unanimous vote, 9-0-0 (Yes-No-Abstain).

**Motion # 2** → R. Warden / 2<sup>nd</sup> D. Smith to use traditional LTMS with consequences for severity only on reference oil tests. Motion was passed with a unanimous vote, 9-0-0 (Yes-No-Abstain).

### **2.0 Importance of Contact Pattern**

During the six-test matrix at SwRI and Intertek, Intertek discovered what appeared to be a critical parameter regarding the Gleason axle builds. That parameter is coast-side contact pattern. Further investigations ensued and the newly discovered information was shared with SwRI. After fine-tuning their build procedure and paying close attention to the coast side contact pattern, Intertek were in essence able to turn “off & on” a passing test result on the TMC 117 fluid. Intertek and SwRI both shared their findings from this experiment and it was agreed that close attention needs to be paid to coast side contact during the Gleason build process. Capturing this to include in the build procedure is a must.

### **3.0 Dana Supply of Future L-37 Hardware Components**

Discussion was had on what options we have for purchasing axle components not readily available via aftermarket channels (i.e., axle housings, diff cases, etc.). Many options were discussed without consensus. This agenda item will be revisited during future meetings.

### **4.0 Unique Gleason Distress**

W. Venhoff shared a presentation prepared by Lubrizol detailing SEM photography of the unique distress observed. Further discussion was had in an attempt to identify the distress. In the end, Gleason agreed to take a closer look at the hardware to try and identify the distress and also determine if any processing changes could be made to address to issue. This agenda item will be revisited once a full metallurgical analysis has been completed.

## **5.0 Adjournment**

**Motion # 3** → J. Dharte / 2<sup>nd</sup> D. Smith to adjourn. Motion to adjourn was passed with a unanimous vote, 9-0-0 (Yes-No-Abstain).

Meeting Adjourned at 2:30pm EST

Respectfully submitted,

Wes Venhoff  
L-37/L-37-1 Surveillance Panel Chairman

Initial L371 LTMS Reference Targets (155-1)

IND	TESTHARD	TVERSION	SERIALNO	STRUN	LAB	TESTKEY	LTMSDATE	WEAR	RIPP	RIDG	SPIT	WEARR	RIPPR	RIDGR	SPITR	SCOR	SCORR	COMMENT	PINBAT	RINGBAT
155-1	Non-Lubrited	Standard	LAB-A0022-02	43	A	106973-L371	20150225	8	9	10	9.9	8	10	10	9.9	10	10		2115435	2116457
155-1	Non-Lubrited	Standard			D		20150213	7	9	9	9.9	8	10	10	9.9	10	10			
155-1	Non-Lubrited	Standard		3-198	D	106960-L371	20150325	7	10	10	9.9	7	10	10	10	10	10		2124465	2124399
155-1	Non-Lubrited	Standard		366	B	106968-L371	20150430	8	10	10	9.9	9	10	10	10	10	10		2116453	2115440
155-1	Non-Lubrited	Standard		368	B	106969-L371	20150502	9	10	10	9.9	9	10	10	9.9	10	10	Chipping on Pinion Teeth	2135702	2135619
155-1	Non-Lubrited	Standard	LAB-G0002-01	30	G	106964-L371	20150724	8	10	9	9.9	9	10	10	9.9	10	10		2116454	2116458
155-1	Non-Lubrited	Standard	LAB-G0003-01	31	G	106965-L371	20150724	8	9	9	9.9	9	10	10	9.9	10	10		2116454	2116458

mean 7.9 9.6 9.6 9.9  
 std 0.7 0.5 0.5 0.0  
 min 6.6 8.6 8.6 9.9  
 max 9.1 10.0 10.0 9.9  
  
 round min 6 8 8 9  
 round max 10 10 10 10  
 eff k low 2.69 2.94 2.94 #DIV/0!  
 eff k high 3.11 0.80 0.80 #DIV/0!

155-1	Non-Lubrited	Standard	LAB-A0022-01	42	A	106972-L371	20150221	7	8	8	9.5	9	10	10	10	10	10	Broken Pinion Tooth	2116453	2115440
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Initial L371 LTMS Reference Targets (152-2)

IND	TESTHARD	TVERSION	SERIALNO	STRUN	LAB	TESTKEY	LTMSDATE	WEAR	RIPP	RIDG	SPIT	WEARR	RIPPR	RIDGR	SPITR	SCOR	SCORR	COMMENT	PINBAT	RINGBAT
152-2	Non-Lubrited	Standard	LAB-A0025-01	47	A	107271-L371	20150305	7	7	10	9.9	8	10	10	9.9	10	10	1 Shut down due to dyno output 100%	2116453	2115440
152-2	Non-Lubrited	Standard	LAB-A0028-01	50	A	107272-L371	20150312	7	6	9	9.9	8	10	10	9.9	10	10		2116453	2115440
152-2	Non-Lubrited	Standard		3-195	D	99162-L371	20150319	7	10	9	9.9	7	10	10	10	10	10		2153061	2153064
152-2	Non-Lubrited	Standard		3-196	D	99163-L371	20150321	7	10	8	9.9	7	10	10	9.9	10	10		2153061	2153064
152-2	Non-Lubrited	Standard		369	B	99172-L371	20150503	9	10	10	9.9	9	10	10	9.9	10	10		2135702	2135619
152-2	Non-Lubrited	Standard		371	B	99173-L371	20150507	8	10	10	9.9	9	10	10	10	10	10	Chipping on 2 pinion teeth	2135702	2135619
152-2	Non-Lubrited	Standard	LAB-G0003-02	32	G	107194-L371	20150805	9	8	9	9.9	9	9	9	9.9	10	10		2116454	2116458
152-2	Non-Lubrited	Standard	LAB-G0002-02	33	G	107195-L371	20150808	8	10	9	9.9	9	10	9	9.9	10	10		2116454	2116458

mean 7.8 8.9 9.3 9.9  
 std 0.9 1.6 0.7 0.0  
 min 6.2 5.9 8.0 9.9  
 max 9.3 10.0 10.0 9.9  
  
 round min 6 5 7 9  
 round max 10 10 10 10  
 eff k low 1.97 2.36 3.18 #DIV/0!  
 eff k high 2.54 0.69 1.06 #DIV/0!

Initial L371 LTMS Reference Targets (134)

IND	TESTHARD	TVERSION	SERIALNO	STRUN	LAB	TESTKEY	LTMSDATE	WEAR	RIPP	RIDG	SPIT	WEARR	RIPPR	RIDGR	SPITR	SCOR	SCORR	COMMENT	PINBAT	RINGBAT
134	Non-Lubrited	Standard	LAB-A0021-01	41	A	90169-L371	20150108	6	6	3	9.7	6	10	4	9.5	10	10	Pre-Workshop Run	2115435	2116457
134	Non-Lubrited	Standard	LAB-A0032-01	44	A	106145-L371	20150227	5	8	3	8	6	8	4	9.9	10	10	Chipping on pinion teeth	2116453	2115440
134	Non-Lubrited	Standard	LAB-A0026-01	48	A	106146-L371	20150307	4	7	4	9.8	6	9	4	9.8	10	10		2116453	2115440
134	Non-Lubrited	Standard		3-186	D	99160-L371	20150213	6	9	6	8	6	10	6	9.9	10	10		2124465	2124399
134	Non-Lubrited	Standard		373	B	107311-L371	20150510	5	8	4	5	6	10	5	9.9	10	10	Chipping on pinion teeth. 8 broken ring gear teeth	2116453	2115440
134	Non-Lubrited	Standard	LAB-G0001-01	29	G	107190-L371	20150721	3	9	3	6	7	9	4	9.9	10	10	Chipping on pinion teeth. 3 broken ring gear teeth	2116454	2116458

mean	4.8	7.8	3.8	7.8
std	1.2	1.2	1.2	1.9
min	2.7	5.7	1.7	4.3
max	6.9	9.9	5.9	10.0
round min	2	5	1	4
round max	7	10	6	10
eff k low	2.42	2.42	2.42	1.94
eff k high	1.85	1.85	1.85	1.16

134	Non-Lubrited	Standard		3-184	D	99159-L371	20150212											Failed	2116453	2115440
134	Non-Lubrited	Standard		367	B	98239-L371	20150501											Shut down at 14 hours on Test. 5 Pinion Teeth Broken, All except 3 Ring Gear Teeth Broken (those 3 are cracked)	2116453	2115440

Initial L371 LTMS Reference Targets (117)

IND	TESTHARD	TVERSION	SERIALNO	STRUN	LAB	TESTKEY	LTMSDATE	WEAR	RIPP	RIDG	SPIT	WEARR	RIPPR	RIDGR	SPITR	SCOR	SCORR	COMMENT	PINBAT	RINGBAT
117	Non-Lubrited	Standard	LAB-A0024-01	46	A	96487-L371	20150303	7	7	6	9.9	8	9	7	9.9	10	10	Chipping on one tooth	2116454	2115440
117	Non-Lubrited	Standard	LAB-A0027-01	49	A	96490-L371	20150310	8	9	9	9.9	8	9	10	9.9	10	10		2116453	2115440
117	Non-Lubrited	Standard		3-194	D	99167-L371	20150318	7	8	7	9.9	7	10	8	9.9	10	10		2124463	2124399
117	Non-Lubrited	Standard		3-197	D	99168-L371	20150324	7	8	8	9.9	7	10	9	9.9	10	10		2153061	2153064
117	Non-Lubrited	Standard		3-201	D	98455-L371	20150331	7	6	6	9.9	7	9	7	9.9	10	10		2124465	2124399
117	Non-Lubrited	Standard		370	B	96483-L371	20150506	9	10	9	9.9	9	10	10	10	9	10	Unusual wear on pinion. Possibly scored and polished out	2116453	2115440
117	Non-Lubrited	Standard		372	B	96484-L371	20150509	8	9	9	9.9	9	10	9	9.9	10	10	Unusual contact on pinion. 1 shutdown due to power outage	2116453	2115440
117	Non-Lubrited	Standard		3-205	D	99169-L371	20150428	7	8	8	9.9	7	10	9	9.9	10	10		2124465	2124399
117	Non-Lubrited	Standard		3-206	D	99170-L371	20150429	7	8	7	9.9	7	10	8	9.9	10	10		2124465	2124399
117	Non-Lubrited	Standard		3-207	D	99171-L371	20150501	7	8	7	9.9	7	9	7	9.9	10	10		2124465	2124399
117	Non-Lubrited	Standard	LAB-G0009-01	27	G	96496-L37-1	20150716	9	10	9	9.9	9	10	10	9.9	10	10		2116453	2115440
117	Non-Lubrited	Standard	LAB-G0010-01	28	G	108140-L371	20150717	9	10	9	9.9	9	10	10	9.9	10	10		2116453	2115440
117	Non-Lubrited	Standard	LAB-G0004-01	35	G	108141-L371	20150925	8	9	9	9.9	9	10	9	9.9	10	10	Built 0.010 into mesh (into the root)	2116454	2116458
117	Non-Lubrited	Standard	LAB-G0002-03	36	G	108142-L371	20151001	7	9	10	9.9	8	10	10	9.9	10	10	Built 0.010 out of mesh (out of the root)	2116454	2116458
117	Non-Lubrited	Standard	LAB-G0024-3	55	G	110839-L371	20170215	8	9	9	9.9	9	9	9	9.9	10	10		2135703	2135700
117	Non-Lubrited	Standard	LAB-G0032-3	56	G	110840-L371	20170217	8	8	9	9.9	9	10	9	10	10	10		2124463	2124397
117	Non-Lubrited	Standard	LAB-A0142-01	69	A	107307-L371	20170217	7	7	6	9.9	7	8	7	9.9	10	10		2153061	2153064
117	Non-Lubrited	Standard	LAB-A0143-01	70	A	107308-L371	20170218	8	9	8	9.9	8	10	10	9.9	10	10		2153061	2153064
117	Non-Lubrited	Standard	LAB-A0144-01	71	A	125088-L371	20170221	7	8	4	9.9	8	9	6	9.9	10	10		2153061	2153064
117	Non-Lubrited	Standard		58	G	125092-L371	20170302	7	9	9	9.9	8	10	9	9.9	10	10	Repeat of Test Run no. 57, optimal coast side pattern	2116454	2116458
117	Non-Lubrited	Standard	LAB-D0099-01	3-270	D	108591-L371	20170328	8	8	7	9.9	8	9	7	9.9	10	10			
117	Non-Lubrited	Standard	LAB-D0089-03	3-271	D	108592-L371	20170330	8	8	8	9.9	9	9	8	9.9	10	10		2115435	2116457
117	Non-Lubrited	Standard	LAB-D0099-02	3-272	D	125706-L371	20170331	8	8	9	9.9	9	9	8	9.9	10	10		2115435	2116457
117	Non-Lubrited	Standard	LAB-A0147-02	72	A	125089-L371	20170408	8	9	9	9.9	8	9	10	9.9	10	10	Repeat of Test Run no. 71, optimal coast side pattern	2135701	2135618
117	Non-Lubrited	Standard	LAB-A0141-02	73	A	125090-L371	20170411	7	8	7	9.9	7	9	8	9.9	10	10	Repeat of Test Run no. 72, optimal coast side pattern	2135701	2135618

mean 7.6 8.4 7.9 9.9  
 std 0.7 1.0 1.4 0.0  
 min 6.4 6.7 5.4 9.9  
 max 8.9 10.0 10.0 9.9

round min 6 6 5 9  
 round max 9 10 10 10  
 eff k low 2.34 2.51 2.07 #####  
 eff k high 1.94 1.67 1.47 #####

117	Non-Lubrited	Standard	LAB-G0034-01	57	G	125091-L371	20170222	7	7	6	9.9	8	8	8	9.9	10	10	Odd pinion coast side wear - test will be repeated on same hardware, non-optimal coast side pattern	2116454	2116458
117	Non-Lubrited	Standard		59	G	125093-L371		6	7	6	9.9	7	9	7	9.9	10	10	Purposely build with non-optimal coast side pattern	2135703	2135700
117	Non-Lubrited	Standard		61	G	125887-L371	20170406	7	7	5	9.0	8	9	7	9.9	10	10	Purposely build with non-optimal coast side pattern	2124463	2124397

**Initial L371 LTMS Reference Targets (152-2 Canadian)**

IND	TESTHARD	TVERSION	SERIALNO	STRUN	LAB	TESTKEY	LTMSDATE	WEAR	RIPP	RIDG	SPIT	WEARR	RIPPR	RIDGR	SPITR	SCOR	SCORR	COMMENT	PINBAT	RINGBAT
152-2	Non-Lubrited	Canadian	LAB-A0029-01	51	A	107273-L371	20150313	8	6	9	9.9	8	10	9	9.9	10	10		2116453	2115440
152-2	Non-Lubrited	Canadian		53	A	107301-L371	20150318	8	10	8	9.9	8	10	9	9.9	10	10		2116453	2115440
152-2	Non-Lubrited	Canadian		3-199	D	99164-L371	20150327	7	9	8	9.9	7	10	10	9.9	10	10		2124465	2124399
152-2	Non-Lubrited	Canadian		3-200	D	99165-L371	20150328	7	10	8	9.9	7	10	8	9.9	10	10		2124465	2124399
152-2	Non-Lubrited	Canadian		374	B	99174-L371	20150522	7	10	10	9.9	9	10	10	10	10	10	Non-Typical look on Pinion. Similar to scoring that has been polished out	2116453	2115440
152-2	Non-Lubrited	Canadian		375	B	99175-L371	20150523	7	10	10	9.9	9	10	10	10	10	10	Non-Typical look on Pinion. Similar to scoring that has been polished out	2135702	2135619

mean	7.3	9.2	8.8	9.9
std	0.5	1.6	1.0	0.0
min	6.4	6.3	7.1	9.9
max	8.3	10.0	10.0	9.9
round min	6	6	7	9
round max	9	10	10	10
eff k low	2.58	1.98	1.86	#DIV/0!
eff k high	3.23	0.52	1.19	#DIV/0!

Initial L371 LTMS Reference Targets (IND1)

IND	TESTHARD	TVERSION	SERIALNO	STRUN	LAB	TESTKEY	LTMSDATE	WEAR	RIPP	RIDG	SPIT	WEARR	RIPPR	RIDGR	SPITR	SCOR	SCORR	COMMENT	PINBAT	RINGBAT
IND 1	Non-Lubrited	Standard		380	B			7	6	8	9.9	7	10	9	10	10	10		2135702	2135619
IND 1	Non-Lubrited	Standard		407	B			7	5	6	9.9	7	10	8	9.9	10	10		2135702	2135619
IND 1	Non-Lubrited	Standard		410	B			7	7	9	9.9	8	10	9	9.9	10	10	10% reduction in dyno load	2135701	2135618
IND 1	Non-Lubrited	Standard				independent		6	5	7	9.9	7	9	7	9.9	10	10		2116453	2115440
IND 1	Non-Lubrited	Standard		3-262	D	120259-L371	20160908	7	6	7	9.9	7	7	8	9.9	10	10	2359 N-m	2115435	2116457
IND 1	Non-Lubrited	Standard		3-263	D	120258-L371	20160910	7	9	9	9.9	7	10	9	10	10	10	2359 N-m	2115435	2116457
IND 1	Non-Lubrited	Standard		3-264	D	120257-L371	20160915	7	8	8	9.9	7	10	10	9.9	10	10	2359 N-m	2115435	2116457
IND 1	Non-Lubrited	Standard		462	B		20161006	8	8	9	9.9	9	10	9	9.8	10	10		2135703	2135700
IND 1	Non-Lubrited	Standard		465	B		20161013	7	9	8	9.9	9	10	9	9.9	10	10		2153060	2153063
IND 1	Non-Lubrited	Standard		466	B		20161014	7	9	8	9.9	9	10	9	9.9	10	10		2124466	2124462

mean 7.0 7.2 7.9 9.9  
 std 0.5 1.6 1.0 0.0  
 min 6.2 4.3 6.1 9.9  
 max 7.8 10.0 9.7 9.9  
  
 round min 6 4 6 9  
 round max 8 10 10 10  
 eff k low 2.12 1.98 1.91 #####  
 eff k high 2.12 1.73 2.11 #####

IND 1	Non-Lubrited	Canadian		463	B		20161008	9	10	10	9.9	9	10	10	9.9	10	10		2135703	2135700
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**ASTM L-37/L-37-1 Surveillance Panel Membership / Sign In List**  
**Meeting Date: 5/3/17**

Initials*	Name	Voting Status	Company Name & Address	Phone/Email Info
<i>RB</i>	Banas, Rob	Voting	ExxonMobil Fuels, Lubricants & Specialties 114 Arcadia Park Dr. Canton, GA 30114	Phone: 678-493-3930 Fax: E-Mail: rob.a.banas@exxonmobil.com
<i>DB</i>	Bell, Don	Non Voting	Afton Chemical 500 Spring Street Richmond, VA 23219	Phone: 804-788-6332 Fax: 804-788-6243 E-Mail: don.bell@aftonchemical.com
<i>BB</i>	Bubonic, Brad	Non Voting	The Lubrizol Corporation 29400 Lakeland Boulevard Wickliffe, Ohio 44092	Phone: 440-347-5325 Fax: E-Mail: brad.bubonic@lubrizol.com
	Clark, Jeff	Non Voting	ASTM Test Monitoring Center 6555 Penn Avenue Pittsburgh, Pennsylvania 15206	Phone: 412-365-1032 Fax: 412-365-1047 E-Mail: jac@astmtmc.cmu.edu
<i>PHONE</i>	Chambers, Harold	Non-Voting	Linamar Driveline Systems 26555 Evergreen Rd Southfield 48076	Phone: 248-358-6038 Fax: E-Mail: hchambers@linamar.com
	Comfort, Allen	Voting	US Army RDECOM/TARDEC 6501 East 11 Mile road Warren, MI 48397-5000	Phone: 586-282-4225 Fax: 586-282-4244 E-Mail: allen.s.comfort.civ@mail.mil
<i>PHONE</i>	Dennis, Mike	Non-Voting	The Gleason Works 1000 University Ave Rochester, NY 14692	Phone: 585-241-4081 Fax: E-Mail: mdennis@gleason.com
	Dharte, John	Voting	American Axle & Manufacturing 1 Dauch Drive Detroit, MI 48211	Phone: 313-758-4687 Fax: 313-758-4237 E-Mail: Dhartej@aam.com
<i>ED</i>	Donovan, Eric	Voting	Afton Chemical 500 Spring Street Richmond, VA 23219	Phone: 804-788-5097 Fax: E-Mail: Eric.Donovan@aftonchemical.com
<i>KN</i>	Drjja, Kristijan	Non-Voting	The Lubrizol Corporation 29400 Lakeland Boulevard Wickliffe, Ohio 44092	Phone: 440-347-2326 Fax: E-Mail: kristijan.drjja@lubrizol.com
	Dwornick, Bridget	Non-Voting	US Army RDECOM/TARDEC 6501 East 11 Mile road Warren, MI 48397-5000	Phone: 586-282-4221 Fax: 586-282-4244 E-Mail: bridget.l.dwornick.civ@mail.mil

\* Initial to indicate attendance at subject meeting

**ASTM L-37/L-37-1 Surveillance Panel Membership / Sign In List**  
**Meeting Date:**

Initials*	Name	Voting Status	Company Name & Address	Phone/Email Info
	Farber, Frank	Non Voting	ASTM Test Monitoring Center 6555 Penn Avenue Pittsburgh, Pennsylvania 15206	Phone: 412-365-1030 Fax: 412-365-1047 E-Mail: fmf@astmtmc.cmu.edu
	Foeking, Brian	Non Voting	The Lubrizol Corporation 29400 Lakeland Boulevard Wickliffe, Ohio 44092	Phone: 440-347-2130 Fax: 440-347-9011 E-Mail: brian.foeking@lubrizol.com
	Gao, Hong	Non-Voting	Conoco Phillips 100 s Pine St. Ponca City, OK 74602	Phone: 580-767-2126 Fax: 580-767-4534 E-Mail: hong.gao@conocophilips.com
<i>Arjun</i>	Goyal, Arjun	Voting	BASF 500 White Plains Rd Tarrytown NY	Phone: 914-785-2083 Fax: E-Mail: Arjun.Goyal@BASF.com
<i>Joe</i>	Guzkowski, Joe	Voting	Dana Corporation 3939 Technology Drive Maumee, OH 43537	Phone: 419-887-3425 Fax: E-Mail: joe.guzkowski@dana.com
	Hobson, Kevin	Non Voting	Afton Chemical 500 Spring Street Richmond, VA 23218	Phone: 804-788-5307 Fax: E-Mail: kevin.hobson@aftonchemical.com
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				Phone: Fax: E-Mail:
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