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Committee D02 on PETROLEUM PRODUCTS AND LUBRICANTS

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January 2nd, 2014

Reply to:
Chris Prengaman
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ASTM D02.B0.03 L-37-1 Next Generation Hardware Task Force
Members and Guests:

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

- **November 6th , 2013 Next Generation Hardware Task Force Meeting; Automation Alley, Detroit.**

Please direct any corrections or comments to my attention.

Sincerely,

Chris Prengaman, Chairman
L-37-1 Hardware Taskforce Chairman

Report of Meeting
L-37-1 Next Generation Hardware Task Force Meeting
Automation Alley, Detroit, MI
November 06th, 2013 Meeting

Attendees:

Voting Members in **BOLD**

Gottwald, Thomas – Afton Chemical

Boschert, Tom – Afton Chemical

Keisler, Marc – Afton Chemical

Kearney, Bill – Afton Chemical

Bell, Don – Afton Chemical

Hobson, Kevin – Afton Chemical

Parke, Scott – ASTM TMC

Marougy, Thelma – Eaton

Mosher, Donna - Eaton

Smith, Dale – Intertek Automotive Research

Trader, Angela – Intertek Automotive Research

Barrera, Tony – Intertek Automotive Research

Chambers, Harold - Linamar

Prengaman, Chris – Lubrizol

Hamilton, Larry – Lubrizol

Umerley, Matt – Lubrizol

Gropp, Jerry – Lubrizol

Bubonic, Brad – Lubrizol

Scherick, Pete – Lubrizol

Oesterle, Karen – Lubrizol

McCaulley, Brian – Lubrizol

McGlone, Bruce – Meritor

Muransky, Troy - Meritor

Koehler, Brian – Southwest Research Institute

Comfort, Allen – US Army RDECOM/TARDEC

Dwornick, Bridget – US Army RDECOM/TARDEC

The meeting was called to order at 1515 EST.

1.0 Agenda Review

The agenda was reviewed

2.0 Approval of Meeting Minutes

Motion: Motion to approve prior minutes that have been posted for review on the TMC website.

1. 8/14/13 – Surveillance Panel Meeting
2. 8/7/13 – Teleconference

Approved by voice vote unanimously.

3.0 Review & Discuss Test Progress

Gleason Testing Progress

T. Gottwald presented results on Gleason gear axles. All test data to date was shared with the group. See attachment.

The Gleason data is from Green gears, standard conditions, lab built into used Dana housings, Electric Motor test stand.

24 new gear sets are on their way to Afton, and will be made available to outside labs for development.

The Gleason gearsets cost about \$730/gearset

Zeta Testing Progress

C. Prengaman presented the results on testing on Zeta axles to date. See attachment. C. Prengaman shared a photo of the modified spray nozzles used on the test stand.

In Person Meeting

C. Prengaman asked for interest in a Possible in person meeting in Detroit in Jan. (week of 6th or 13th). Teleconferences will be setup to discuss this further. The purpose of this meeting is to discuss test results and provide direction moving forward.

4.0 New Business

C. Prengaman will share the second version of the draft of the procedure with the working group.

5.0 Adjournment

Motion to adjourn .

Respectfully Submitted
Chris Prengaman

D6121 (L-37) ASTM Surveillance Panel Meeting

November 06th, 2013
1:30 pm –2:30 pm EST
Automation Alley - Detroit, MI

Agenda

- 1) Call to order/Agenda review
- 2) Membership Review
- 3) Approval of Meeting Minutes
 1. 8/14/13 – Surveillance Panel Meeting
- 4) Rebuilt Hardware Update – Dana
- 5) Rusty Housing Discussion
- 6) Lab Rebuilt Hardware
- 7) Dana Presentation
- 8) New business
- 9) Adjournment

Call in number → **216-706-7052 code 324160**



Gleason Results, 2013 Batch

Prepared for ASTM L-37-1 TF

Nov. 6, 2013

Passion for Solutions™

Data

Favorable Results

Gear Number	Oil	CMIR	EOT Date	Housing	Pinion					Ring					Comments
					Wear	Ripple	Ridge	Spitt	Score	Wear	Ripple	Ridge	Spitt	Score	
001	134	83422	8/2/2013	G-1	6	9	7	9.9	10	7	10	7	9.9	10	Shutdown at 7hrs 2min for 11:20 min due to high left torque. Restarted and ran through full duration. Chipping on pinion.
002	155-1	95818	8/9/2013	G-1	7	10	9	9.9	10	7	10	10	10	10	
003	1-B	-	8/11/2013	G-2	7	8	8	9.9	10	7	10	10	10	10	
004	155-1	95819	8/13/2013	G-3	7	9	9	9.9	10	7	10	10	10	10	Power failure at 4hrs 25min. Shutdown for 14:08 min. Restarted and completed.
005	1-B	-	8/14/2013	G-1	7	10	9	9.9	10	7	10	10	10	10	Test invalid due to multiple shutdowns.
006	155-1	95820	8/22/2013	G-2	7	9	9	9.9	10	7	10	10	9.9	10	
007	134	95815	8/23/2013	G-3	7	9	6	9.9	10	7	9	6	2.0	10	2 broken teeth on ring.
008	134	95816	8/24/2013	G-1	7	10	6	9.9	10	7	10	7	9.9	10	Chipping on pinion.
013	GL-5 off-the-shelf fluid with QPL #	-	9/5/2013	G-2/G-3	7	10	10	9.9	10	7	10	10	9.9	10	Test oil temp out for 3 min 19 sec.

Questionable Run Results

- Unknown stand controller issues

Gear Number	Oil	CMIR	EOT Date	Housing	Pinion					Ring					Comments
					Wear	Ripple	Ridge	Spitt	Score	Wear	Ripple	Ridge	Spitt	Score	
009	1-B	-	8/26/2013	G-2	7	6	8	9.9	10	8	9	9	9.9	10	Pasty oil residue on ring and pinion. Not sludge. Test oil temp out for 4 min.
010	1-B	-	8/27/2013	G-3	7	7	6	9.9	10	7	10	9	9.9	10	Test oil temp out for 3 min 40 sec.
011	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Unusual finish observed during CMM evaluation. Returned to Gleason because it had not been shot peened.
012	134	95817	8/29/2013	G-1	-	-	-	-	-	-	-	-	-	-	EOT at 18 hr 22 min. No rating broken teeth on ring and pinion, test did not complete.

All axles are non-lubrited, run at Standard temp



Company Confidential

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Benefits and Hardware Status

Benefits

- ▶ Runs exact same speeds, temps, loads and duration as the current L-37 test
- ▶ Currently built in to Dana housings
 - Future test box → Faster turn around
- ▶ Endless supply of test specific hardware vs. finite lifespan production hardware
 - Gleason willing to work closely with SP
 - Big business opportunity for Gleason = unique manufacturing relationship.

Hardware Status

- ▶ 24 gear sets to be completed and delivered next week
- ▶ Possible distribution for industry evaluation

October 2013 Zeta Update

11/6/13

Redesign of test conditions

- Goal: Rank & Separate TMC 134, TMC 117, TMC 155
- Test Speed: 100,124,160 rpm
- Test Load: 1350, 1500, 1650 ft-lbs
- Fill Volume: 950, 1075, 1200 ml
- 16.5 Hour Test length
- No modified break-in
- Modified spray nozzles

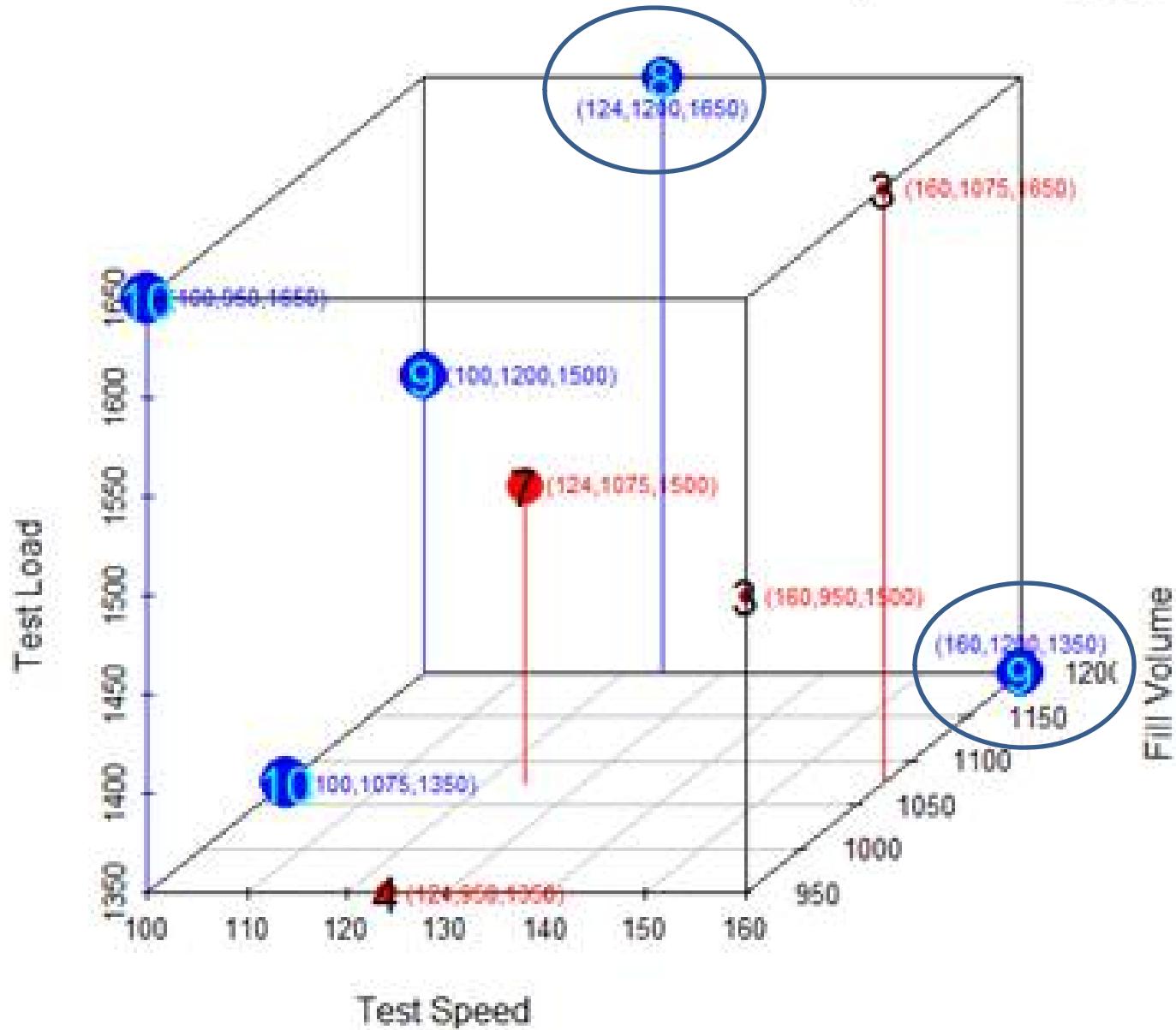


Phase 1 – TMC 117

Test		Fill Volume
Speed	Load	mL
124	1500	1075
160	1500	950
100	1500	1200
124	1350	950
160	1650	1075
124	1650	1200
160	1350	1200
100	1350	1075
100	1650	950

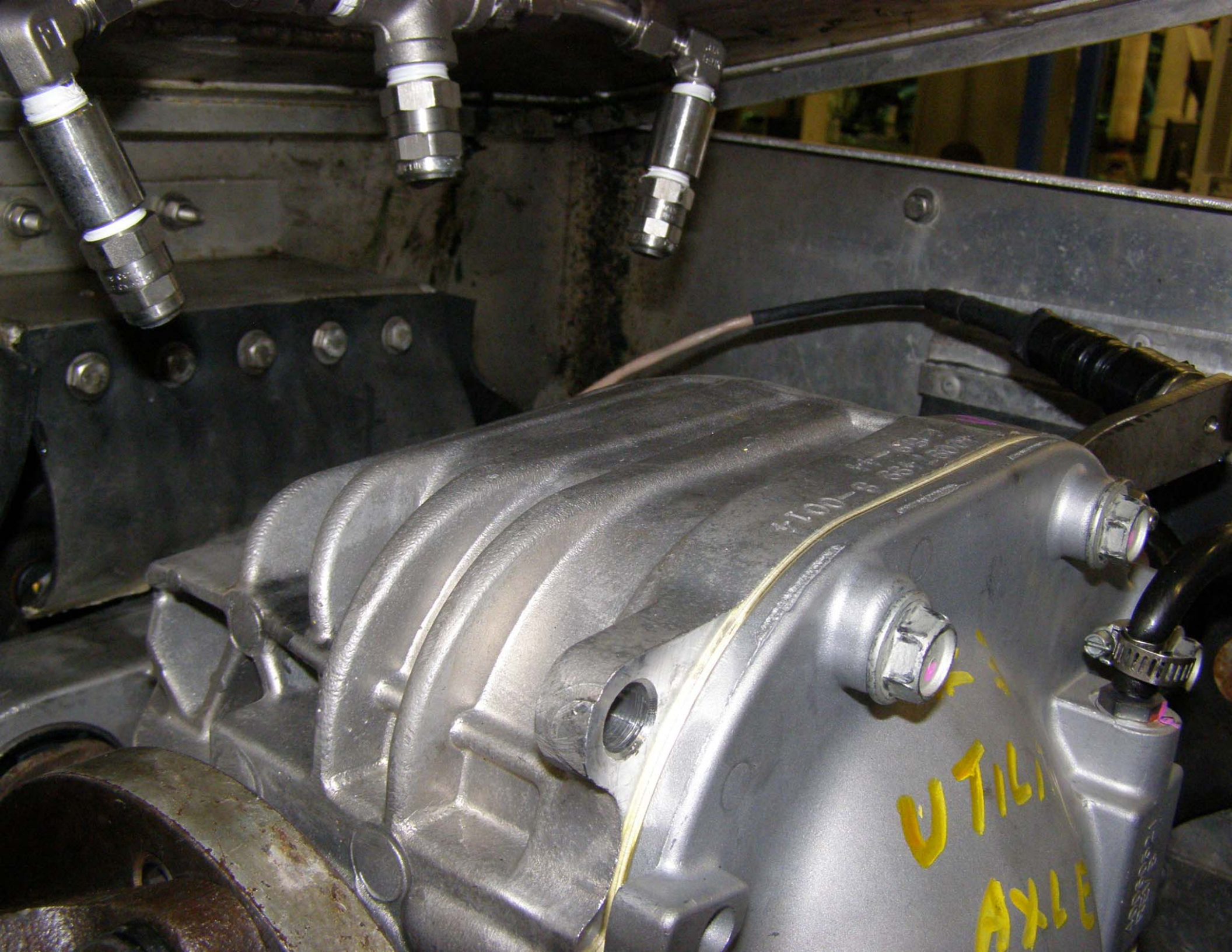
Pick best 2 conditions, run TMC 134 & repeat TMC 117

DOE of Oil 117 for L-37 Test Parameters (Pinion Ridging)



Initial Results

Run	Oil	Pinion Rating					Ring Rating				
		WEAR	RIDG	RIPP	SPIT	SCOR	WEARR	RIDGR	RIPPR	SPITR	SCORR
8	117	7	8	8	9.9	10	8	10	10	10	10
14	117	6	9	6	9.9	10	7	10	8	10	10
12	134	6	5	10	9.9	10	7	8	10	10	10



UTILITY
AXLE

310-018-0000

Test	Industry Oil Code (TMC Oil)	Test Version (Standard or Canadian)	Test Hardware	EOT Date	Conditioning		Test		Test Length	Fill Volume	Modified Break In	Test EOT Early?
	IND	TVERSION	TESTHARD	LTMSDATE	Speed	Load	Speed	Load	Hours	mL		
	Phase 1 Test Redesign Matrix											
1	134	STANDARD	NONLUBRITED	20131012	682	375	124	1650	8.5	950	No	Yes
2	155	STANDARD	NONLUBRITED	20131013	682	375	124	1650	16.5	950	No	No
3	117	STANDARD	NONLUBRITED	20131014	682	375	124	1500	16.5	1075	No	No
4	117	STANDARD	NONLUBRITED	20131015	682	375	160	1500	14.4	950	No	Yes
5	117	STANDARD	NONLUBRITED	20131017	682	375	100	1500	16.5	1200	No	No
6	117	STANDARD	NONLUBRITED	20131026	682	375	124	1350	16.5	950	No	No
7	117	STANDARD	NONLUBRITED	20131027	682	375	160	1650	16.5	1075	No	No
8	117	STANDARD	NONLUBRITED	20131029	682	375	124	1650	16.5	1200	No	No
9	117	STANDARD	NONLUBRITED	20131030	682	375	160	1350	16.5	1200	No	No
10	117	STANDARD	NONLUBRITED	20131031	682	375	100	1350	16.5	1075	No	No
11	117	STANDARD	NONLUBRITED	20131101	682	375	100	1650	16.5	950	No	No
12	134	STANDARD	NONLUBRITED	20131102	682	375	124	1650	16.5	1200	No	No
13	134	STANDARD	NONLUBRITED	20131103	682	375	160	1350	16.5	1200	No	No
14	117	STANDARD	NONLUBRITED	20131104	682	375	124	1650	16.5	1200	No	No
15	117	STANDARD	NONLUBRITED	20131105	682	375	160	1350	16.5	1200	No	No

Test	Pinion Rating					Ring Rating					Broken Tooth	Broken Tooth Location	Free-form Comment
	WEAR	RIDG	RIPP	SPIT	SCOR	WEARR	RIDGR	RIPPR	SPITR	SCORR			
1	6	4	5	8	10	4	4	10	9.8	10	Yes	Ring	
2	7	10	10	9.9	10	7	10	10	9.9	10	No		
3	7	7	9	9.9	10	7	9	10	9.9	10	No		
4	3	3	10	7	6	4	3	10	9	9	Yes	Ring & Pinion	6/24 broken pinion/ring gear teeth
5	9	9	10	9.9	10	9	10	10	9.9	10	No		
6	7	4	5	9.9	10	7	6	10	9.9	10	No		
7	4	3	8	7	6	6	4	6	8	10	Yes		Most ring gear teeth cracked.
8	7	8	8	9.9	10	8	10	10	10	10	No		
9	7	9	9	9.9	10	7	10	10	10	10	No		
10	8	10	10	9.9	10	8	10	10	9.9	10	No		
11	8	10	10	9.9	10	9	10	10	9.9	10	No		
12	6	5	10	9.9	10	7	8	10	10	10	No		
13	7	9	8	9.9	10	7	9	9	9.9	10	No		
14	6	9	6	9.9	10	7	10	8	10	10	No		
15	7	10	8	9.9	10	7	9	9	10	10	No		

Industry Oil Code (TMC Oil)	Test Version (Standard or Canadian)	Hardware Identification	Lab	Stand	Test Hardware	EOT Date	Pinion Rating					Ring Rating					Free-form Comment
							WEAR	RIDG	RIPP	SPIT	SCOR	WEARR	RIDGR	RIPPR	SPITR	SCORR	
IND	TVERSION	SERIALNO	LTMSLAB	LTMSAPP	TESTHARD	LTMSDATE	WEAR	RIDG	RIPP	SPIT	SCOR	WEARR	RIDGR	RIPPR	SPITR	SCORR	COMMENT
16.5 hour, 1650 lb-ft torque, Highly Modified Break-In																	
134	STANDARD		D		NONLUBRITED		7	6	9	9.9	10	7	7	10	10	10	Highly Modified Break-In Run
134	STANDARD	GGAD12047085304	D		NONLUBRITED	20130514	6	6	9	9.9	10	7	7	10	10	10	Highly Modified Break-In Run
134	STANDARD	GGAD12063092213	A		NONLUBRITED	20130716	6	3	7	9.9	10	6	7	10	10	10	Non-lubricated AAM Zeta axle - Batch 2012. Conducted per SwRI highly modified break-in. 950 ml oil charge. Standard temp. Matrix test.
134	STANDARD		B		NONLUBRITED	20130720	5	4	7	9.8	10	7	5	10	10	10	Test stopped at 7.8 hours due to broken teeth.
1-B	STANDARD	GGAD12047074125	D		NONLUBRITED	20130612	4	4	8	9.9	10	5	5	9	9.9	10	Highly Modified Break-In Run Test stopped at 6 hours due to vibration.
1-B	STANDARD	GGAD12047092818	D		NONLUBRITED	20130620	4	4	8	9.9	10	5	5	9	9.9	10	Highly Modified Break-In Run Test stopped at 5:25 due to vibration
1-B	STANDARD	GGAD12063113	B		NONLUBRITED	20130730											Invalid Test Pinion Ratings: 6 Wear, 5 Ridge, 6 Ripple, 10 Spit, 10 Score. Ring Ratings: 7 Wear, 6 Ridge, 10 Ripple, 10 Spit, 10 Score.
1-B	STANDARD		G		NONLUBRITED	20130917	6	3	5	9.8	10	6	4	8	9.8	10	7 pinion teeth broken, 10 ring gear teeth broken, failure at 11.5 hours
1-B	STANDARD	GGAD12063092024	A		NONLUBRITED	20130731	6	7	7	9.9	10	6	7	8	9.9	10	Non-lubricated AAM Zeta axle - Batch 2012. Conducted per SwRI highly modified break-in. 950 ml oil charge. Standard temp. Matrix test.
155	STANDARD	GGAD12047080902	D		NONLUBRITED	20130627	7	9	10	10	10	7	10	10	10	10	Highly Modified Break-In Run
155	STANDARD	No tag on axle	A		NONLUBRITED	20130720	7	8	9	9.9	10	8	9	9	9.9	10	Non-lubricated AAM Zeta axle - Batch 2012. Conducted per SwRI highly modified break-in. 950 ml oil charge. Standard temp. Matrix test.
155	STANDARD	GGAD12063112	B		NONLUBRITED	20130731	7	10	10	9.9	10	8	10	10	9.9	10	
16.5 hour, 1500 lb-ft torque, Highly Modified Break-In																	
1-B	STANDARD		G		NONLUBRITED	20130917											broken teeth at 14.5 hours

Industry Oil Code (TMC Oil)	Test Version (Standard or Canadian)	Hardware Identification	Lab	Stand	Test Hardware	EOT Date	Pinion Rating					Ring Rating					Free-form Comment
							WEAR	RIDG	RIPP	SPIT	SCOR	WEARR	RIDGR	RIPPR	SPITR	SCORR	
IND	TVERSION	SERIALNO	LTMSLAB	LTMSAPP	TESTHARD	LTMSDATE	WEAR	RIDG	RIPP	SPIT	SCOR	WEARR	RIDGR	RIPPR	SPITR	SCORR	COMMENT
16.5 hour, 1650 lb-ft torque																	
134	STANDARD	GGAD120036- - - -	B		NONLUBRITED	20120413											AAM Zeta axle - Batch 2012. Conducted per Lubrizol proposed procedure. Test ran for 11hrs. - all teeth broken, catastrophic failure. Last 5 digits of serial number missing.
134	STANDARD	GGAD12063093932	A	5	NONLUBRITED	20120414	6	6	8	9.9	10	6	6	10	9.9	10	AAM Zeta axle - Batch 2012. Conducted per Lubrizol proposed procedure.
134	STANDARD	GGAD12063092414	B		NONLUBRITED	20120427						5	6	10	9.9	10	AAM Zeta axle - Batch 2012. Conducted per Lubrizol proposed procedure. Test ran for 11.25hrs. - all teeth broken, pinion unrateable.
134	STANDARD	GGAD12047090125	D	3	NONLUBRITED	20120515	7	7	7	9.9	10	7	8	9	10	10	AAM Zeta axle - Batch 2012. Conducted per Lubrizol proposed procedure. Broken teeth on pinion. Damage to ring. Shut down due to vibration at 15 hrs 37 min (on test).
134	STANDARD	GGAD12063112723	D	3	NONLUBRITED	20120519	7	7	9	9.9	10	7	7	9	9.9	10	AAM Zeta axle - Batch 2012. Conducted per Lubrizol proposed procedure.
134	STANDARD	GGAD12063134922	B		NONLUBRITED	20120521	6	4	7	5	10	6	4	10	9.9	10	AAM Zeta axle - Batch 2012. Conducted per Lubrizol proposed procedure. High vibration at 8.5hrs. - pinion teeth cracked.
134	STANDARD	GGAD12047081449	D	3	NONLUBRITED	20120524	7	7	10	9.9	10	7	8	10	9.9	10	AAM Zeta axle - Batch 2012. Conducted per Lubrizol proposed procedure. Shutdown due to excessive vibration at 5:01 test hours.
134	STANDARD		G		NONLUBRITED	20120822	7	5	9	9.9	10	7	5	9	9.9	10	AAM Zeta axle - Batch 2012. Conducted per Lubrizol proposed procedure. Light coast side scoring observed
152-1	STANDARD		B		NONLUBRITED	20121101	7	10	10	9.9	10	7	10	10	9.9	10	Non-lubrited AAM Zeta axle - Batch 2012. Conducted per Lubrizol proposed procedure.
152-1	CANADIAN		B		NONLUBRITED	20121103	7	10	10	9.9	10	7	10	10	9.9	10	Non-lubrited AAM Zeta axle - Batch 2012. Conducted per Lubrizol proposed procedure.
155	STANDARD	GGAD12047090210	D	3	NONLUBRITED	20120504	7	7	10	10	10	7	7	10	10	10	Non-lubrited AAM Zeta axle - Batch 2012. Conducted per Lubrizol proposed procedure. Cracked tooth on ring gear
155	STANDARD	GGAD12063093332	B		NONLUBRITED	20120621	8	9	10	9.9	9	8	9	10	9.9	10	Non-lubrited AAM Zeta axle - Batch 2012. Conducted per Lubrizol proposed procedure.
155	STANDARD	GGAD12063092600	A	5	NONLUBRITED	20120721	7	8	10	9.9	10	7	8	10	9.9	10	This is a non-lubrited AAM Zeta axle - Batch 2012. Conducted per Lubrizol proposed procedure.
1-A	STANDARD		A	5	NONLUBRITED	20120804	6	6	8	9.9	10	6	7	9	9.9	10	Non-lubrited AAM Zeta axle - Batch 2012. Conducted per Lubrizol proposed procedure.
1-A	STANDARD		G		NONLUBRITED	20120830						6	6	8			Non-lubrited AAM Zeta axle - Batch 2012. Conducted per Lubrizol proposed procedure. Non-interprettable. Distress - Heavy to Catastrophic. Broken teeth on pinion and ring.
1-B	STANDARD		A	5	NONLUBRITED	20120807	3	6	7	9.9	10	5	6	9	10	10	Non-lubrited AAM Zeta axle - Batch 2012. Conducted per Lubrizol proposed procedure.
1-B	STANDARD		G		NONLUBRITED	20120905	5	3	9	9.8	10	6	5	8	9	10	Non-lubrited AAM Zeta axle - Batch 2012. Conducted per Lubrizol proposed procedure.
16.5 hour, 1350 lb-ft torque																	
134	STANDARD	GGAD12063093015	A	5	NONLUBRITED	20120830	6	6	8	9.9	10	7	7	10	10	10	AAM Zeta axle - Batch 2012. Conducted per Lubrizol proposed procedure. This ran at 1350 lb-ft torque.
134	STANDARD	GGAD12063093135	B		NONLUBRITED	20120830	7	10	9	9.9	10	7	10	10	9.9	10	AAM Zeta axle - Batch 2012. Conducted per Lubrizol proposed procedure. This ran at 1350 lb-ft torque.

Industry Oil Code (TMC Oil)	Test Version (Standard or Canadian)	Hardware Identification	Lab	Stand	Test Hardware	EOT Date	Pinion Rating					Ring Rating					Free-form Comment
							WEAR	RIDG	RIPP	SPIT	SCOR	WEARR	RIDGR	RIPPR	SPITR	SCORR	
IND	TVERSION	SERIALNO	LTMSLAB	LTMSAPP	TESTHARD	LTMSDATE	WEAR	RIDG	RIPP	SPIT	SCOR	WEARR	RIDGR	RIPPR	SPITR	SCORR	COMMENT
16.5 hour, 1500 lb-ft torque																	
134	STANDARD	GGAS22928327218	A	5	NONLUBRITED	20120831	6	5	9	9.9	10	6	6	10	9.9	10	AAM Zeta axle - Batch 2012. Conducted per Lubrizol proposed procedure. This ran at 1500 lb-ft torque.
152-1	STANDARD	GGAD12063113036	G		NONLUBRITED	20120827	7	8	9	9.9	10	7	10	9	9.9	10	1500 torque, 16.5 hours. This was supposed to be 134 but we had a mix up during oil assignment and 152-1 was ran instead.
11 hour, 1650 lb-ft torque																	
134	STANDARD	GGAD12063111151	G		NONLUBRITED	20120912	6	4	8	9.9	10	7	5	9	9.9	10	AAM Zeta axle - Batch 2012. Conducted per Lubrizol proposed procedure. This ran at 1650 lb-ft torque for 11hrs.
134	STANDARD	GGAD12063094027	A	5	NONLUBRITED	20120912	7	5	8	9.9	10	7	6	9	9.9	10	AAM Zeta axle - Batch 2012. Conducted per Lubrizol proposed procedure. This ran a special test length of 11 hours.
152-1	STANDARD	GGAD12063112939	G		NONLUBRITED	20120915	8	9	9	9.9	10	8	9	8	9.9	10	AAM Zeta axle - Batch 2012. Conducted per Lubrizol proposed procedure. This ran a special test length of 11 hours.
152-1	STANDARD	GGAD12063123814	A	5	NONLUBRITED	20120917	7	7	10	10	10	7	10	10	10	10	AAM Zeta axle - Batch 2012. Conducted per Lubrizol proposed procedure. This ran a special test length of 11 hours.
152-1	CANADIAN	GGAD12063112848	G		NONLUBRITED	20120921	7	9	10	9.9	10	7	10	9	9.9	10	1650 torque, 11 hours, Problems controlling to Canadian conditions with current valve setup (3 nozzles @ 100% on)
152-1	CANADIAN	GGAD12063110037	B		NONLUBRITED	20120925	7	10	10	9.9	10	7	10	10	10	10	AAM Zeta axle - Batch 2012. 11 hr test length, 1650 lb-ft torque.
152-1	CANADIAN	GGAD12063113138	G		NONLUBRITED	20121009	7	9	8	9.9	10	8	10	9	9.9	10	1650 torque, 11 hours, Problems controlling to Canadian conditions with current valve setup (3 nozzles @ 100% on)
155	STANDARD	GGAD12063111331	G		NONLUBRITED	20120922	7	8	9	9.9	10	7	9	9	9.9	10	1650 torque, 11 hours
155	STANDARD	GGAD12063094334	B		NONLUBRITED	20120925	7	7	9	9.9	10	7	9	10	9.9	10	AAM Zeta axle - Batch 2012. 11 hr test length, 1650 lb-ft torque.
1-A	STANDARD	GGAD12063092127	A	5	NONLUBRITED	20120926	6	5	5	10	10	7	7	9	10	10	AAM Zeta axle - Batch 2012. Conducted per Lubrizol proposed procedure. 11 hrs.
1-A	STANDARD	GGAD12063111115	G		NONLUBRITED	20121006	7	7	8	9.9	10	7	7	8	9.9	10	AAM Zeta axle - Batch 2012. Conducted per Lubrizol proposed procedure. 11 hrs.
1-A	CANADIAN	GGAD12063093512	A	5	NONLUBRITED	20121130	7	9	9	9.9	10	8	9	9	9.9	10	Ran Lubrizol recommended test conditions except ran oil set points as L-37 Canadian. Used Oil 1-A. Non-lubricated AAM Zeta axle - Batch 2012.
1-B	STANDARD	GGAD12063093822	A	5	NONLUBRITED	20120927	6	6	7	9.9	10	6	7	10	10	10	AAM Zeta axle - Batch 2012. Conducted per Lubrizol proposed procedure. 11 hrs.
1-B	STANDARD	GGAD12063103742	G		NONLUBRITED	20121005	5	4	9	9.7	10	6	5	9	9.7	10	AAM Zeta axle - Batch 2012. Conducted per Lubrizol proposed procedure. 11 hrs.
1-B	CANADIAN	GGAD12063093242	A	5	NONLUBRITED	20121214	7	9	9	9.9	10	7	9	9	9.9	10	Ran Lubrizol recommended test conditions except ran oil set points as L-37 Canadian. Used Oil 1-B. Non-lubricated AAM Zeta axle - Batch 2012.

Industry Oil Code (TMC Oil)	Test Version (Standard or Canadian)	Hardware Identification	Lab	Stand	Test Hardware	EOT Date	Pinion Rating					Ring Rating					Free-form Comment
							IND	TVERSION	SERIALNO	LTMSLAB	LTMSAPP	TESTHARD	LTMSDATE	WEAR	RIDG	RIPP	
11 hour, 1650 lb-ft torque, Overfilled (1450ml)																	
1-A	STANDARD	GGAD12063091633	G		NONLUBRITED	20121126	7	9	9	9.9	10	7	9	10	9.9	10	1650 torque, 11 hours - 1450 ml fill
1-B	STANDARD	N/A	G		NONLUBRITED	20121128	7	10	9	9.9	10	7	10	9	9.9	10	1650 torque, 11 hours - 1450 ml fill
134	STANDARD	N/A	G		NONLUBRITED	20121206	7	8	8	9.9	10	7	10	9	9.9	10	1650 torque, 11 hours - 1450 ml fill
11 hour, 1650 lb-ft torque, Highly Modified Break-In																	
1-B	STANDARD		A		NONLUBRITED	20130403	7	9	9	10	10	8	10	10	10	10	Highly Modified Break-In Run
134	STANDARD	GGAD12063112	B		NONLUBRITED	20130411	6	5	10	9.9	10	7	6	10	9.9	10	Highly Modified Break-In Run

Industry Oil Code (TMC Oil)	Test Version (Standard or Canadian)	Hardware Identification	Lab	Stand	Test Hardware	EOT Date	Pinion Rating					Ring Rating					Free-form Comment
							WEAR	RIDG	RIPP	SPIT	SCOR	WEARR	RIDGR	RIPPR	SPITR	SCORR	
IND	TVERSION	SERIALNO	LTMSLAB	LTMSAPP	TESTHARD	LTMSDATE	WEAR	RIDG	RIPP	SPIT	SCOR	WEARR	RIDGR	RIPPR	SPITR	SCORR	COMMENT
16.5 hour, 1650 lb-ft torque																	
134	STANDARD	GGAD12063130725	D	3	LUBRITED	20120505	7	6	9	9.9	10	7	7	10	10	10	AAM Zeta axle - Batch 2012. Conducted per Lubrizol proposed procedure. 7 spat on inner cone of head bearing.
134	STANDARD	GGAD12063122708	A	5	LUBRITED	20120720	6	5	10	10	10	6	6	10	10	10	AAM Zeta axle - Batch 2012. Conducted per Lubrizol proposed procedure.
134	STANDARD		G		LUBRITED	20120804	6	5	9	9.9	10	7	6	8	9.9	10	AAM Zeta axle - Batch 2012. Conducted per Lubrizol proposed procedure.
155	STANDARD	GGAD12063132945	B		LUBRITED	20120406	7	7	9	9.9	10	7	8	10	9.9	10	AAM Zeta axle - Batch 2012. Conducted per Lubrizol proposed procedure.
155	STANDARD	GGAD12063124110	A	5	LUBRITED	20120425	7	8	9	9.9	10	8	9	10	9.9	10	AAM Zeta axle - Batch 2012. Conducted per Lubrizol proposed procedure.
155	STANDARD	GGAD12063140809	D	3	LUBRITED	20120517	7	7	10	9.9	10	7	8	10	10	10	AAM Zeta axle - Batch 2012. Conducted per Lubrizol proposed procedure.
155	STANDARD	GGAD120631- - - -	D	3	LUBRITED	20120518	7	8	10	9.9	10	7	8	10	9.9	10	AAM Zeta axle - Batch 2012. Conducted per Lubrizol proposed procedure. Last 5 digits of serial number missing.

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