Report of Meeting
L-37 Next Generation Task Force Meeting
PRI Headquarters
Warrendale, PA

February 8th, 2012

Attendees:

SwRI -	**Koehler**
Lubrizol -	**Greene**, Hamilton, Gropp, Venhoff (TC)
Afton -	**Gottwald**, Bell, Higuchi, Kearney, Boschert, Hobson
Intertek -	**Smith**
TMC -	**Parke**
Meritor -	**McGlone**, Muransky
Volvo -	**Bryson**, Athey
ExxonMobil -	Eliot, Kanga
Chevron -	**Zakarian**
GM -	Zreik

Voting Members in **BOLD**

The meeting was called to order at 3:30 pm EST.

1.0 Approval of Meeting Minutes

- **January 12th, 2012 (AAM Mexico; San Antonio, TX)**

Motion # 1 → Mr. Koehler / 2nd Mr. Gottwald to approve the minutes as presented. Motion for approval was passed with a vote of 6-Yes, 0-No, and 0-Abstentions.

2.0 Summary of Meeting Discussions

2.1 Cooling Strategy Discussion

Mr. Koehler presented the cooling experiment that was discussed/proposed at the last meeting. The goal of this strategy was to bias the cooling such that water sprayed on the pinion nozzle first. The details of this experiment are attached in attachment 2. The group discussed the cooling strategy. One such strategy would be for the pinion nozzle only to spray for the first 50% of controller output, and then the rear nozzles would come on over 50% such that both nozzles were wide open at 100%. The group decided that at this point, we don't need to pin the exact strategy. However, it was agreed that all labs should set their stand up such that water starts spraying on the pinion before the rear cover.

2.2 Solicitation of Field Oils

It was agreed at the previous meeting that the group must solicit the industry for field oils to ensure the new test is representative of the current test. These oils would be included in the procedure validation. These oils must have proven field and L-37 test data and must have either GL-5 or J2360 credentials.

A draft letter was circulated with the minutes of the last meeting. The group reviewed this letter and agreed on a few minor additions/changes. The letter will be sent out within a week or two from the end of the meeting. The letter will ask for any oils to be submitted by June 1st, 2012.

3.0 Adjournment

Motion to Adjourn by Mr. Smith, 2nd Mr. Gottwald. Meeting Adjourned at 5:00 pm EST

4.0 Lab Visit Supplement (Afton visit on February 7th, Lubrizol visit on February 10th)

The labs viewed the remaining two test stands that are participating in the new test development at Afton and Lubrizol.

The following observations/decisions were made:

- Coupler: Afton had found two different couplers and pinion flanges during their investigative work. Some of the pinion flanges had larger recessed areas when compared to some of the earlier axles. The group will watch this carefully. The two couplers had two different part numbers: New – 514-411-04-15, old – 514-411-03-15.
- The spray nozzles were standardized:
    - Pinion nozzle location:
        - 6.5 inches from pinion flange (forward most machined surface)
        - In line with the centerline of the pinion
        - 4 inches above the axle at the 6.5 inch mark
    - Rear cover nozzle locations:
        - Left nozzle should be flush with driver side of bushing horizontally
        - Right nozzle should be 1 inch outside passenger side of bushing horizontally
        - Both nozzles are to be vertically 4 inches from the top point of the cover
        - Both nozzles are to be 2 inches away from the cover
        - The nozzles are to be 90 degrees from vertical and going straight into the axle at 90 degrees when viewed from the top
        - All tolerances are ± 0.25 inches and ± 5 degrees
- Thermocouple location:
    - The thermocouple is to be installed into the drain of the axle and the tip of the thermocouple is to be 1 (± 0.25) inch from the machined back surface of the ring gear on the inside of the housing.
- The labs will document and discuss ramping strategy.

Respectfully submitted,

Digitally signed by Galen Greene
Date: 2012.02.15 15:08:03 -05'00'

Galen Greene
L-37 Next Generation Task Force Chairman

Attachment 1

1

ASTM L-37 Surveillance Panel Membership/Mailing List

Meeting Date: February 8th, 2012

Initials*	Name	Voting Status	Company Name & Address	Phone/Email Info
AAA	Athey, Allison	~~Non~~ Voting	Volvo Powertrain 13302 Pennsylvania Avenue Hagerstown, Maryland 21740	Phone: 301-573-5684 Fax: E-Mail: allision.athey@volvo.com
DCB	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
TSB	~~Bryson, Tom~~ remove	~~Voting~~	Volvo Powertrain 13302 Pennsylvania Avenue Hagerstown, Maryland 21740	Phone: 301-790-6744 Fax: 301-790-5605 E-Mail: thomas.bryson@volvo.com
JAC	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
	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@us.army.mil
	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
	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.dwornick@us.army.mil
	Eliot, Stephen	Non Voting	ExxonMobil Lubricants & Specialties 18486 Lanier Island Sq. Leesburg, Virgina 20176	Phone: 703-669-9916 Fax: 703-669-9917 E-Mail: stephen.w.eliot@exxonmobil.com
	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@conocophillips.com

* Initial to indicate attendance at subject meeting

Attachment 1

ASTM L-37 Surveillance Panel Membership/Mailing List

Meeting Date: February 8th, 2012

Initials*	Name	Voting Status	Company Name & Address	Phone/Email Info
	Graziano, Rick	Non-Voting	The Lubrizol Corporation 29400 Lakeland Boulevard Wickliffe, Ohio 44092	Phone: 440-347-2058 Fax: 440-347-2878 E-Mail: rick.graziano@lubrizol.com
	Greene, Galen	Voting/Chair	The Lubrizol Corporation 29400 Lakeland Boulevard Wickliffe, Ohio 44092	Phone: 440-347-2394 Fax: 440-347-2878 E-Mail: galen.greene@lubrizol.com
JLG	Gropp, Jerry	Non Voting	The Lubrizol Corporation 29400 Lakeland Boulevard Wickliffe, Ohio 44092	Phone: 440-347-1223 Fax: 440-347-1555 E-Mail: jerrold.gropp@lubrizol.com
	Guzikowski, Joe	Voting	Dana Corporation Maumee, IN	Phone: Fax: E-Mail: joe.guzikowski@dana.com
LDHA	Hamilton, Larry	Non Voting	The Lubrizol Corporation 29400 Lakeland Boulevard Wickliffe, Ohio 44092	Phone: 440-347-2326 Fax: 440-347-2878 E-Mail: ldha@lubrizol.com
SJH	Higuchi, Sam	NV ~~Voting~~	Afton Chemical 500 Spring Street Richmond, VA 23218	Phone: 804-788-5375 Fax: 804-788-6358 E-Mail: samuel.higuchi@aftonchemical.com
	Huron, John	Non Voting	Chevron Oronite Company LLC Suite 210 San Antonio, Texas 78228-1374	Phone: 210-731-5609 Fax: 210 731 5699 E-Mail: huro@chevrontexaco.com
	Jackson, Matt	Non Voting	Southwest Research Institute PO Drawer 28510 San Antonio, Texas 78228-0510	Phone: 210-522-6981 Fax: 210-522-6858 E-Mail: matt.jackson@swri.org
	Kanga, Percy	Non Voting	ExxonMobil Research & Engineering 600 Billingsport Road Paulsboro, New Jersey 08066	Phone: 856-224-2094 Fax: 856-224-3613 E-Mail: percy.r.kanga@exxonmobil.com
WAK	Kearney, Bill	Non Voting	Afton Chemical Southfield, MI	Phone: Fax: E-Mail:
[signature]	Koehler, Brian	Voting	Southwest Research Institute PO Drawer 28510 San Antonio, Texas 78228-0510	Phone: 210-522-3588 Fax: 210-684-7523 E-Mail: bkoehler@swri.org

* Initial to indicate attendance at subject meeting

ASTM L-37 Surveillance Panel Membership/Mailing List

Meeting Date: February 8th, 2012

Initials*	Name	Voting Status	Company Name & Address	Phone/Email Info
	Lind, Don	Non Voing	ASTM Test Monitoring Center 6555 Penn Avenue Pittsburgh, Pennsylvania 15206	Phone: 412-365-1034 Fax: 412-365-1047 E-Mail: dml@astmtmc.cmu.edu
	Lochte, Michael	Non Voting	Southwest Research Institute PO Drawer 28510 San Antonio, Texas 78228-0510	Phone: 210-522-5430 Fax: 210-684-7523 E-Mail: Mlochte@swri.org
	Marougy, Thelma	Voting	Eaton Corporation 26201 Northwestern Highway Southfield, MI 48034	Phone: 248-226-6985 Fax: 248-226-2739 E-Mail: thelmaemarougy@eaton.com
	Martin, Dan	Non Voting	The Lubrizol Corporation 29400 Lakeland Boulevard Wickliffe, Ohio 44092	Phone: 440-347-4723 Fax: 440-347-2878 E-Mail: dan.martin@lubrizol.com
	McGlone, Bruce	Voting	Meritor Automotive 2135 West Maple Troy, Michigan 48084	Phone: 248-435-9929 Fax: 248-435-1411 E-Mail: Bruce.McGlone@Meritor.com
	Muransky, Troy	Non Voting	Meritor Automotive 2135 West Maple Troy, Michigan 48084	Phone: 248-435-1401 Fax: 248-435-6602 E-Mail: troy.muransky@Meritor.com
	O'Brien, Cheryl	Non Voting	General Motors 823 Joslyn Ave. Pontiac, MI 48340-2925	Phone: 248-343-7347 Fax: 248-676-7146 E-Mail: cheryl.obrien@gm.com
	Pappademos, Lou	Non Voting	Dana Corporation Fort Wayne, IN	Phone: Fax: E-Mail: lou.pappademos@dana.com
[signature]	Parke, Scott	Voting	ASTM Test Monitoring Center 6555 Penn Avenue Pittsburgh, Pennsylvania 15206	Phone: 412-365-1036 Fax: E-Mail: sdp@astmtmc.cmu.edu
	Radonich, Peter	Non Voting	The Lubrizol Corporation 29400 Lakeland Boulevard Wickliffe, Ohio 44092	Phone: 440-347-2184 Fax: 440-347-9011 E-Mail: peter.radonich@lubrizol.com
	Sanchez, Art	Non Voting	Southwest Research Institute PO Drawer 28510 San Antonio, Texas 78228-0510	Phone: 210-522-3445 Fax: 210-680-1777 E-Mail: asanchez@swri.org

* Initial to indicate attendance at subject meeting

Attachment 1

ASTM L-37 Surveillance Panel Membership/Mailing List

Meeting Date: February 8th, 2012

Initials*	Name	Voting Status	Company Name & Address	Phone/Email Info
[illegible]	Smith, Dale	Voting	Intertek San Antonio, Texas	Phone: 412-855-6854 Fax: 210-684-6074 E-Mail: Dale.Smith@intertek.com
	Song, HaiQing	Non Voting	Research Institue of Petroleum Processing No. 18, XueYan Road, PO Box 914-19 Beijing 10083 P.R. China	Phone: 011-86-10-8236-8182 Fax: 011-86-10-6231-1290 E-Mail: songhq@ripp-sinopec.com
	Sullivan, Bill	Non Voting	William T. Sullivan, Inc. 5 Scheiber Drive Brick, NJ 08723	Phone: 908-930-3512 Fax: 267-220-7750 E-Mail: wtsullivan@comcast.net
	Venhoff, Wes	Non Voting	The Lubrizol Corporation 29400 Lakeland Boulevard Wickliffe, Ohio 44092	Phone: 440-347-4879 Fax: 440-347-2878 E-Mail: wve@lubrizol.com
	Xie, JingChun	Non Voting	Lanzhou Lube Oil R&D Institute No. 369 Yumen Streat, XiGu District Lanshou 730060, GanSu Province P.R. China	Phone: 011-86-931-793-3713 Fax: 011-86-139-9319-2560 E-Mail: xiejingchun_rhy@petrochina.com.cn
	Zakarian, Jack	Voting	Chevron Products 100 Chevron Way Richmond, CA 94802	Phone: 510-242-3595 Fax: 510-242-3758 E-Mail: jaza@chevron.com
K.Z	Zreik, Khaled	Non Voting	General Motors 823 Joslyn Ave Pontiac, MI 48340-2925	Phone: 248-977-9214 Fax: 248-857-2550 E-Mail: khaled.zreik@gm.com
TG	Thomas Gottwald	V	Afton Chemical 500 Spring St Richmond, VA 23219	Phone: 804-788-5280 Fax: E-Mail: thomas.gottwald@aftonchemical.com
TB	Tom Boschert	NV	"	Phone: 804-788-5262 Fax: E-Mail: Tom.Boschert@AftonChemical.com
				Phone: Fax: E-Mail:

* Initial to indicate attendance at subject meeting

I would like to be a voting member.

Attachment 1

ASTM L-37 Surveillance Panel Membership/Mailing List

Meeting Date: February 8th, 2012

Initials*	Name	Voting Status	Company Name & Address	Phone/Email Info
				Phone: Fax: E-Mail:
				Phone: Fax: E-Mail:
				Phone: Fax: E-Mail:

* Initial to indicate attendance at subject meeting

Attachment 2

Greene, Galen

From: Koehler, Brian P. <brian.koehler@swri.org>
Sent: Thursday, February 02, 2012 1:27 PM
To: Greene, Galen; Angela Trader; Gottwald, Thomas; Hobson, Kevin (Kevin.Hobson@AftonChemical.com); NON-LZ DALE SMITH; Scott Parke
Cc: Marsh, Greg; Dharte, John; Gropp, Jerrold; Venhoff, Wes
Subject: Next Gen L-37 experiments at SwRI, axle cooling

SwRI agreed to perform some axle cooling experiments for the next generation electric drive L-37. I have some results to share:

Conditions:
Spray water temp= 72 deg. F
Ambient temp= 73 deg. F
Spray water supply pressure= 55 psig
80w-90 shop oil in axle
Zeta slave axle (well broken in)
Three nozzles, same position as shown to working group, matched original Lubrizol nozzle locations.
Nozzles are same part # as current L-37 procedure requires
Same research control valves, stems, seats, as current L-37 procedure requires

Control set up:
I have two PID controllers configured for spray nozzle control.
Each PID is assigned one research valve to control water flow.
One valve controls flow to the top, pinion bearing cooling spray nozzle.
The other valve controls flow to the two rear cover spray nozzles.
I can easily relate the two PID controller % outputs to each other, via software, in any way I wish.

For this first experiment, I have the PID relationship as follows:
The PID for the top spray nozzle is closed loop control using the axle sump temp as the set point. At 100% output to the research valve, the flow is off, at 0% output, the flow is maximum, 50% output= 50% flow, etc.
The PID for the rear two spray nozzles was set in open loop control. Its output to its research valve was set to start to open the valve when the PID to the top spray nozzle control valve reaches 50% output. It then goes full open when the top nozzle control is at full flow. It stays closed when the top nozzle control is between 100 and 50%. There is hysteresis in the system. I set the valves so the water would not drip when the valves were to be closed. Assume that the % had to change by 5 to 10 to allow for flow to start and go up by 5 to 10 to again stop flow. This is normal for these valves and this system.

Break-in conditions:
I first ran the stand at the Lubrizol proposed break-in conditions. I noted the following:
With all spray nozzles at 100% flow (primary PID set at 0% out), I could hold about 118 deg. F oil sump temperature.
At 50% output on the primary PID (top nozzle at 50% flow but rear nozzles still off), I was able to hold a sump temperature of 125 deg. F.
At a set point of 130 deg. F, the primary control was at 78% (Top spray nozzle only was flowing at about 22% open)

At test conditions:
I next ran the stand as the Lubrizol proposed test conditions. I noted the following:
With all spray nozzles at 100% flow (primary PID set at 0% out), I could hold about 165 deg. F oil sump temperature.

At 50% output on the primary PID (top nozzle at 50% flow but rear nozzles still off), I was able to hold a sump temperature of 170 deg. F.
While controlling at the 275 deg. F test conditions, about 87% output was being used (top spray nozzle only was flowing at about 13% open)

Conclusions:
The experiment is not ideal. It is now winter in Texas with lower than yearly average ambient and water temperatures. Also, this axle was not giving off the heat typical of an axle breaking in. Our supply pressure of 55 psig is higher than most labs will use and is actually higher than the other SwRI lab which houses our referenced L-37 stand. Regardless:
This axle appears to demand less spray water than a Dana Model 60 axle at standard conditions. It is smaller, the housing is made of aluminum, and the conditions are different so this does make sense.
The three nozzles, at full flow, do a good job of flooding most axle housing surfaces with cooling water.
The experiment does seem to indicate that it may be possible to use the top spray nozzle only as the primary control nozzle for the test (bias cooling to the pinion bearing housing). The rear nozzles can be held in reserve for satisfying the initial new axle break-in cooling needs. Additional front nozzles could be added if needed for Canadian conditions and controlled off of the rear spray nozzle circuit.
The above control strategy eliminates the flow vs elevation variable between the rear and top nozzles but the % setup still must be managed properly.
Steady state control using the top nozzle only at test condition was generally good. The control was +/- 1.5 deg. F but this was without any additional tuning being attempted.

Regards,
Brian P. Koehler
Principal Engineer
Southwest Research Institute
P.O. Drawer 28510, Zip: 78228-0510
9503 West Commerce, Zip: 78227
San Antonio, TX USA
Building 209
Tel: 210-522-3588
Fax: 210-684-7523
Cell: 210-213-2761

From: Greene, Galen [mailto:Galen.Greene@lubrizol.com]
Sent: Tuesday, January 24, 2012 4:04 PM
To: Angela Trader; Koehler, Brian P.; Gottwald, Thomas; Hobson, Kevin (Kevin.Hobson@AftonChemical.com); NON-LZ DALE SMITH
Cc: Marsh, Greg; Dharte, John; Gropp, Jerrold; Venhoff, Wes
Subject: RE: Requirements for ASTM Zeta 218 Test Hardware

Hello,

Just wanted to pass on that the builds have been delayed slightly and are scheduled for next week. As you can see below, John will actually be heading back down to Mexico to oversee the builds (thanks John!). I believe they are targeting Feb. 2nd and 3rd for the builds. Therefore, they will likely ship from Mexico during the week of Feb. 6th.