

**L-37 Surveillance Panel Teleconference Minutes  
Thursday, 10/09/2008**

**Attendees:**

Dana -	Basset, Pappademos, Miller, Fett, Horvath, Okamuro
SwRI –	Koehler
Lubrizol –	Bartlett, Gropp, Graziano
Afton -	Koglin
Park -	Smith
TMC -	Lind
ArvinMeritor	McGlone

**7 voting members**

The L-37 Surveillance Panel teleconference call was directed to convene at this time by the Panel at its September 30<sup>th</sup> teleconference meeting to review testing options and progress to date.

Agenda:

- o Approve the September 30, 2008 SP teleconference meeting minutes.
- o Review pending action items.
- o Next step with SwRI modified test condition matrix.
- o Update Standard 6121 units per ASTM Units Project Directive – Lyle Bowman.

**Approval of Minutes**

**Motion #1:** Mr. McGlone /Second Mr. Smith – That the September 30, 2008 meeting minutes be approved as written. Motion passed unanimously with a voice vote of 7-0-0.

**Retrofit Lubrited Hardware – Review and Discussion**

**Prior Action Item Review & Update:**

→ **Ramsey**– Mr. Ramsey to work with chairman to address a Dana refund to the industry labs since the hardware has already been paid for. Mr. Ramsey agreed that there are 32 unusable Axles due to the ring and pinion shortage. He needs the count and PO number for each lab in order to issue credit. The labs were asked to send their PO numbers and axle counts to the chairman who would detail and forward the information to Mr. Ramsey (see below) **Closed** 10/7/2008

<b>Lab</b>	<b>PO Number</b>	<b>Initial Receipt</b>	<b>On Hand</b>	<b>Credit Lab</b>
Afton	509527	267pcs	252	8
Lubrizol	4500795409	300pcs	271	9
Parc	6002-05	219pcs	203	7
SwRI	663206G	267pcs	248	8

→ **Dana/Labs** - At the September 4 panel teleconference call the labs were directed to convene and draft a letter to Dana representatives specific to laboratory questions and issues. The labs teleconferenced on September 4, drafted and sent the letter to Dana representatives Brazeau, Miller, Ramsey, Fett and Guzikowski. Letter was also included as attachment # 2 of the September 4 panel meeting minutes. Dana was asked to respond to the questions by September 18<sup>th</sup> panel teleconference meeting. Attachment # 1, dated 9/30/2008, details the Dana response to our questions. **Open**

### Continued Reduced Torque Testing on the Retrofit Lubrified Axles

1. **Gear Conditioning Phase** will be conducted per the Standard, no change.
2. **Gear Test Phase** – Test alternate conditions will be provided by Dana:
  - 80 wheel rpm and reduced lbf-ft torque per Dana and Panel direction.
  - Axle oil temperature will be the same as a standard test.
  - Test length will be 24 hours of on-test time.

Attachment # 2 is the photomicrographs of one tooth from each of the four-lubricated pinions. Technically, it all looks normal.

### Discussion and Comments –

**Miller & Okamuro** – discussion was held on an acceptable estimation of a mean and standard deviation for the stress levels of the gears that may exhibit spalled and/or broken teeth. The more you reduce the chances of this distress, the more you are reducing your torque load. See Attachment # 3 which is the Dana summary of a recommendations and options.

Attachment # 4 is the TMC database summary of Tests by gear batch exhibiting broken teeth.

**Lind** - asked if anything had been found with respect to a re-polishing of the top land. Okamuro commented that, with these four, they did not see any issues. Miller commented/suggested that no additional polishing of remaining pinions would really be necessary. The panel still has some questions, but we will address that after the second round of reduced torque load testing.

**Bartlett** – recommended that the panel select a ‘% contact Stress reduction’ option of 11%. After much discussion, there was panel consensus and agreement. SwRI agreed to conduct four tests on TMC 134, 153-1, 152, and 155. Axles to be used for this round will be from the first matrix axle assembly (4 left) that were assembled with a flank neutral pattern position (these have not had the topland polish). SwRI indicated that they could not begin testing until Monday, October 13, at the earliest.

The 10 axles with polished toplands recently assembled and delivered to SwRI are to be identified accordingly and set aside for future discussion and possible testing. Dana, Maumee was instructed to hold on the assembly on the remaining 30 axles (hardware with polished toplands) for future panel direction.

**Gropp** – after more discussion, made the following motion, seconded by Koehler:

The L-37 Surveillance Panel is requesting Dana to immediately begin the process of manufacturing a new batch of pinions and rings for use in the L-37 test. This hardware should be manufactured using the same specifications for metallurgy, hardness, case depth, surface profile, etc. as was used in the V1L417/P4L792 batch of non-lubrited hardware. The intent of the Panel is that a portion of this batch will remain non-lubrited, and that a portion of this batch will be lubrited.

More specifically, a sufficient quantity of pinions and rings should be manufactured to allow for the V1L500/P4T813 batch of non-lubrited hardware to be retrofitted with these new pinions and rings, as well as for a sufficient quantity to be lubrited so that they may be used to retrofit the V1L500/P4L870A batch of lubrited hardware (both the new and the retrofitted subsets of this batch) with these new pinions and rings.

All companies who intend to purchase a portion of this new batch of pinions and rings are to provide Dana with an initial indication of the size of their order no later than the end of the business day on Friday, October 24. Formal purchase orders are to be provided to Dana no later than the end of the business day on Friday, October 31. Dana is to provide the Surveillance Panel with a projected date for the availability of this hardware no later than the end of the business day on Friday, November 7.

Motion passed with a vote of 3-1-3.

### **Update Standard 6121 units per ASTM Units Project Directive - Bowman**

*Attachment # 5* is the ballot proposal from Mr. Bowman received 10/07/08 and distributed prior to this meeting. He commented that the ASTM editor will make revisions and alter the figures and tables accordingly. With respect to the current legends (there were some existing legends for a few figures), he chose to leave those and simply place parentheses around the SI units, rather than having the editor remove the legends and do the units revisions in the figures themselves. Thus, the final updated D 6121 standard will contain all revisions.

**Note:** *Chairman's comments on panel questions and discussions with Mr. Bowman this teleconference:*

- 1. Section 4.4, nothing after (2359? This is OK as the procedure currently has the correct information from that point on.*
- 2. The previous changes and recommendations with Table A9.1 were dropped after adding the exception note (see ballot section note 1.3.1. This will make it a consistent option through the other gear test standards using CRC manuals.*

After consensus discussion, a motion was made by Mr. McGlone second by Mr. Koehler to accept and adopt the proposed ballot as presented by Mr. Bowman. Vote was unanimous, 7-0-0. The chairman has notified Mr. Bowman via email and item should immediately proceed to balloting.

## New Lubrified Hardware – Discussion

Continued testing was put on hold by Panel as we focus the attention on the retrofit hardware first.

## Non- Lubrified Hardware – Discussion

Continued testing was put on hold by Panel as we focus the attention on the retrofit hardware first.

### ○ **Next Meetings will be a Surveillance Panel Teleconference**

- **Meeting Thursday, October 16th, 2008 at 10:00 a.m. EDT.**
- **Call in info is 608-250-0194, code 324160.**

Meeting adjourned at 11:32 a.m.

A handwritten signature in blue ink that reads "Donald T. Bartlett". The signature is written in a cursive style with a large, stylized initial "D".

Donald T. Bartlett, L-37 SP Chairman

**Bartlett, Donald**

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**From:** Bill.Ramsey@dana.com  
**Sent:** Tuesday, September 30, 2008 9:46 AM  
**To:** Bartlett, Donald  
**Cc:** Kenny.Miller@dana.com  
**Subject:** ASTM Questions

Don:

I have a standing call at 10 on Tuesdays. Please find below the answers for your questions

32 Unusable Axles- I need the qty and PO for each lab in order to issue credit

Root Cause Analysis - Dana continues to test materials and specifications.

Gear Set Quote - Non - Lube = \$198.80 each, Lube = 205.92 each - based on pre axle build of sufficient qty for matrix test verification to qualify hardware prior to complete run to confirm successful test before processing total order.

Warranty - All claims will be reviewed based on the standard warranty when submitted.

Steel leftover - No

Lead-time - 6 months

Thanks  
Bill

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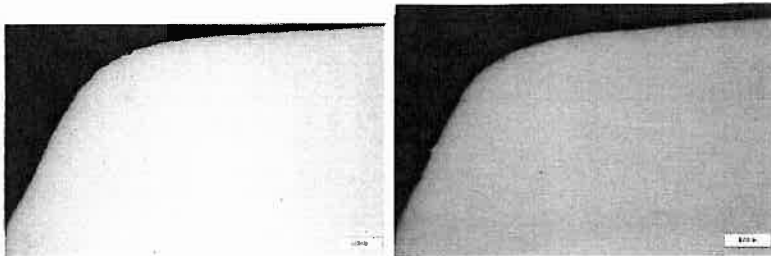
English, Francais, Espanol, Deutsch, Italiano, Portugues:  
<http://www.dana.com/overview/EmailDisclaimer.shtm>

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<b>Attachment</b>	<u>1</u>
<b>Page</b>	<u>10/1</u>
<b>Reference</b>	<u>L-37</u>
	<u>10/9/08</u>

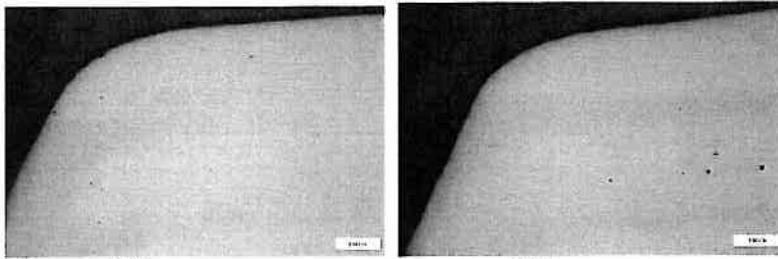
## L37 Conference Call of 9 October 2008

1. Four gear sets were sent to Ft. Wayne and were evaluated by Mark Bassett for presence of top-land polish. The photomicrographs of one tooth from each of the four pinions shows that the polish operation was sufficient to prevent a protuberance of the top-land material into the gear profile. The additional polish on the 40 reworked sets was unnecessary judging from this sample and are equivalent to the un-repolished pinions in the rest of the production run.



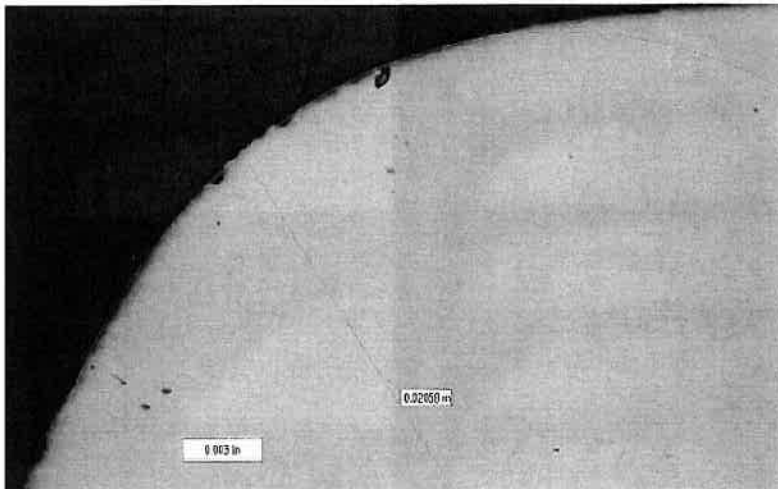
Drive Side Tooth Set 1C

Drive Side Tooth Set 2P



Drive Side Tooth Set 5N

Drive Side Tooth Set 5X



Drive Side Tooth Set 1C

Attachment	<u>2</u>
Page	<u>10/1</u>
Reference	<u>L-37</u> <u>10/9/08</u>

2. Dana was asked to recommend a reduced test torque for the L37 test that would reduce the incidence of tooth breaking/spalling. Based on a small sample size of tests run at full test torque and reduced test torque, an approximation was derived for the sample standard deviation for contact stress. Only tests that were run for 24 hours were included. Assuming a normal distribution for the contact stress, the following table of tooth survival was generated.

Proposed torque for 9 Oct 08 conference call

% Contact stress reduction	% survival of pinion (no spall)	Output torque (lb-ft @ RG)	Output torque (lb-ft @ wheel)	Output % torque reduction	Calculated contact stress (psi)
0%	50%	3,480	1,740	0	300,536
7%	80%	2,882	1,441	82.8%	279,008
11%	90%	2,575	1,288	74.0%	267,477
14%	95%	2,350	1,175	67.5%	258,461

The SP is asked to decide what torque reduction is acceptable based on the data provided.

*1ST ROUND OF TESTING, FLANK NEUTRAL PATTERN ON ALL 4 DILS. NO REDUCE OF TOPLAND ADLISH - Complete*

*\* ROUND 2 OF TESTING, FLANK NEUTRAL PATTERN. NO REDUCE OF TOPLAND ADLISH - NEXT OPTION*

Attachment	<u>3</u>
Page	<u>Left</u>
Reference	<u>L-57</u>
	<u>10/9/08</u>

## LUBRITED HARDWARE

Gear Batch	Total # Tests	Tests with Broken Teeth	% of Tests With Broken Teeth
C1L308//P4L309R	28	0	0 %
C1L426/P4L404A	39	0	0 %
V1L303/P4L514A	87	4	4.6 %
V1L686/P4L626A	139	3	2.15 %
L247/T758A	99	0	0 %
<b>TOTAL</b>	<b>392</b>	<b>7</b>	<b>1.8 %</b>

## NON-LUBRITED HARDWARE

Gear Batch	Total # Tests	Tests with Broken Teeth	% of Tests With Broken Teeth
C1L308/P4L318R	86	0	0 %
C1L426/P4L415A	50	1	2 %
V1L303/P4L514A	32	0	0 %
V1L686/P4L626A	58	1	1.7 %
V1L176/P4L741A	54	0	0 %
V1L351/P4T771	67	0	0 %
V1L417/P4L792	88	0	0 %
<b>TOTAL</b>	<b>435</b>	<b>2</b>	<b>0.5 %</b>

<b>Attachment</b>	<u>4</u>
<b>Page</b>	<u>1 of 1</u>
<b>Reference</b>	<u>L-37</u>
	<u>10/9/08</u>



**Bartlett, Donald**

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**From:** Bartlett, Donald  
**Sent:** Wednesday, October 08, 2008 6:56 AM  
**To:** Allan Comfort ; Bartlett, Donald; bkoehler@swri.edu; Bruce.McGlone@ArvinMeritor.com; Dale Smith (Dale.Smith@intertek.com); Dhartej@aam.com; dml@astmtmc.cmu.edu; james.l.linden@gm.com; Juan Buitrago (jabu@chevrontexaco.com); Ken Miller; Koglin, Cory; pvettel@dastuart.net; Salvatore Rea (salvatore.rea@infineum.com); thelmaemarougy@eaton.com; Tom Bryson (thomas.bryson@volvo.com)  
**Cc:** Lyle Bowman; Chris Barker; Don Bell (don.bell@aftonchemical.com); fmf@astmtmc.cmu.edu; Graziano, Ricki; Greene, Galen; greg.fett@dana.com; Gropp, Jerrold; Higuchi, Samuel; Inc William Sullivan (wtsullivan@comcast.net); Jack Zakarian (jaza@chevrontexaco.com); Jami Pole (jami.pole@aam.com); Joe.Guzikowski@dana.com; John Huron (HURO@chevrontexaco.com); Keith Purnell (kpurnell@sae.org); Kerry Hess (Kerry.hess@dana.com); Martin, Dan; NON-LZ JACKSON MATT; Mike Haire; Percy Kanga (percy.r.kanga@exxonmobil.com); Prengaman, Christopher; Rachel Agusti (rachel.agusti@us.army.mil); Rajakumar, Allison; Schenkenberger, Chris; Stephen Eliot (stephen.w.eliot@exxonmobil.com); Art Sanchez (arthur.sanchez@swri.org); F Lopez (flopez@swri.org); Foecking, Brian; Jesse Rodriquez (jmrodriguez@swri.org); Marty Rose (Marty\_Rose@aftonchemical.com); Mike Panza (E-mail); Pat Adams (pat\_adams@aftonchemical.com); Radonich, Peter; ralph.kozlowski@intertek.com  
**Subject:** FW: Modified D 6121 ballot item  
**Importance:** High  
**Attachments:** WK20838D 61218-08.doc

All,

**RE: Action item for D6121 to adopt SI units wherever possible.**

As many of you know from last weeks Panel teleconference meeting, Mr. Bowman and I have gone back and forth on this ballot.

Attached please find the proposed final ballot for the Standard D6121 provided by Mr. Bowman. Please review, comment, and be prepared to take action during the L-37 Surveillance Panel Teleconference call on **Thursday, October 9th at 10:00 a.m. EST. Call in number is 608-250-0194, pass code is 324160.**

Thanks,

Don

**Office Phone: 440-347-2388 Mobile: 440-220-0843 E-mail to: dtb@lubrizol.com**

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**From:** Lyle Bowman [mailto:jbfoodie@comcast.net]  
**Sent:** Tuesday, October 07, 2008 3:54 PM  
**To:** Bartlett, Donald  
**Subject:** Modified D 6121 ballot item

<b>Attachment</b>	<u>5</u>
<b>Page</b>	<u>1 of 9</u>
<b>Reference</b>	<u>L-37</u> <u>10/9/08</u>

Don,

As promised earlier today, the attachment is the 'complete' D 6121 ballot item.

Lyle.



D02 AND D02.B0 CONCURRENT BALLOT ITEM

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To: ASTM D02 and D02.B0 Members

From: Lyle Bowman, D02.B0.10 Facilitator

Subject: Revision of D 6121 (L-37)

WK No.: 20838

Rationale: Update the standard's units per the ASTM Units Project directive.

1.3 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.3.1 Exceptions – (1) In Table A9.1, the values stated in SI units are to be regarded as standard, and (2) no SI unit where there is not a direct SI equivalent.

4.3 Gear Conditioning Phase—Run the charged test unit for 100 min at 440 wheel ~~r/min~~ rpm

4.4 Gear Test Phase—Next, run the test unit for 24 h at 80 wheel ~~r/min~~ rpm, 1740 lbf-ft. (2359 .

6.2.4.3 Axle Cooling

(2) Use a single control valve to control the cooling water supply. The control shall be a 1/2 in. (12.7 mm) two-way, C linear trim, .....See A6.3.2.2 for L-37 Canadian Version test.

(3) Use only 3/8 or 1/2 in. (9.5 or 12.7 mm) line material to the spray nozzles.

(4) Use a minimum supply water pressure of 25 psi (172 kPa) to the control valve.

10.1.3 After reaching the appropriate gear, accelerate smoothly to 440 ± 5 wheel ~~r/min~~ rpm

Attachment	5
Page	2 of 9
Reference	L-37 10-9-08

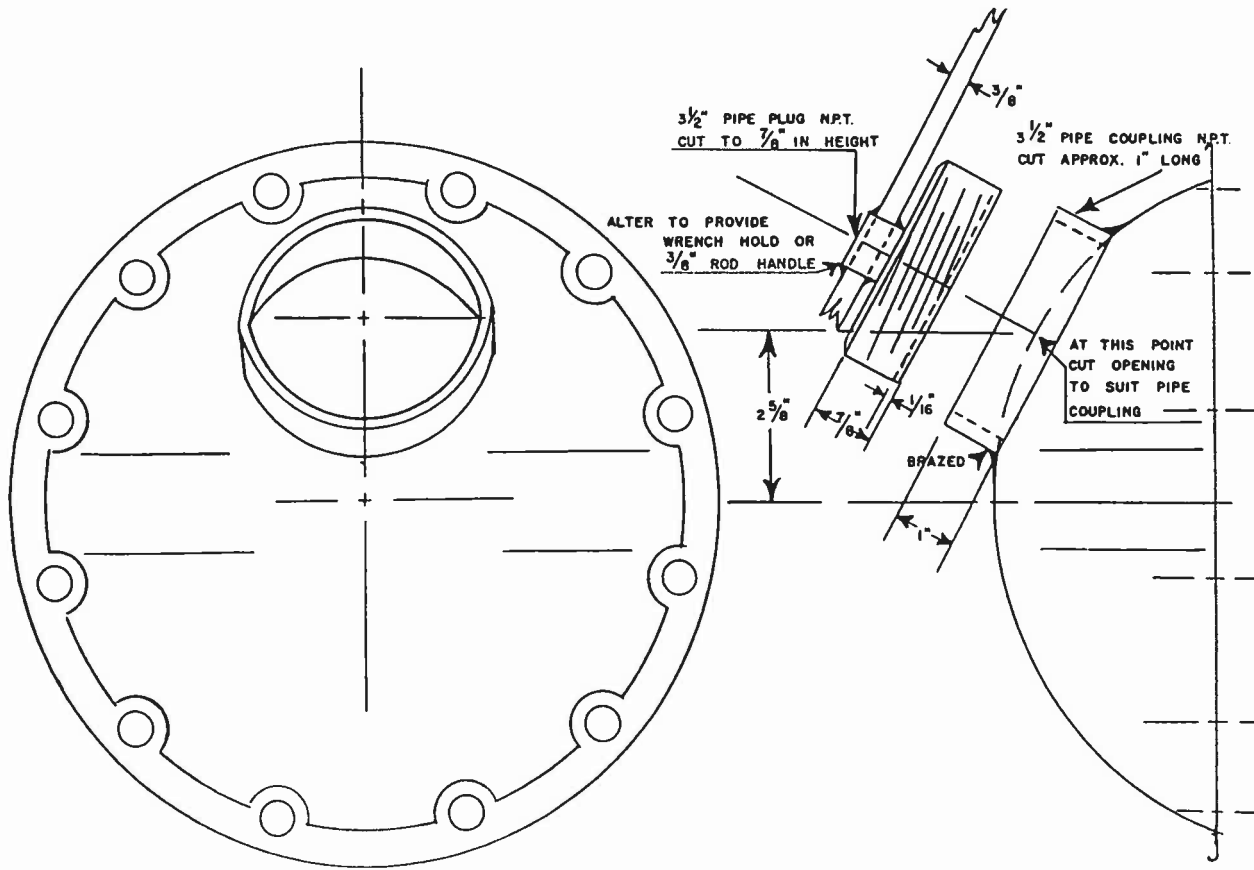


NOTE 1—The time required to accelerate to the test conditions of 440 wheel ~~r/min~~ rpm and 395 lbf-ft (535 N-m) is about 5 min.

10.2.3 After reaching the appropriate gear, accelerate smoothly to  $80 \pm 1$  wheel ~~r/min~~ rpm and

NOTE 4—The time required to accelerate to the test conditions of 80 wheel ~~r/min~~ rpm and 1044 lbf-ft (1415 N-m) is about 10 min.

Attachment	<u>5</u>
Page	<u>32/9</u>
Reference	<u>L-37</u>
	<u>10/9/08</u>

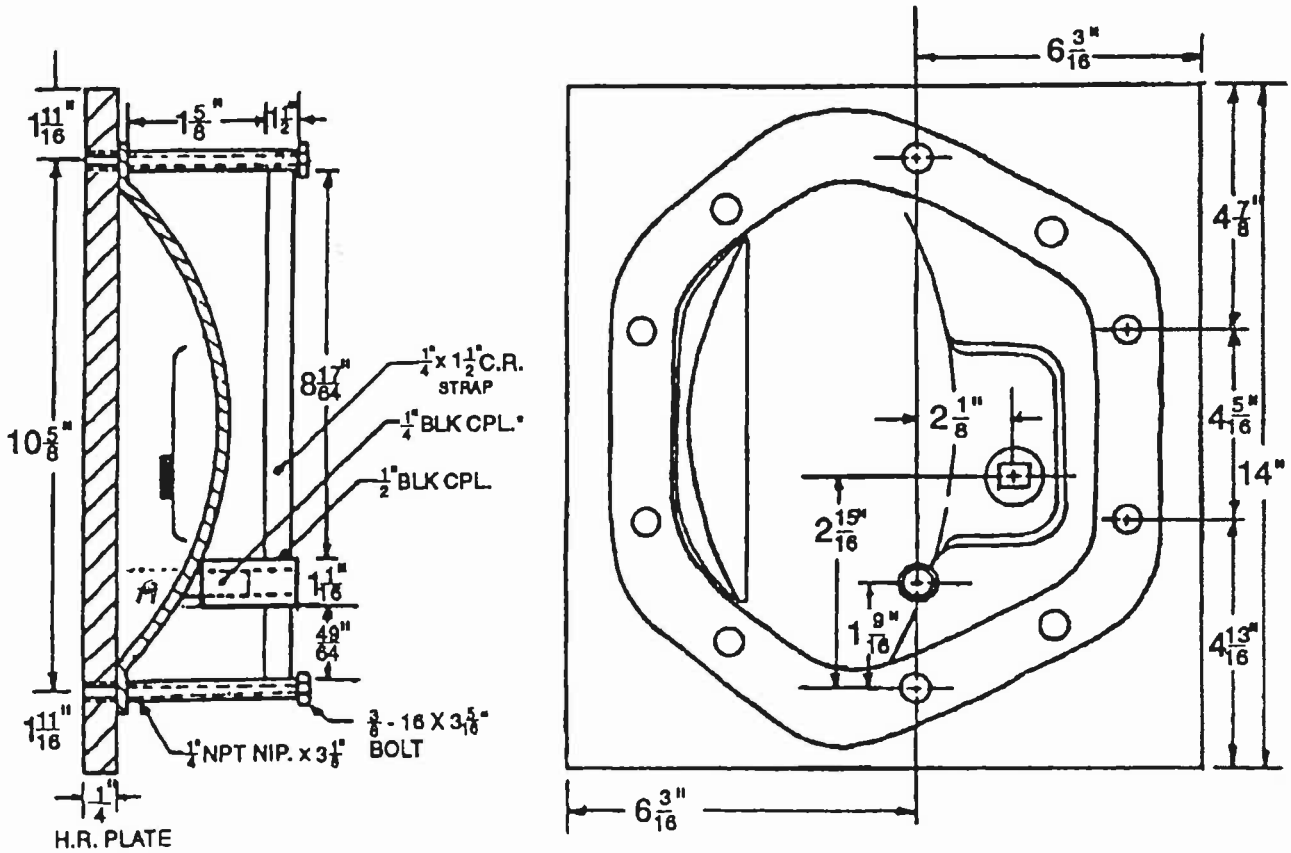


in.	mm	in.	mm
1/16	1.6	1	25.4
3/8	9.5	25/8	66.7
7/8	22.2	31/2	88.9

FIG. A2.1 Axle Cover Example

In Fig. A2.1, place parentheses around the SI units in the legend below the figure.

Attachment	5
Page	4 of 9
Reference	L-37
	10/9/08



A CPL cut a approximately 50° angle (sand cpl to match contour of cover)

in.	mm	in.	mm
1/4	6.4	31/8	79.4
3/8	9.5	35/16	84.1
1/2	12.7	45/16	109.5
11/16	27.0	413/16	122.2
1 1/2	38.1	47/8	123.8
19/16	39.7	63/16	157.2
15/8	41.3	817/64	209.9
1 11/16	42.9	105/8	269.9
2 1/8	54.0	13	330.2
2 15/16	76.6		

FIG. A4.1 Cover Plate Temperature Sensor Locating Device

In Fig. A4.1, place parentheses around the SI units in the legend below the figure.

Attachment	5
Page	5 of 9
Reference	1-37 10/9/08

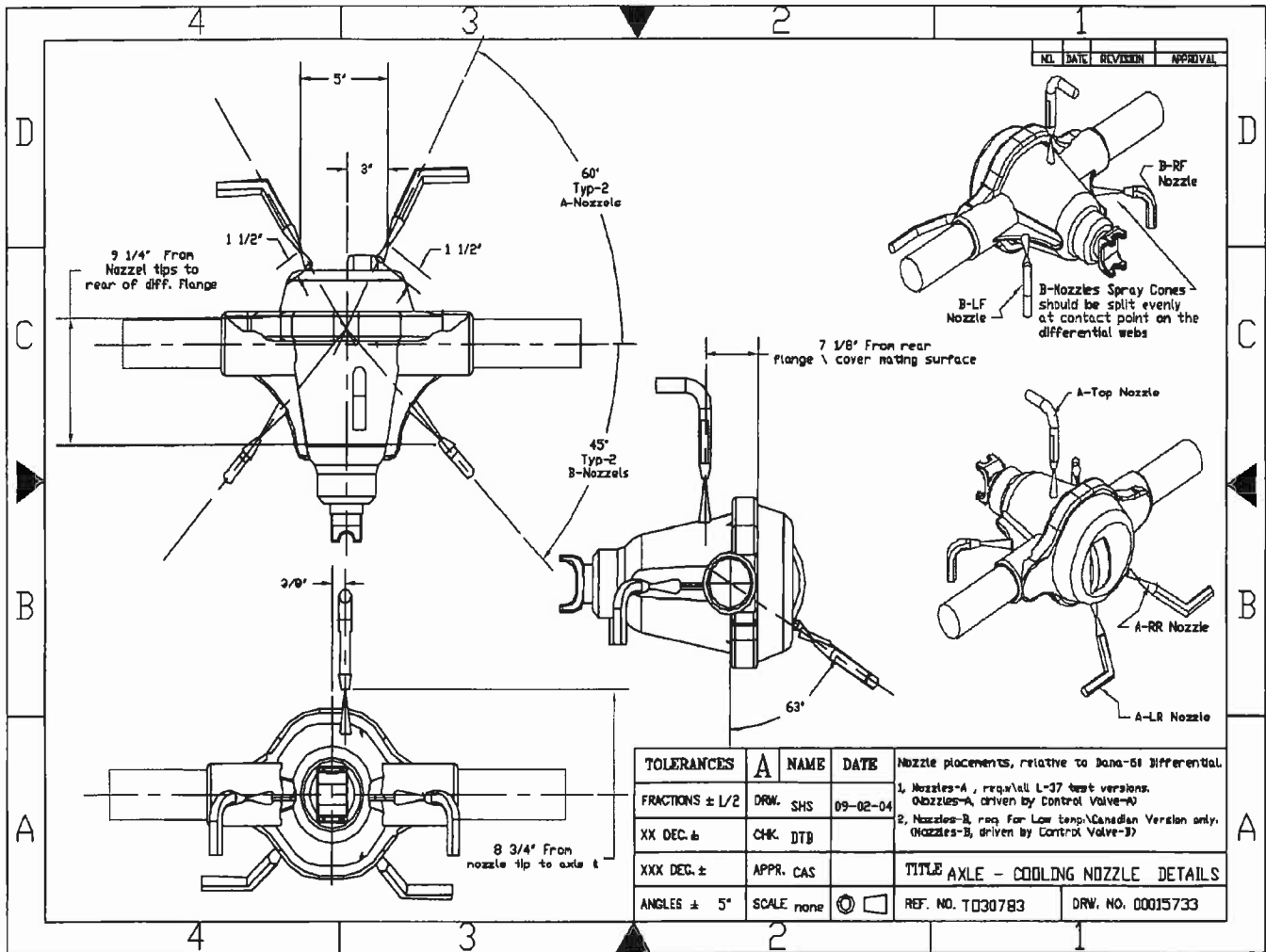


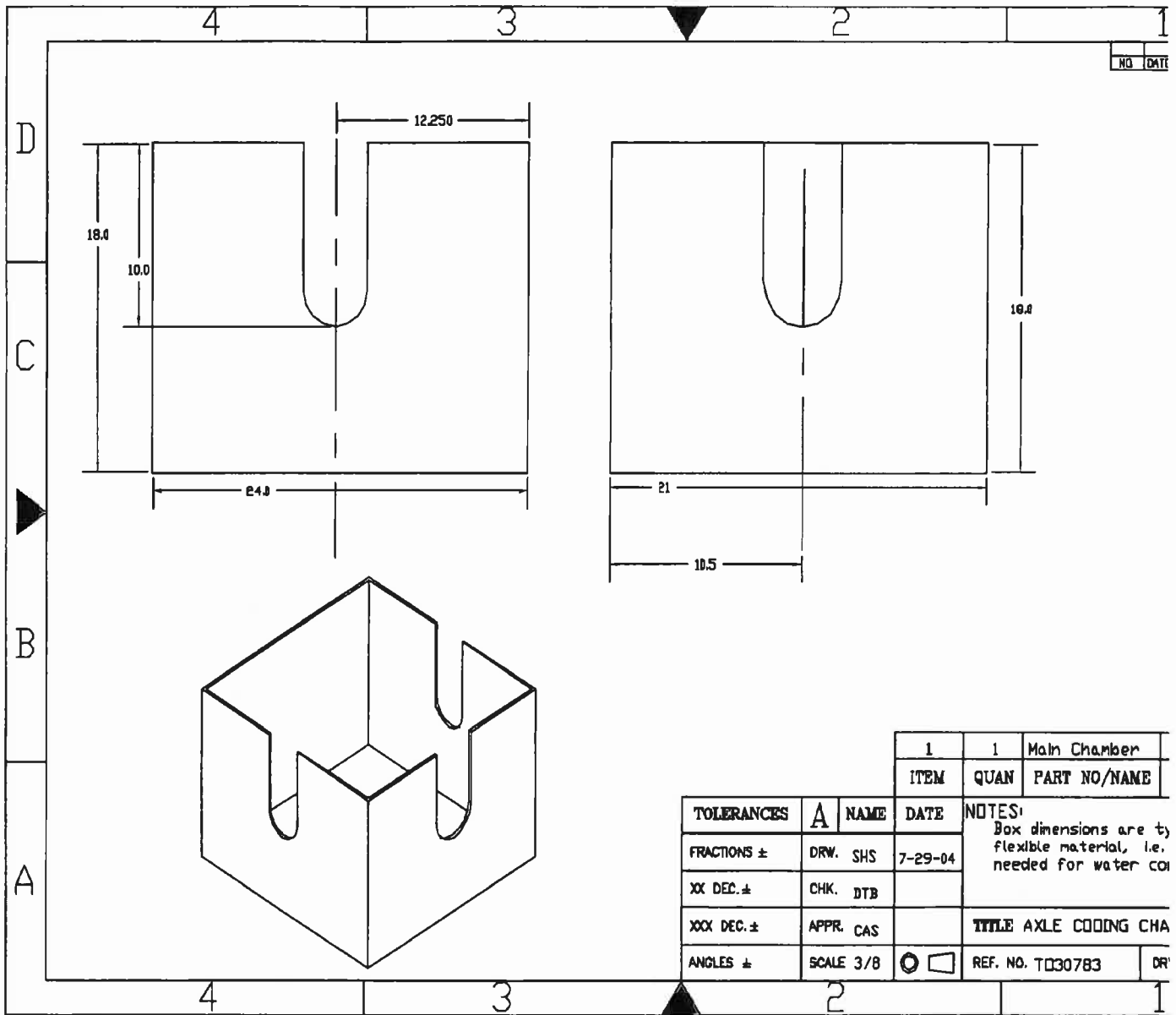
FIG. A5.1 Location of Spray Nozzles on Axle

In Fig. A5.1, add SI units in parentheses after the inch-pound units from the top-to-the bottom of the figure, as indicated below:

- 5"                      127 mm
- 3"                      76 mm
- 1 1/2" (two places)    42 mm

Attachment	<u>5</u>
Page	<u>6 of 9</u>
Reference	<u>L-37</u> <u>10/9/08</u>

9 1/4"	235 mm
7 1/8"	181 mm
3/8"	10 mm
8 3/4"	222 mm



1	1	Main Chamber
ITEM	QUAN	PART NO/NAME

TOLERANCES	A	NAME	DATE	NOTES
FRACTIONS ±	DRW.	SHS	7-29-04	Box dimensions are to flexible material, i.e. needed for water coil
XX DEC. ±	CHK.	DTB		
XXX DEC. ±	APPR.	CAS		TITLE AXLE COILING CHA
ANGLES ±	SCALE	3/8	<input checked="" type="checkbox"/> <input type="checkbox"/>	REF. NO. T030783

Attachment	<u>5</u>
Page	<u>20/9</u>
Reference	<u>L-37</u>
	<u>10/9/08</u>

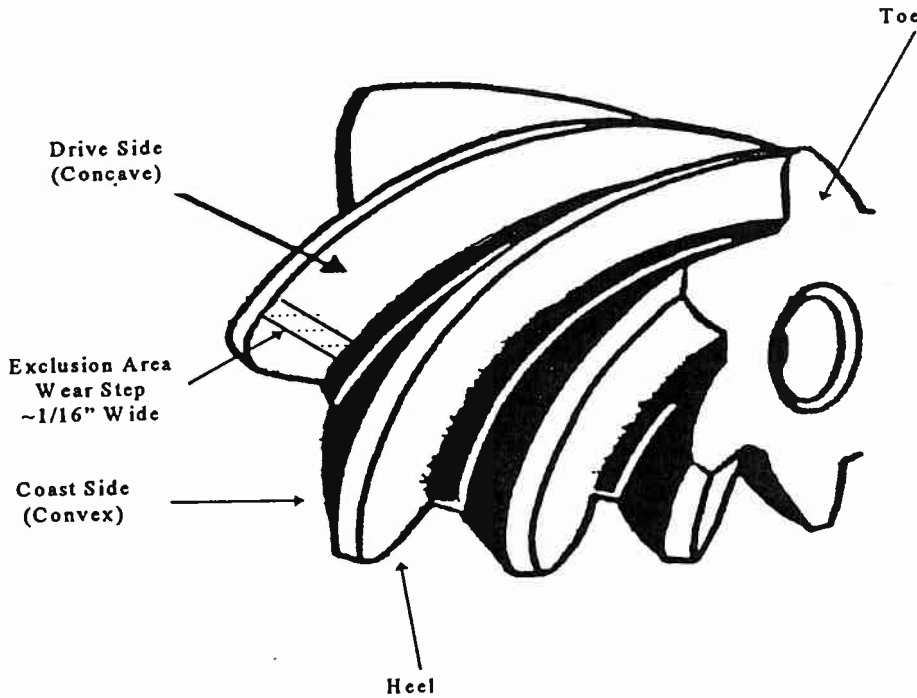


FIG. A10.1 Exclusion Area on Pinion

In Fig. A10.1, add '(1.6 mm)' after the 1/16" unit in the figure

A11. GEAR BATCH EXCLUSIONS

A11.1

Comments have been developed to accurately describe approved gear batch exclusions. When reporting test results, place one of the comments from Table A11.1 on Form 2 (Annex A7) in the area of Exclusion Comments.

TABLE A11.1 Gear Batch Exclusion Comments

Gear Batch	Comment
CIL426/P4L415A Non-lubrited hardware only (reference and non-reference tests)	Excludes any pitting/spalling values between 9.3 and 9.9, inclusively, in the wear step area (1/16 in. (1.6 mm)) of the drive side pinion tooth.
VIL303/P4L514A Non-lubrited hardware only (reference and non-reference tests)	Excludes any pitting/spalling values between 3.0 and 9.9, inclusively, in the wear step area (1/16 in. (1.6 mm)) of the drive side pinion tooth.

Attachment	5
Page	9 of 9
Reference	L-37
	10/9/08