L-37 Surveillance Panel Teleconference Minutes
Thursday 07/31/2008

Attendees:

Dana -	Miller, Basset, Pappademos, Sullivan, Guzikowski, Fett
SwRI –	Koehler
Lubrizol –	Bartlett, Gropp, Graziano, Prengaman
Afton -	Koglin
Park -	Smith
TMC -	Farber

Non- Lubrited Hardware – Discussion

Prior Action Item Update:

- → TMC does not have all the data. **Done**
- → All labs to send all hardware from the 10 matrix tests to Joe Guzikowski. **Done.**
- → For matrix test results completed to date, see ***attachment # 1***
- → Afton, Lubrizol, & SwRI, to provide pre test contact pattern photos and EOT photos of a disassembled ring and pinion to show the distress of the test. Identify with the CMIR number and oil code. LZ- Done, SwRI-Done, **Afton Pending.**

Discussion:

Miller & Sullivan – Metallurgical results and geometry looks good. Seem to be seeing varying results at EOT and looking at the wear phenomena concerns. Questions if there could be lapping oil compound interactions and if we should consider checking check EOT oil drain samples for sulfur. Not all labs take/retain EOT drain sample.

Review of laboratory practice for axle cleaning and preparation:

- Afton – axle to spray booth and spray with solvent, rinse contact pattern, dried, and inspected.
- Intertek-Parc – uses a soft bristle brush to scrub each tooth with solvent, spray solvent to clean housing, bearings, and axle tubes, and air dry, etc.
- SwRI – uses a soft bristle brush to scrub each tooth with solvent, spray solvent to clean housing, bearings, and axle tubes, and air dry, etc.
- LZ – uses a soft cloth and solvent to scrub each tooth, goes to spray room to spray solvent clean housing, bearings, and axle tubes, and air dry, etc.
- Keeping EOT oil (looking for silicone), SwRI and Lubrizol take EOT drain sample on all tests as a general practice. References cannot be analyzed per procedure. Afton and Parc only take EOT drain samples per customer request. No EOT drains for references.

Fett – Findings and observations – On all four pinions the area of high contact stress has changed from the traditional heel end bottom of contact to the central heel top of contact. At this location we see damage anywhere from mild metal deformation all the way to severe ridging. The ring gears exhibit similar damage at the bottom of contact at the heel end. Two of the ring gears exhibited full wear along the total tooth length while the other two had no contact on an irregular area at the toe end. The two with no contact at the toe end had a poor test result. It appears if the contact comes off of the toe the test may be negatively affected. The Lubrizol TMC 155 was a good test and the contact on the ring gear was full length. However, the Afton gear was also full length but the test result was poor. The gears may be sensitive to the build position.

Miller – Noted that the high stress area on the new hardware was changed by design vs. the model.

New Motions & Action Items:

→ **Motion 1** – Miller/Koglin – To aid in future Dana analysis work on hardware batches for all L-37 matrix reference testing from this point forward, there is to be photo documentation accounting of the pretest pattern contact for both the coast and drive side of the ring gear and an EOT photo of a disassembled ring and pinion to show the distress of the test. All photos to document the CMIR number and Oil Code identification at a minimum. Labs to send PDF file photos to Miller, Guzikowski and the TMC gear engineer. TMC to place the PDF documentation on the TMC website for viewing by panel all.

- Vote was unanimous - 6-0-0.

→ **Action item – Miller** – Since there were questions concerning where the carriers were purchased and if they were CNC machined, Miller to confirm if they were from Smokey Mountain or Sypris (bought Morganton). He confirmed that they were measured at start of build and met specs. Miller to confirm what company made the carriers for the 2005 gear batch too.

→ **Action Item** – Panel to consider recommendations on what other test condition options we should explore to make the hardware work, i.e., change the torques, shift test conditions, or change the test length and conditions, etc.

At this point, the panel felt we should focus the attention on the retrofit hardware as we prepare for out meeting in two weeks in Pittsburgh.

Retrofit Lubrited Hardware – Discussion

Prior Action Item Update:

- → **Basset –** Update on multiple sets (Ft. Wayne and Custom Coatings) of test panels. ***Attachments # 2 , and # 3*** details information from panel analysis (Custom Coatings and Henkel) of the phosphate process on the 060GA104X gear sets. Included are panel coating weights. General summary is, all results looked close. Custom coatings values are a little high as they do not take the oil off after the coating. The Hinkle SEM is good ~ 800 mg per sq ft.
- → **Sullivan** reported that the remaining 160 pieces (ring and pinion) shipped about a week ago.
- → **All labs** provide to TMC and email requesting assignment of TMC 127 and TMC 155 for Retrofit lubrited hardware. **Done**.
- → **16 axles** were assembled and 4 axles shipped to each lab for matrix testing (one test each lab on TMC 127 and TMC 155). **All labs have received their hardware and testing has commenced.**
- → Continued assembly was put on hold until further notice by the panel.

New Motions & Action Items:

- → **Motion 1** – Gropp/Koehler- besides the laboratory initial runs on TMC 127 and TMC 155 and to have meaningful discussions at the panel meeting in two weeks, two labs to conduct 1 test each on TMC 152-1 and the other two labs to conduct 1 test each on TMC 153-1. Testing to be complete and results reported to the TMC by August 7th. Vote was unanimous - 5-0-1.

  It was agreed to have Afton and LZ conduct tests on 152-1 and SwRI and Parc to conduct tests on TMC 153-1.
- → **All labs** to ship EOT ring, pinion, and bearings to Joe Guzikowski for analysis.
- → **All labs** to immediately provide PDF documentation of pre test pattern contact and EOT ring and pinion distress for all tests.
- → **Guzikowski/Horvath** – Confirm if the missing 160 pieces of lubrited ring and pinions from Ft. Wayne have been received at Maumee.
- → **Guzikowski/Horvath –** it appears that there was no assembly date information provide with the 16 axels (procedurally required for the labs to report). We need the information for the initial 16 axles and to determine what we are going to do for future axle builds. Please contact the chairman.
- → **Guzikowski/Horvath** – Provide the assembly spreadsheet information for the 16 axles previously shipped. Please contact the chairman.

New Lubrited Hardware – Discussion

Pending Action Items:

- → For matrix test results completed to date, see ***Attachment # 4.***
- → **All labs** to immediately provide PDF documentation of pre test pattern contact and EOT ring and pinion distress for all tests.
- → Continued testing was put on hold until further direction by the panel.

NOTE:
For all ring, pinions, and pinion bearings being shipped to Dana, Send to:

Dana Corporation
Attn: Joe Guzikowski
3939 Technology Drive
Maumee, Ohio 43537

- **Next HTF Teleconference call is scheduled for Thursday, August 7th at 10:00 a.m. Call in information is Call in info is 608-250-0194, code 324160.**

- **Next L-37 Surveillance Panel Meeting is in Pittsburgh at PRI headquarters on Wednesday, August 13 at 09:00 – 11:00 a.m. For those not traveling, the call in information is 608-250-0194, code 324160.**

Meeting adjourned at 12:15 p.m.

Donald T. Bartlett, L-37 SP Chairman

Donald T Bartlett

V1L500/P4L870A NEW LUBRITED MATRIX RESULTS

Testkey	Lab	STD	Run	Oil	VAL	Pinbat	DTCOMP	Pwear	Pridg	Pripp	Pspit	Rwear	Rridg	Rripp	Rspit	fpcrat	lpcrat	Mfg. Min B/Lash	KUSA	COM1
58905	D	3A	934	155	AG	V1L500	20080723	7	9	10	3	7	8	10	9.8	0	2	0.006	7322	
61849	B	191	2652	155	AG	V1L500	20080723	7	9	9	9	7	10	10	9.9	0	2	0.007	7367	FRACTURE CRACK AT PITCH LINE
67325	D	3A	935	127	MG	V1L500	20080724	7	8	7	2	8	10	9	9.9	0	2	0.005	7320	BROKEN TOOTH-MIDDLE OF TOOTH
63637	B	191	2653	127	AG	V1L500	20080724	6	5	8	9	6	6	9	9.9	0	2	0.008	7169	
67303	B	191	2655	152-1	AG	V1L500	20080729	8	9	8	9.9	9	10	10	10	0	2	0.004	7271	

Attachment 1
Page 1 of 1
Reference L-37
7/21/08

Bartlett, Donald

From: Mark.Bassett@dana.com
Sent: Tuesday, July 22, 2008 10:21 AM
To: Bartlett, Donald
Cc: Kenny.Miller@dana.com; Bob.Sullivan@dana.com
Subject: Re: Minutes of July 17 L-37 Surveillance Panel Teleconference - Next L-37 Surveillance Panel meeting is July 31, 2008, 10:a.m. EST
Attachments: Custom Coatings.pdf

Don,

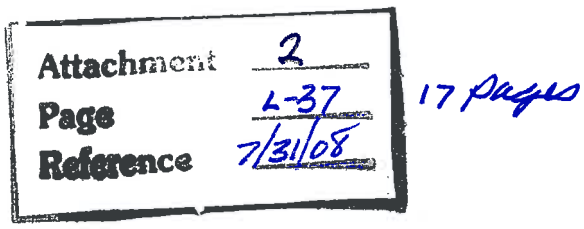
Attached is the report that I received from Custom Coating concerning the phosphate process on the 060GA104X gear sets. Included are panel coating weights. Please distribute at your discretion. Custom Coating has not yet received any test results from Henkel Corporation. I will forward on their report when I receive it from CC.

My panel results are as follows: Test Panel #1: 779.8 mg/ft^2
Test Panel #2: 812.4 mg/ft^2
Test Panel #3: 789.3 mg/ft^2

I will formalize these test results along with pitting photographs of a pinon hopefully by July 24, 2008. Unfortunately my image analysis system did not restart following our plant shutdown.

Thanks.

Mark Bassett
(260)470-5648



Custom Coating, Inc.

DUNS #153416953
ISO 9001:2000 EDITION
MBE CERT #101703-01

1937 JACOB STREET P.O. BOX 143
AUBURN, IN 46706
TELEPHONE (260) 925-0623
FAX (260) 925-5774

DANA CORPORATION

TORQUE-TRACTION MFG. TECHNOLOGIES, INC.

FORT WAYNE PLANT

2100 WEST STATE BOULEVARD

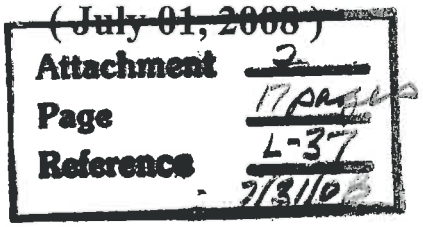
P.O. BOX 750

FORT WAYNE, IN 46801

P/N 060GA104 X
Model-60 Hypoid Drive Gear Set
ASTM Test Assemblies

Parco Lubrite-2 Coating:
Dana Coating Spec ES-PS-0506
Process Documentation

~~(July 01, 2008)~~



www.customcoatinginc.com

CONTENTS :

Custom Coating Inc.

Parco Lubrite-2 Test Coupon Panel
Coating Weight Determination:

Dana Corp – Torque-Traction Mfg Technologies, Inc.

ASTM Lube Test : Model 60 – # 060GA104X Gear Sets

Test Coupon Panel, Lubrite Coating Weight Results:

	Coupon #	Coating Wgt	Coating Thk
Beginning of Production:	1	845.1 mg/ft2	0.12 mils
Middle of Production Run:	2	901.4 mg/ft2	0.11 mils
End of Production Run:	3	941.8 mg/ft2	0.102 mils

(GM 9733P Method A) Surface coating weight Lab Procedure Method used.

NOTE: Above calculated Lubrite Coating Weights will be slightly higher than normally calculated, due to the coupons (while being Lubrite coating were), hung down inside (see attached photo) production Gear Set holding baskets. I wasn't able to retrieve the coupons prior to the Soluble Oil Rust Preventative bath. Therefore the initial coating calculation weight also includes the Soluble Oil weight. However, Test Panel Coupons were air dried for five days (July 4th Holiday weekend) prior to weighing & stripping panels.

See attached Custom Coating Inc. Surface Coating weight calculation work sheets.

Dennis Davis D. Davis (07-08-'08)
CCI -QA/Env Coordinator

file: Coupon Coating Wgt Test.doc

Custom Coating Inc

Chem Lab Procedure to Determine Mn-ph Coating Weight (mg / ft^2) Surface Area.

Procedure : (GM 9733P Method A) Test Panel # 1 (7:00 am)

Panel surface coating wgt checked (07-07-2008)

Test Panel Coupon ran with production Part # 060GA104X (07-01-2008)

Calc Sheet : Mn-ph Coating Weight (mg / ft^2) Surface Area.

Test Panel Area ft^2

Length inches =	3.000	Hole dia =	0.315	1 hole
avg Width inches =	2.4535	corner radii =	0.125	2 corners
L x W Area in^2 =	7.361	minus area =	0.0846	
	x 2			
Total Area in^2 =	14.5517	both panel sides included		
Total Panel Area =	0.1011	ft^2 both sides		

Initial Panel wgt_I = 29.9707 grams after Mn-ph coating

Mn-ph Stripped, Panel wgt_F = 29.8853 grams

wgt of Mn-ph coating = 85.4000 milligrams ref wgt loss 0.08540 g

Mn-ph Coating Weight = 845.1 mg / ft^2

= 9.1 g / m^2

	Initial		Final	
sample	Panel wgt	sample	Strip wgt	
1	29.9705	1	29.8852	2.463
2	29.9706	2	29.8854	2.444
3	29.9710	3	29.8851	avg width = 2.4535
4	29.9705	4	29.8853	
5		5		
avg =	29.97065	avg =	29.88525	

signed: _____

Custom Coating Inc

Chem Lab Procedure to Determine Mn-ph Coating Weight (mg / ft^2) Surface Area.

Procedure : (GM 9733P Method A) Test Panel # 2 (11:00 am)

Panel surface coating wgt checked (07-07-2008)

Test Panel Coupon ran with production Part # 060GA104X (07-01-2008)

Calc Sheet : Mn-ph Coating Weight (mg / ft^2) Surface Area.

Test Panel Area ft^2

Length inches =	3.000	Hole dia =	0.315	1 hole
avg Width inches =	2.5090	corner radii =	0.125	2 corners
L x W Area in^2 =	7.527	minus area =	0.0846	
	x 2			
Total Area in^2 =	14.8847	both panel sides included		

Total Panel Area = **0.1034** ft^2 both sides

Initial Panel wgt_I = **30.6945** grams after Mn-ph coating

Mn-ph Stripped, Panel wgt_F = **30.6013** grams

wgt of Mn-ph coating = **93.1700** milligrams ref wgt loss **0.09317** g

Mn-ph Coating Weight = **901.4** **mg / ft^2**

= **9.7** **g / m^2**

	Initial		Final		
sample	Panel wgt	sample	Strip wgt		2.499
1	30.6939	1	30.6014		2.519
2	30.6945	2	30.6012	avg width =	2.5090
3	30.6948	3	30.6013		
4	30.6948	4	30.6014		
5		5			
avg =	30.69450	avg =	30.60133		

signed: _____

File: Mn-ph Coating Wgt Procedure.xls

Custom Coating Inc

Chem Lab Procedure to Determine Mn-ph Coating Weight (mg / ft^2) Surface Area.

Procedure : (GM 9733P Method A) Test Panel # 3 (3:00 pm)

Panel surface coating wgt checked (07-07-2008)

Test Panel Coupon ran with production Part # 060GA104X (07-01-2008)

Calc Sheet : Mn-ph Coating Weight (mg / ft^2) Surface Area.

Test Panel Area ft^2

Length inches =	3.000	Hole dia =	0.315	1 hole
avg Width inches =	2.5070	corner radii =	0.125	2 corners

L x W Area in^2 = 7.521 minus area = 0.0846

x 2

Total Area in^2 = 14.8727 both panel sides included

Total Panel Area = 0.1033 ft^2 both sides

Initial Panel wgt_I = 30.6273 grams after Mn-ph coating

Mn-ph Stripped, Panel wgt_F = 30.5300 grams

wgt of Mn-ph coating = 97.2700 milligrams

ref wgt loss 0.09727 g

Mn-ph Coating Weight = 941.8 mg / ft^2

= 10.1 g / m^2

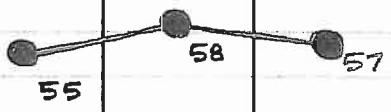
	Initial		Final
sample	Panel wgt	sample	Strip wgt
1	30.6278	1	30.5301
2	30.6271	2	30.5299
3	30.6272	3	30.5301
4	30.6271	4	30.5300
5		5	
avg =	30.62730	avg =	30.53003

	2.498
	2.516
avg width =	2.5070

signed: _____

Date: Tues 07-01 | Chemical Tritate Test | Test Specifications

Tank: # 1 | Free Alkali | Upper Limit: 60 | Lower Limit: 40



(mls)	EC 382 R Make-up to Add (Gals)
100	
90	
80	
70	
60	
55	0
54	1.9
52	3.8
50	4.7
48	6.6
46	8.5
44	11.3
42	13.2
40	14.1
35	18.8
30	23.5
20	32.9
10	42.3

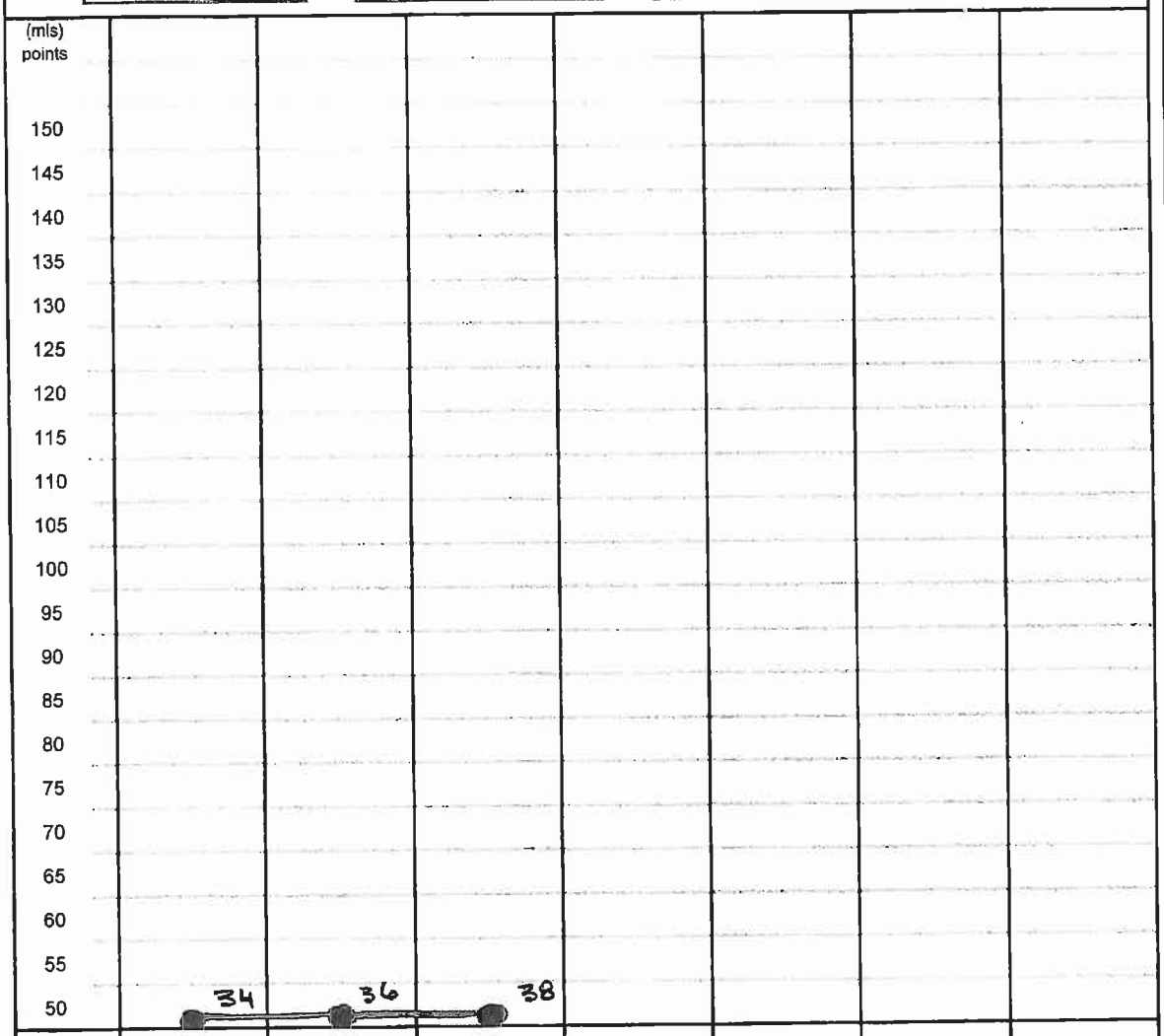
Temp	157	160	159				
Time	6:00 am	11:00 am	3:00 pm				
Day	~~Mon~~ Tues	Tues	~~Wed~~ Thurs	~~Thur~~	~~Fri~~	~~Sat~~	~~Sun~~
Oper	TB	TB	TB				

Comments: **Alkali Cleaner # EC 382 R** (Target = 55 mls = 11 % by Volume)

Acceptable Range 60 - 40 mls (60 mls = 12 % & 40 mls = 8 % by Volume)

Form: L T1 Free Alka EC 382 R Cleaner Revised: 03-25-08

Date:	Tues 07-01	Chemical Tritate Test	Test Specifications	
Tank:	# 1	Total Alkali	Upper Limit: ~150	Lower Limit:



Temp	157	160	159				
Time	6:00 am	11:00 am	3:00 pm				
Day	~~Mon~~ Tues	Tues	~~Wed~~ Tues	~~Thur~~	~~Fri~~	~~Sat~~	~~Sun~~
Oper	TB	TB	TB				

Comments: **Alkali Cleaner # EC 382 R** (Target = 11 % by Volume)

Total Alkali points build-up as tank becomes more contaminated

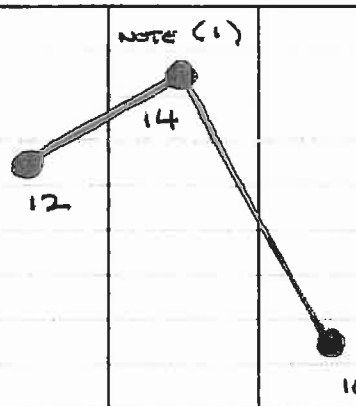
Form: L T1 Total Alka EC 382 R Cleaner

Revised: 03-25-08

Date: Tues 07-01
Tank: # 5

Chemical Titrate Test
Fixodine M

Test Specifications
Upper Limit: 12 ppm | Lower Limit: 8 ppm



lbs Fixodine M ↓ To Add
0
0.51
0.85
1.70
2.54
3.39
4.24
5.09
5.94
6.78
7.63
8.48
9.33
10.18
11.02
11.87

Temp	184	185	185				
Time	6:00 am	11:00 am	3:00 pm				
Day	~~Mon~~ Tues	Tues	~~Wed~~ Tues	~~Thur~~	~~Fri~~	~~Sat~~	~~Sun~~
Date	07.01.08	07.01.08	07.01.08				
Oper	TB	TB	TB				

Comments: **Fixodine M (Target = 10 ppm)**

Form: L T 5 Fixodine M

Revision: 06-10-08

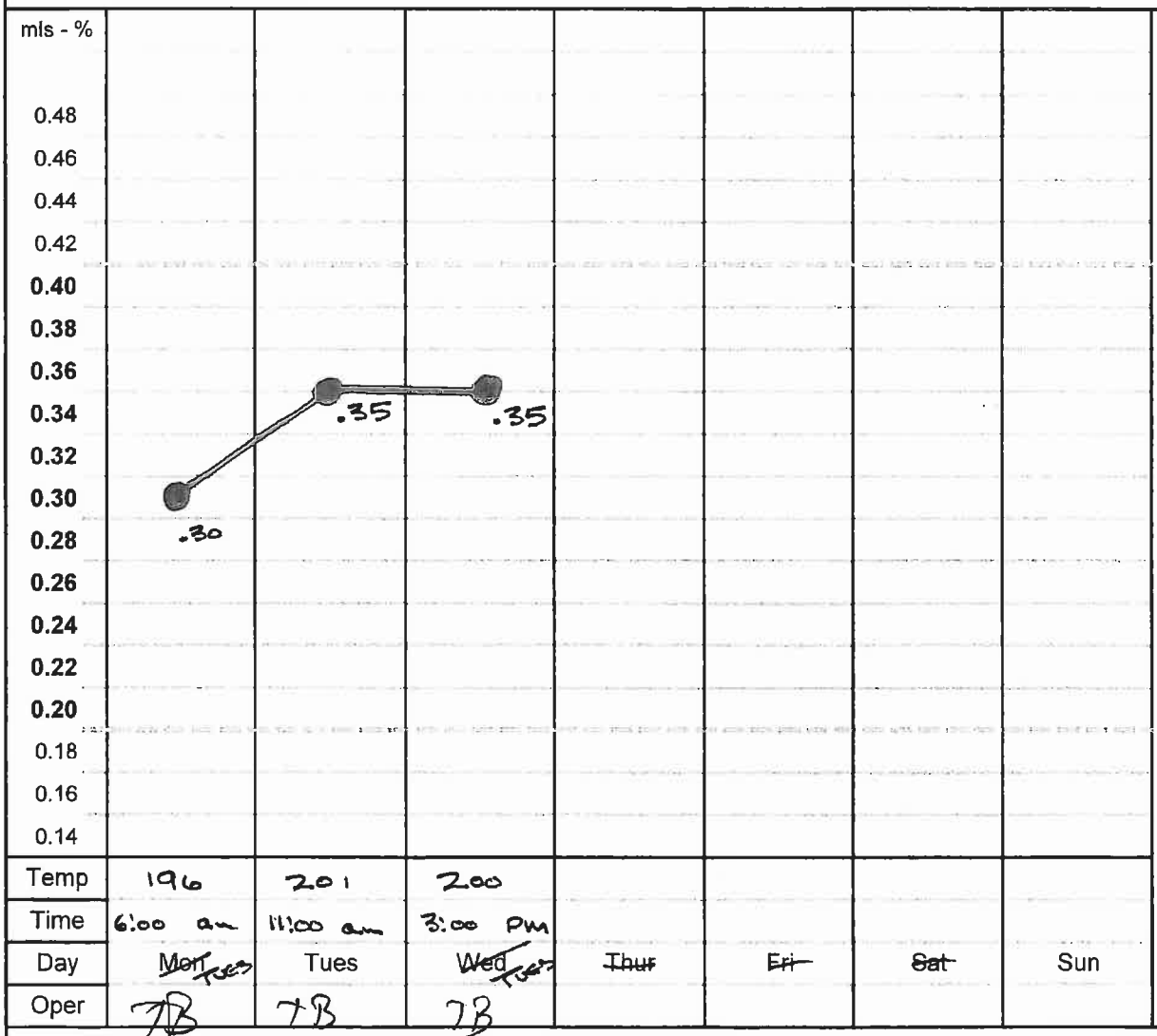
NOTE: (1) – 14 PPM IS OKAY. [HIGHER THE BETTER FOR GRAIN REFINEMENT]. CCI PLACES A UPPER LIMIT FOR CHEMICAL CONSERVATION. (10 hours)

Date: Tues 07-01-08

Tank: #6

Chemical Test: Iron (%)

Test Specifications: Upper Limit: 0.40 % | Lower Limit: 0.20 %



Temp	196	201	200				
Time	6:00 am	11:00 am	3:00 PM				
Day	~~Mon~~ Tues	Tues	~~Wed~~ Tues	~~Thur~~	~~Fri~~	~~Sat~~	Sun
Oper	TB	TB	TB				

Comments: **(Lubrite 2 @ 13 mls & 388 gal Tank)**

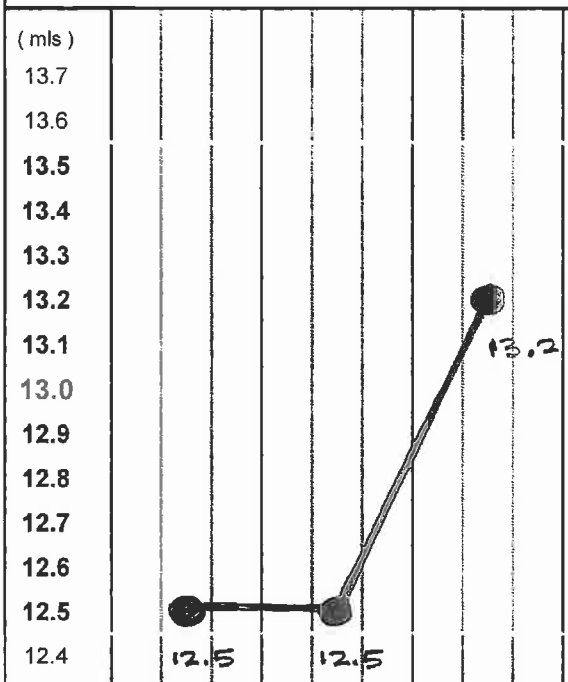
Form: L T6 Iron Test

Date: Tues 07-01-08

Tank: # 6

Chemical Test: Total Acid (mls)

Test Specifications: Upper Limit: 13.5 mls | Lower Limit: 12.5 mls



	Mon/Tues	Tues	Wed/Tues	Thur	Fri	Sat	Sun
Temp	196	201	200				
Time	6:00 am	11:00 am	3:00 pm				
Day	Mon/Tues	Tues	Wed/Tues	Thur	Fri	Sat	Sun
Date:	07-01-08	07-01-08	07-01-08				
Oper	TB	TB	TB				

Lubrite 2 Make-up Additions

Gals		quarts
0		
	+	1.4
	+	2.8
1	+	0.2
1	+	1.6
1	+	3.0
2	+	0.4
2	+	1.8
2	+	3.2
3	+	0.6
3	+	2.0
3	+	3.4
4	+	0.8
4	+	2.2
4	+	3.6

Gals / quarts

Comments: **PARCO Lubrite 2 (Tank Total Acid, mls)**

(calcs for 388 gal tank)

Form: L T6 Lubrite 2 Total Acid

Date: Tues 07-01-'08	Chemical Test	Test Specifications	
Tank: # 6	Free Acid (mls)	Upper Limit: 2.4 mls	Lower Limit: 2.2 mls

(mls)								
2.60								2 + 14.6
2.58								2 + 11.5
2.56								2 + 8.4
2.54								2 + 5.3
2.52								2 + 2.1
2.50								1 + 15.0
2.48								1 + 11.9
2.46								1 + 8.8
2.44								1 + 5.7
2.42								1 + 2.6
2.40								0 + 15.5
2.38								0 + 12.4
2.36								0 + 9.3
2.34								0 + 6.2
2.32								0 + 3.1
2.30								0
2.28								lbs ozs
2.26								
2.24								Neutralizer Additions
2.22								200
2.20								
2.18								
Temp	196	201	200					
Time	6:00 am	11:00 am	3:00 pm					
Day	~~Mon~~ Tues	Tues	~~Wed~~ Tues	~~Thur~~	~~Fri~~	~~Sat~~	~~Sun~~	
Date	07-01-'08	07-01-'08	07-01-'08					
Oper	TB	TB	TB					

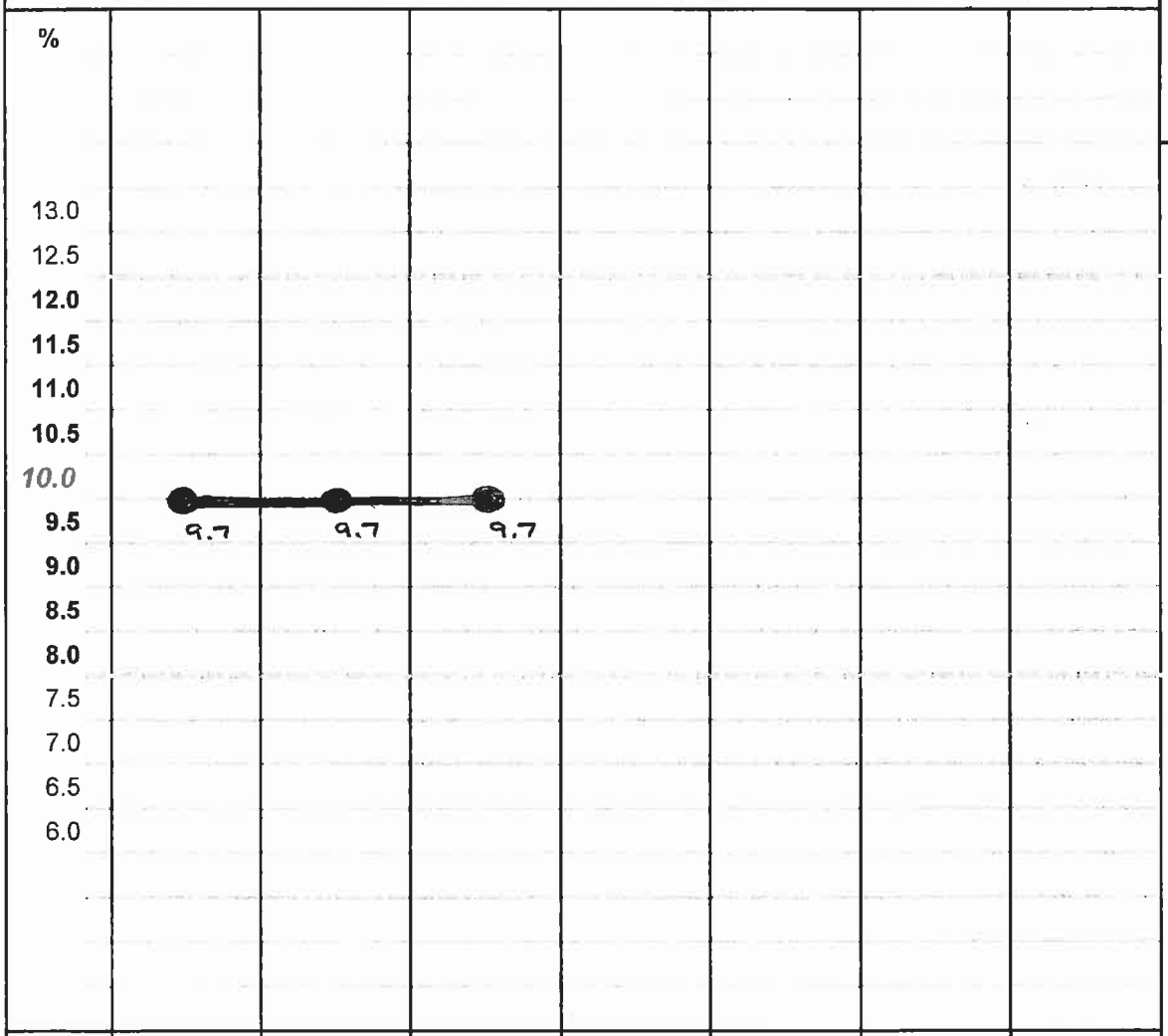
Comments: **(Tank Free Acid, mls)**

(calcs for 388 gal tank)

Form: L T6 Lubrite 2 Free Acid

Date: Tues 07.01.08 | RP Oil Split-out % Test | Test Specifications

Tank: **Tank 9** | % RP Oil Split | Upper Limit: 12 % | Lower Limit: 8 %



								Gals Parcoloc 2945 Make-up to Add
Temp	134	135	135					
Time	6:00 am	11:00 am	3:00 pm					
Day	~~Mon~~ Tues	Tues	~~Wed~~ Tues	~~Thur~~	~~Fri~~	~~Sat~~	~~Sun~~	
Oper	TB	TB	TB					
								0
								2.4
								4.7
								7.1
								9.4
								11.8
								14.1
								16.5
								18.8

Comments: **Rust Inhibitor Parcoloc # 2945**

(new tank charge = 47 gals Parcoloc # 2945)

Form: L T9 Parco 2945 Oil Split

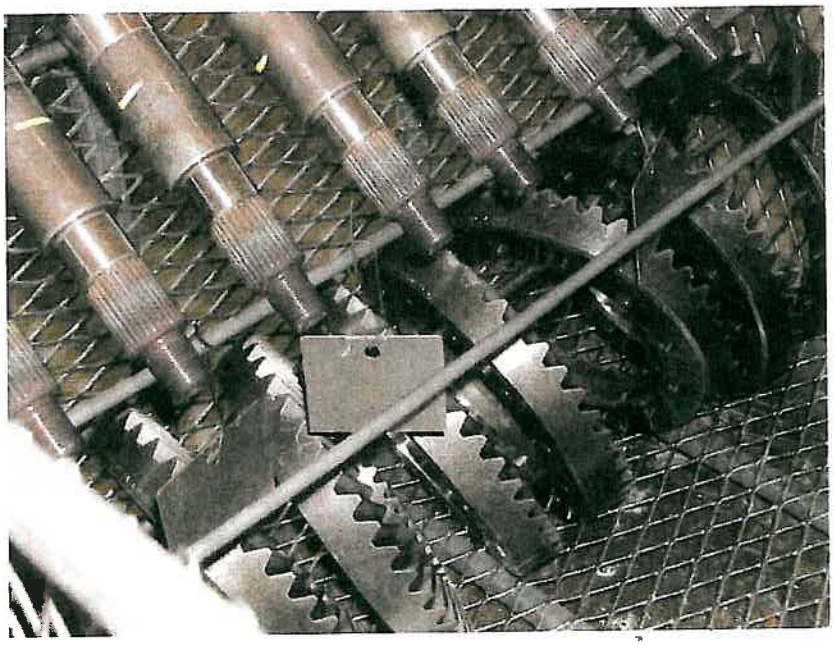
Dana Model - 60 Gear Set

Dana Gear Sets, as received packaging.

File: Dana Gear Set Photos 01.doc

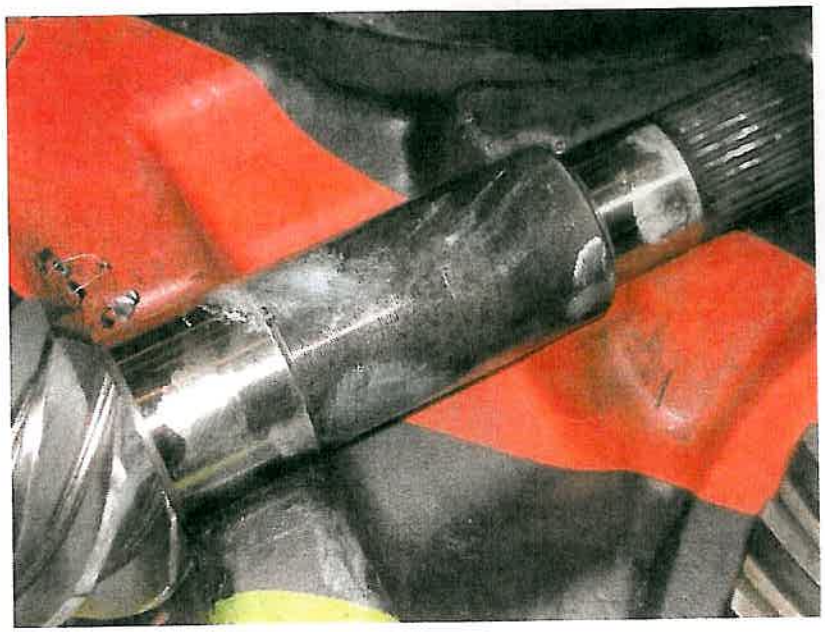
Custom Coating Inc, Gear Set Production Coating Basket Racking.

Test Panel Coupons, basket mounting location.

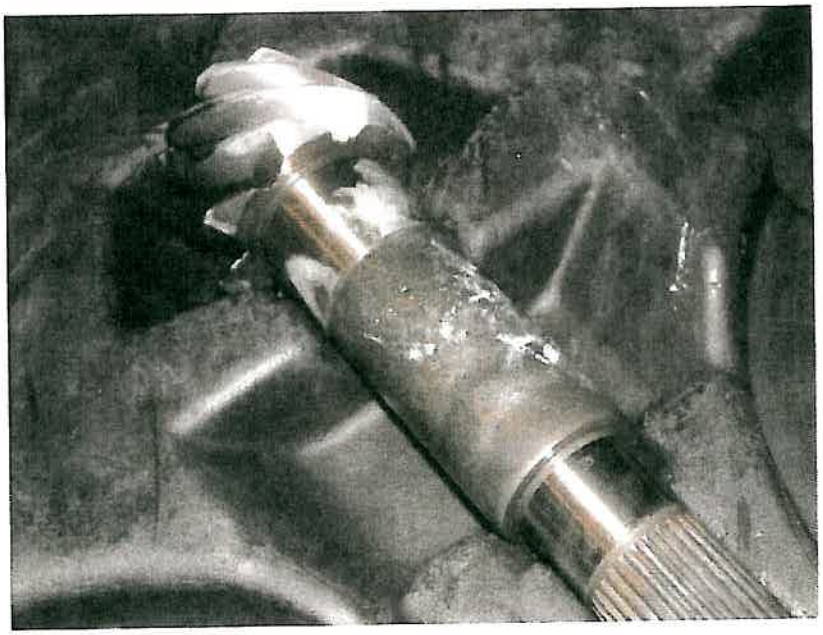


File: Dana Gear Set Photos 02.doc

Dana Gear Sets, Pinion white grease. (easily wipes-off prior to Lubrizing)



Dana Gear Set, Pinion white grease, (easily wipes-off, prior to Lubrizing)



File : Dana Gear Set Photos 03.doc

Dana Gear Set Basket ID tag.

Dana Gear Sets, Lubrite Coated & Ready for Shipment.

File: Dana Gear Set Photos 04.doc

Bartlett, Donald

From: Mark.Bassett@dana.com
Sent: Thursday, July 24, 2008 9:00 AM
To: Bartlett, Donald
Subject: Fw: Custom Coating, Auburn, IN, RCC Results AL2008-03868
Attachments: AL2008-03868.doc.zip

Attachment 3
Page 4 Pages
Reference L-37
7/31/08

Don,

Please find attached the Henkel report on the test panels which Custom Coating ran during the M60 manganese phosphate run. These panel weights compare favorably to my test result. Should you have any questions, please call me.

Thanks.

Mark Bassett
ph. (260)470-5648

----- Forwarded by Mark Bassett/SAD/Dana on 07/24/2008 09:10 AM -----

"Denny Davis" <ddavis@customcoatinginc.com>

07/24/2008 08:46 AM

To: <Mark.Bassett@dana.com>
cc:
Subject: FW: Custom Coating, Auburn, IN, RCC Results AL2008-03868

Mark Bassett -

See attachment: Henkel Test Lab SEM report for Dana 60 Mod Gear Sets, Coating wgts.

Dennis Davis, CCI
Quality/EPA Mgr
= = = = = = = = = = = = = = = = = = =

From: virginia.johnson@us.henkel.com [mailto:virginia.johnson@us.henkel.com]
Sent: Wednesday, July 23, 2008 6:06 PM
To: cecil.wallace@us.henkel.com; Patch Hines; Ron Meyer; Denny Davis
Cc: jack.kramer@us.henkel.com
Subject: Custom Coating, Auburn, IN, RCC Results AL2008-03868

Please find attached the result/s of the above analysis.

Analytical Results, including SEM images, and Sample Tracking are available to the Henkel Sales Person of record for each customer as of 12-31-05 24-hours a day via the LIMS Sales Lab Information Portal on the Henkel Intranet at http://rhlims01:8080/henkel/default.jsp. Contact SFA for access instructions to the Henkel Intranet. If you do not have a log-in ID for this site, request access from Jim Landis by e-mail.

Virginia Johnson
Associate Chemist
Laboratory Services

Attachment 3
Page
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Henkel Technologies

Analytical Services Report

ROUTINE COATING CHARACTERIZATION

Background:

Scanning Electron Microscope (SEM) analysis was requested as part of the Routine Coating Characterization (RCC). This electronic report type (E-SEM) was requested to improve the communication of RCC test results and to comply with the International Organization for Standardization (ISO) requirements.

Summary of Results:

The included SEM images are provided in a continuing effort to monitor the overall quality of your pretreatment process.

Opinions and Interpretations:

For specifications regarding crystal size or coating morphology, please contact your Technical Service Representative.

Results:

See attached images for details.

Experimental Detail:

Unless prevented by the part configuration, the SEM photomicrographs are taken at an angle of 45 degrees with a working distance of 6 to 25 mm using a Leo 435VP under HV mode at 15 kV. The RCC magnification of 1000X is only correct for images viewed or printed at 100% actual size. Use the micron bar on the image to determine actual magnification. The SEM magnification calibration is set for the Video Printer to comply with historical hard copy results.

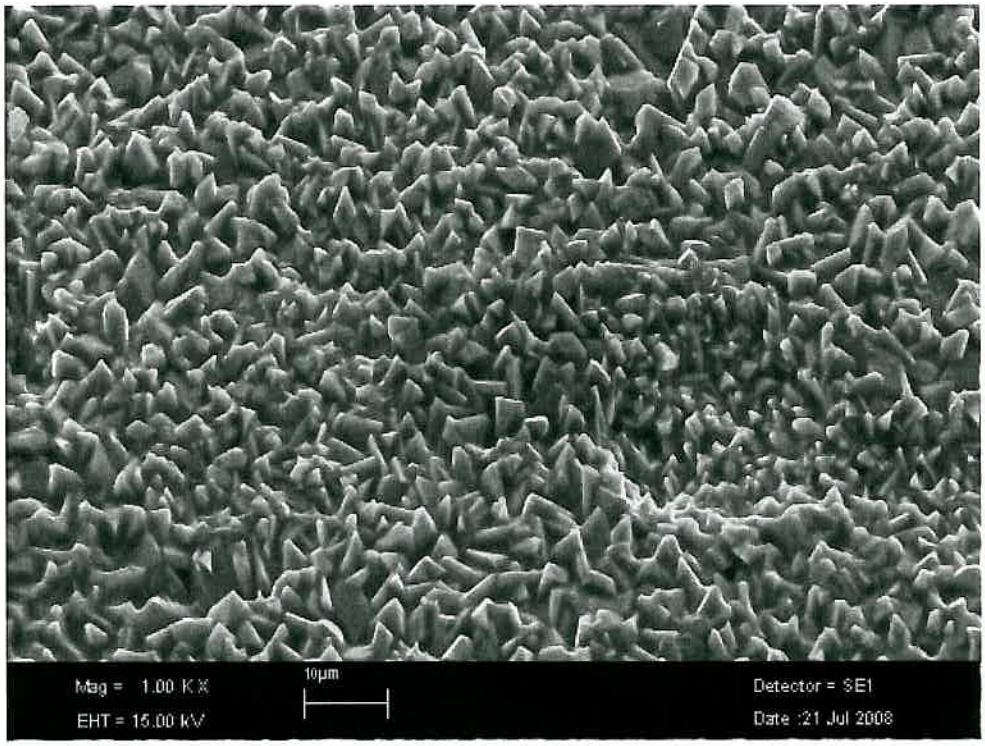
When necessary, the panel\part is sampled by punching, drilling or cutting to facilitate analysis. The area selected for removal from the panel\part is chosen to be representative of the part. The portion of the sample examined by SEM is again chosen to be representative of the overall coating. For further details regarding the RCC process, see 94560-270 in the Analytical Services section of the Quality Intranet site.

Henkel Corporation, Analytical Services
32100 Stephenson Highway, Madison Heights, Michigan 48071

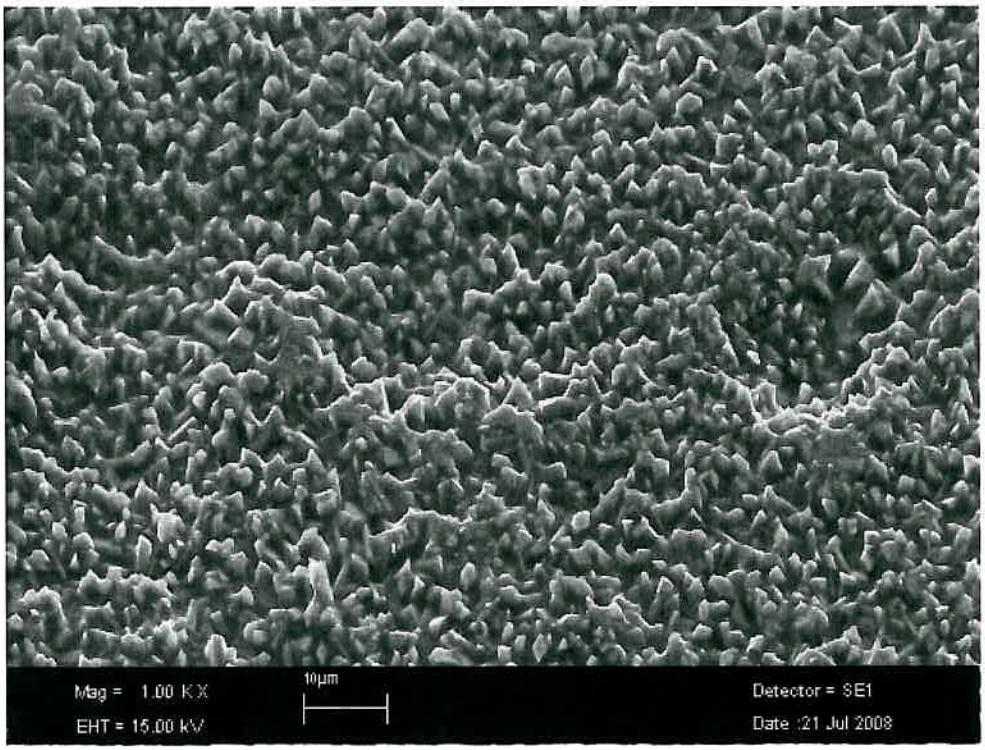
Phone 248-583-9300
FAX 248-583-2976

Custom Coating

Auburn IN



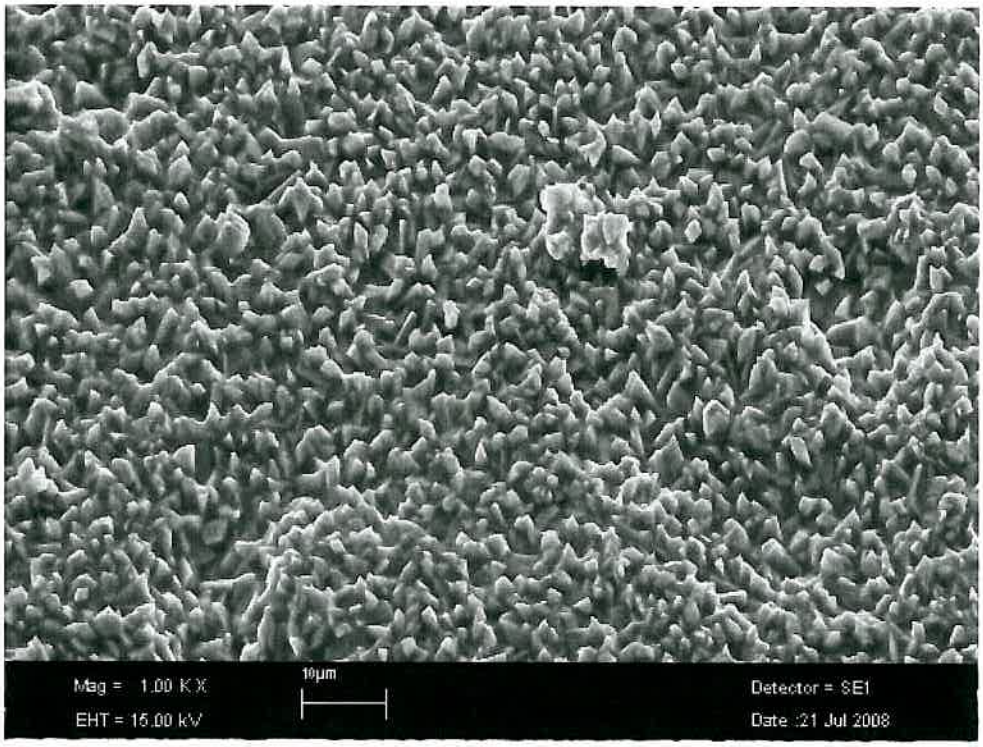
Sample Number: AL8-03868-1
Line Number: 1
Panel Number: 1
Production Date: 7-1-08
Process: PL2
Base Metal: Steel
Coating Weight: 763 mg/ft^2
Crystal Size: microns
P-Ratio:
Notes: 7:00AM



Sample Number: AL8-03868-2
Line Number: 1
Panel Number: 2
Production Date: 7-1-08
Process: PL2
Base Metal: Steel
Coating Weight: 851 mg/ft^2
Crystal Size: microns
P-Ratio:
Notes: 11:00AM

Custom Coating

Auburn IN



Sample Number: AL8-03868-3
Line Number: 1
Panel Number: 3
Production Date: 7-1-08
Process: PL2
Base Metal: Steel
Coating Weight: 822 mg/ft^2
Crystal Size: microns
P-Ratio:
Notes: 3:00PM

V1L500/P4T813 NON-LUBRITED MATRIX RESULTS

Testkey	Lab	STD	Run	Oil	VAL	Pinbat	DTCOMP	Pwear	Pridg	Pripp	Pspit	Rwear	Rridg	Rripp	Rspit	fpcrat	lpcrat	Mfg. Min B/Lash	KUSA	COM1
59315	A	4	215	127	MG	V1L500	20080628	7	8	7	8	7	9	9	9.9	0	2	0.008	4625	Broken Tooth
59293	B	191	2636	127	AG	V1L500	20080701	6	7	8	9.6	6	7	9	9.9	0	2	0.008	4593	
59290	D	3A	924	127	AG	V1L500	20080708	7	7	8	9.9	7	7	10	9.8	0	2	0.006	4930	
67290	B	191	2640	134	AG	V1L500	20080706	6	5	7	7	5	4	9	9.8	1	2	0.004	4692	
58911	A	4	214	155	AG	V1L500	20080628	7	9	9	9.6	8	10	9	9.9	0	2	0.008	4913	
61848	B	191	2637	155	AG	V1L500	20080702	7	9	9	9.6	8	10	10	9.9	0	2	0.008	5143	
58891	D	3A	923	155	MG	V1L500	20080706	7	8	9	2	7	9	8	2	0	2	0.008	4927	Broken Tooth
58892	D	3A	926	155	MG	V1L500	20080710	7	8	10	2	8	9	10	9.8	0	2	0.004	4933	Broken Tooth
63270	B	191	2642	153-1	MG	V1L500	20080708	6	4	8	2	5	4	9	9.8	1	2	0.007	5401	Broken Tooth
64181	A	4	219	153-1	AG	V1L500	20090709	6	7	7	9.8	7	9	10	9.9	0	2	0.006	4925	

Attachment 4
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Reference L-37
7/8/08