A Program of ASTM International

Test Monitoring Center

Carnegie Mellon University
6555 Penn Avenue, Pittsburgh, PA 15206, USA

http://astmtmc.cmu.edu
412-365-1000

MEMORANDUM: 11-025

DATE: June 9, 2011

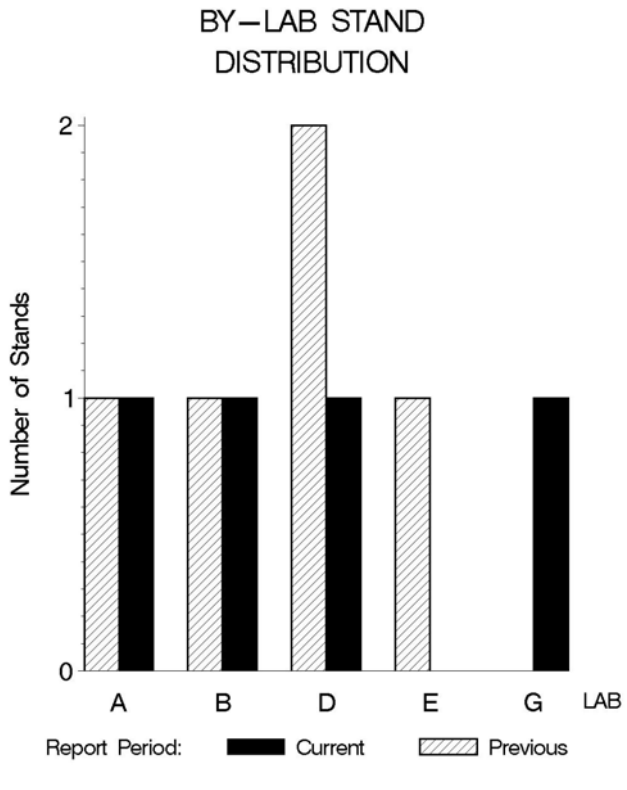
TO: Galen Greene, Chairman, L-37 Surveillance Panel

FROM: Scott Parke

SUBJECT: L-37 Testing from October 1, 2010 through March 31, 2011

A total of 19 L-37 tests were reported to the Test Monitoring Center during the period from October 1, 2010 through March 31, 2011. Following is a summary of testing activity this period.

	Reporting Data	Calibrated on 3-31-11
Number of Labs	4	3
Number of Stands	4	3

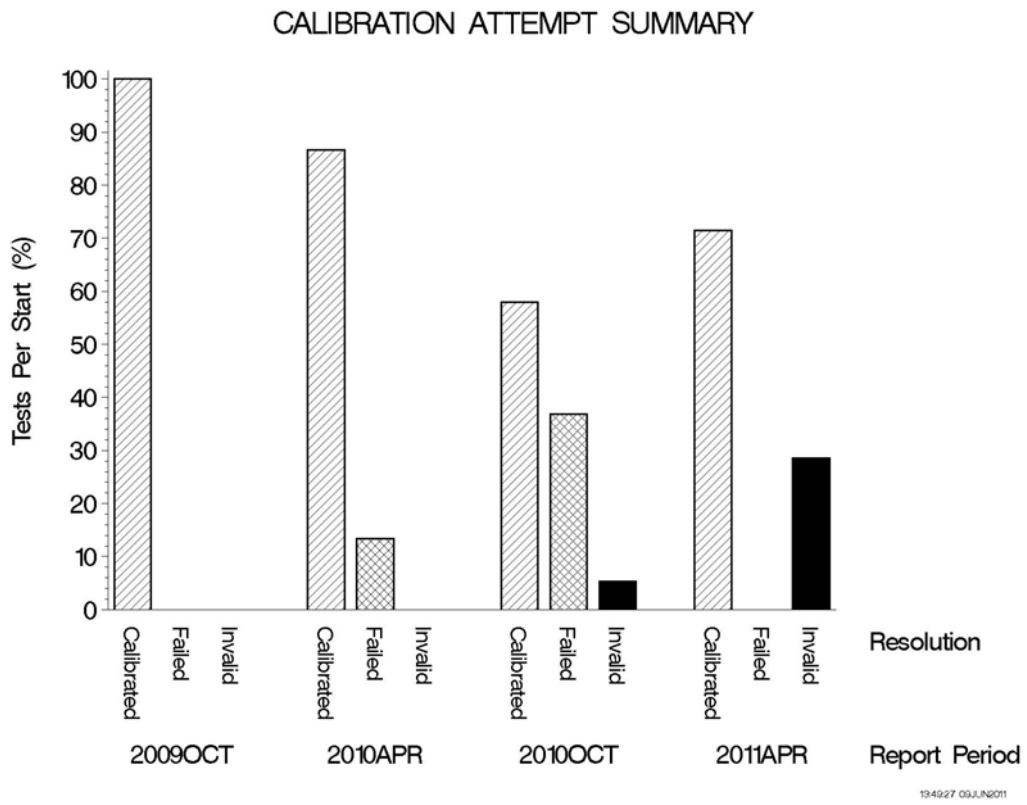


Test Distribution by Oil and Validity

		134	151-3	152-1	153-1	155	Totals Last Period	Totals This Period
Accepted for calibration	AC	0	0	1	0	4	11	5
Rejected (Mild)	OC	0	0	0	0	0	5	0
Rejected (Severe)	OC	0	0	0	0	0	0	0
Rejected (Precision)	OC	0	0	0	0	0	2	0
Invalidated	LC	0	0	1	1	0	1	2
Acceptable non-blind info run	NN	0	0	0	0	0	2	0
Unacceptable hardware approval	MI	0	0	1	0	0	0	1
Acceptable hardware approval run	NI	2	0	6	0	3	0	11
Total		2	0	9	1	7	21	19

Calibration Attempt Detail

	Gear Batch	Acceptable	Failed	Total
LUBRITED	none	0	0	0
	Total	0	0	0
NONLUBRITED	V1L500/P4T813	5	0	5
	Total	5	0	5


CALIBRATION ATTEMPT SUMMARY
Tests Per Start (%)
100
90
80
70
60
50
40
30
20
10
0
Calibrated
Failed
Invalid
Resolution
2009OCT
2010APR
2010OCT
2011APR
Report Period
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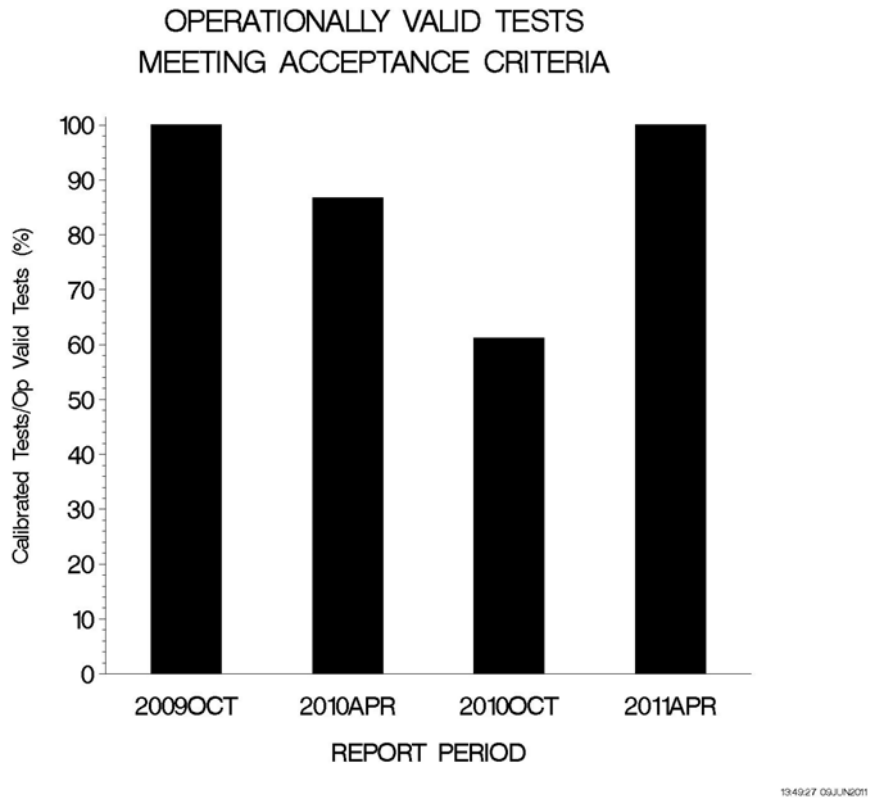

OPERATIONALLY VALID TESTS
MEETING ACCEPTANCE CRITERIA
Calibrated Tests/Op Valid Tests (%)
100
90
80
70
60
50
40
30
20
10
0
2009OCT
2010APR
2010OCT
2011APR
REPORT PERIOD
13:49:27 09JUN2011

CAUSES FOR LOST TESTS:

		Oil				Validity			Loss Rate		
		134	152-1	153-1	155	LC	RC	XC	Lost	Starts	%
Lab	LUBRITED								0	0	0%
	None								0	0	0%
Lab	NONLUBRITED								2	19	11%
B	Conditioning phase oil temp %out exceeded 5%.		●			●			2	8	25%
	Invalid hardware/oil combination.			●		●					
	Lost	0	1	1	0	1	0	0			
	Starts	2	9	1	7	19	19	19			
	%	0%	11%	100%	0%	5%	0%	0%			

GEAR BATCH SEVERITY:

The mean Δ/s by gear batch, overall mean Δ/s, and shift in merits for the operationally valid, non-lubrited calibration tests reported this period are tabulated below. No lubrited tests were completed this period due to an industry-wide shortage of lubrited hardware.

NON-LUBRITED HARDWARE						
Parameter	Gear Batch	N	Δ/s	s[A]	Overall Δ/s	Overall Shift (in Merits)[B]
Ridging	V1L500/P4T813	5	0.409	1.044	0.409	0.272
Rippling	V1L500/P4T813	5	0.128	0.977	0.128	0.071
Spall/Pit	V1L500/P4T813	5	0.199	0.327	0.199	0.168
Wear	V1L500/P4T813	5	0.003	1.092	0.003	0.002

[A] Because the number of tests completed this period was too small to compute a representative pooled standard deviation, the straight standard deviation is shown.

[B] As computed using SA standard deviation as published in the LTMS document.

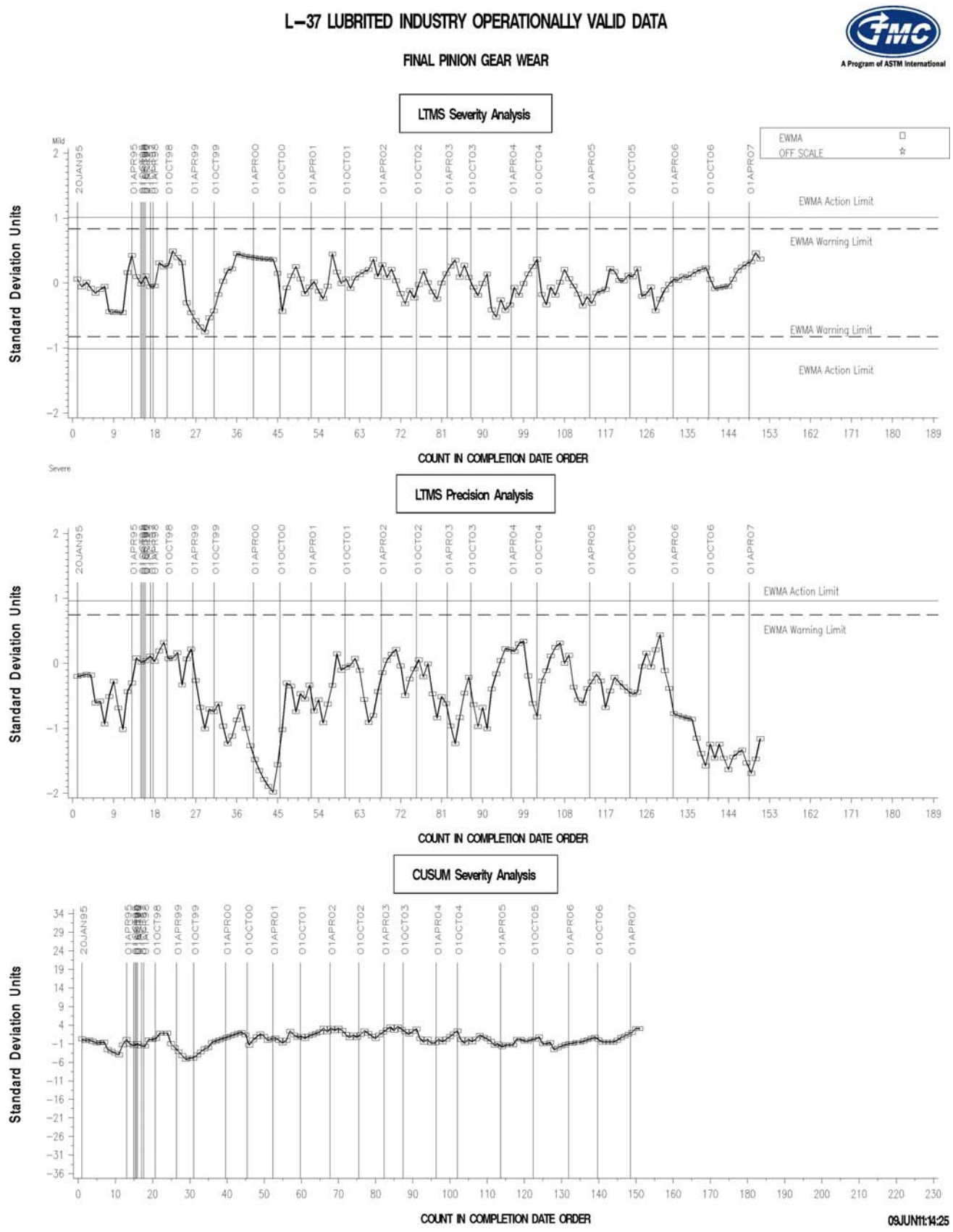
LAB SEVERITY:

Hardware	Gear Batch	Lab	N	Ridging	Rippling	Spall/Pit	Wear
Non-lubrited	V1L500/P4T813	A	1	-0.734	-0.935	-0.284	-0.734
		B	3	1.171	0.836	0.284	-0.150
		D	1	-0.734	-0.935	0.426	1.197

INDUSTRY CONTROL CHARTS:

The industry control charts begin on the following page. Effective November 1, 2010, the L37 Surveillance Panel discontinued the use of transformations for all test parameters. The charts included in this report reflect this change.

Both precision and severity performance for all parameters on both lubrited and non-lubrited hardware are currently performing within control chart alarm limits.


L–37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA
FINAL PINION GEAR WEAR
A Program of ASTM International
LTMS Severity Analysis
Mild
Severe
Standard Deviation Units
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
20JAN95
01APR95
01OCT98
01APR99
01OCT99
01APR00
01OCT00
01APR01
01OCT01
01APR02
01OCT02
01APR03
01OCT03
01APR04
01OCT04
01APR05
01OCT05
01APR06
01OCT06
01APR07
COUNT IN COMPLETION DATE ORDER
LTMS Precision Analysis
Standard Deviation Units
EWMA Action Limit
EWMA Warning Limit
COUNT IN COMPLETION DATE ORDER
CUSUM Severity Analysis
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
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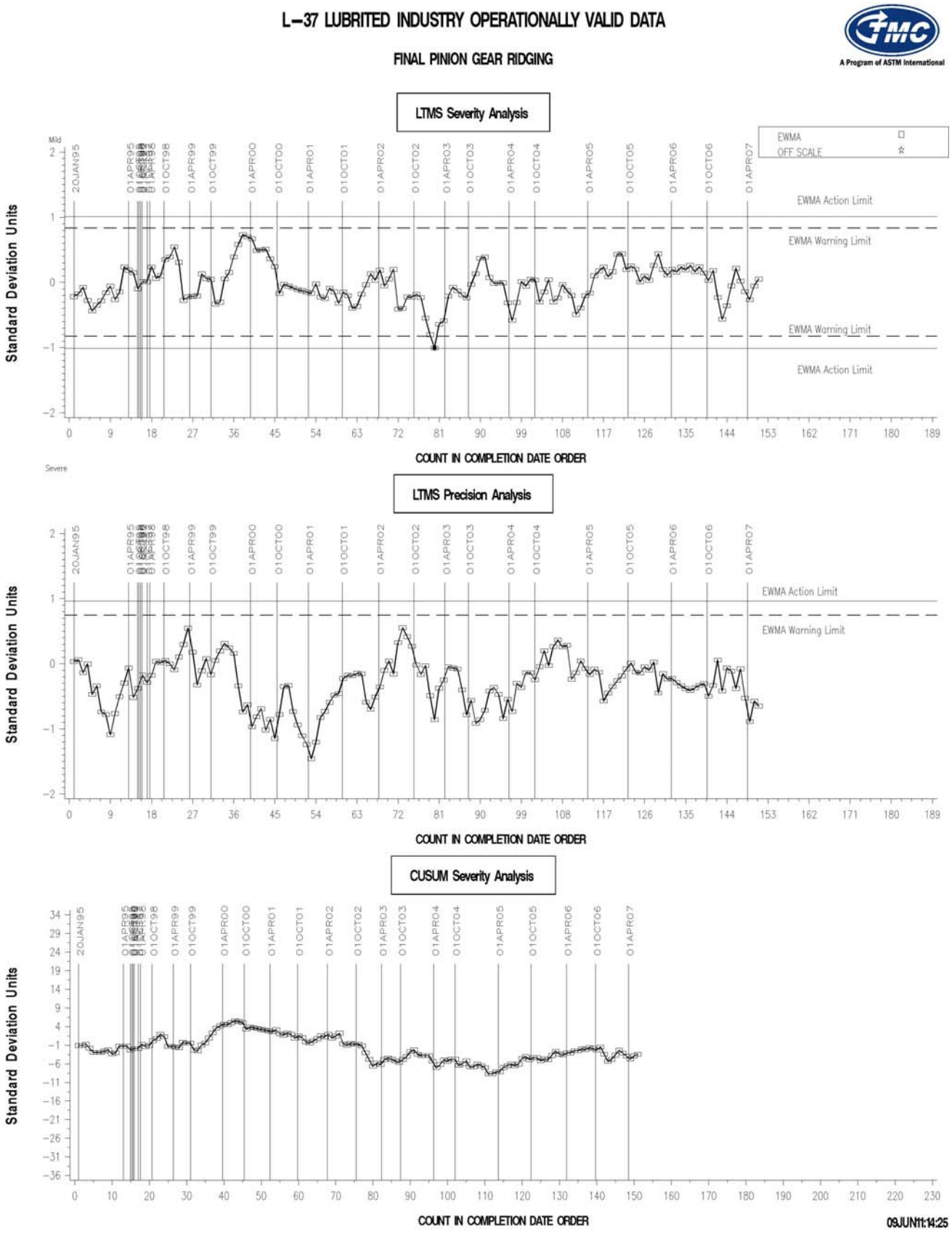
L–37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA
FINAL PINION GEAR RIDGING
A Program of ASTM International
LTMS Severity Analysis
Mild
Severe
Standard Deviation Units
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
20JAN95
01APR95
01OCT98
01APR99
01OCT99
01APR00
01OCT00
01APR01
01OCT01
01APR02
01OCT02
01APR03
01OCT03
01APR04
01OCT04
01APR05
01OCT05
01APR06
01OCT06
01APR07
COUNT IN COMPLETION DATE ORDER
LTMS Precision Analysis
EWMA Action Limit
EWMA Warning Limit
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CUSUM Severity Analysis
Standard Deviation Units
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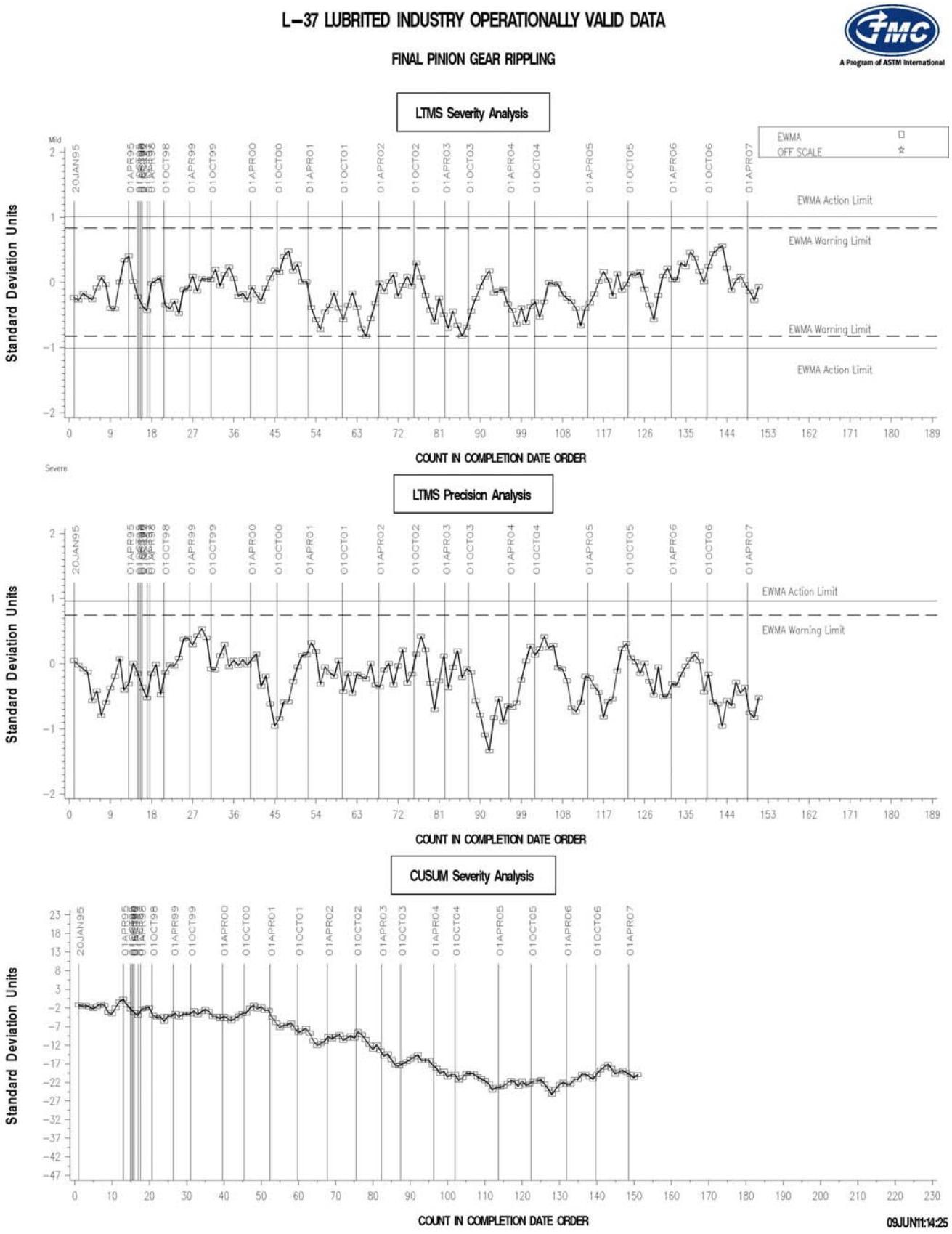
L–37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA
FINAL PINION GEAR RIPPLING
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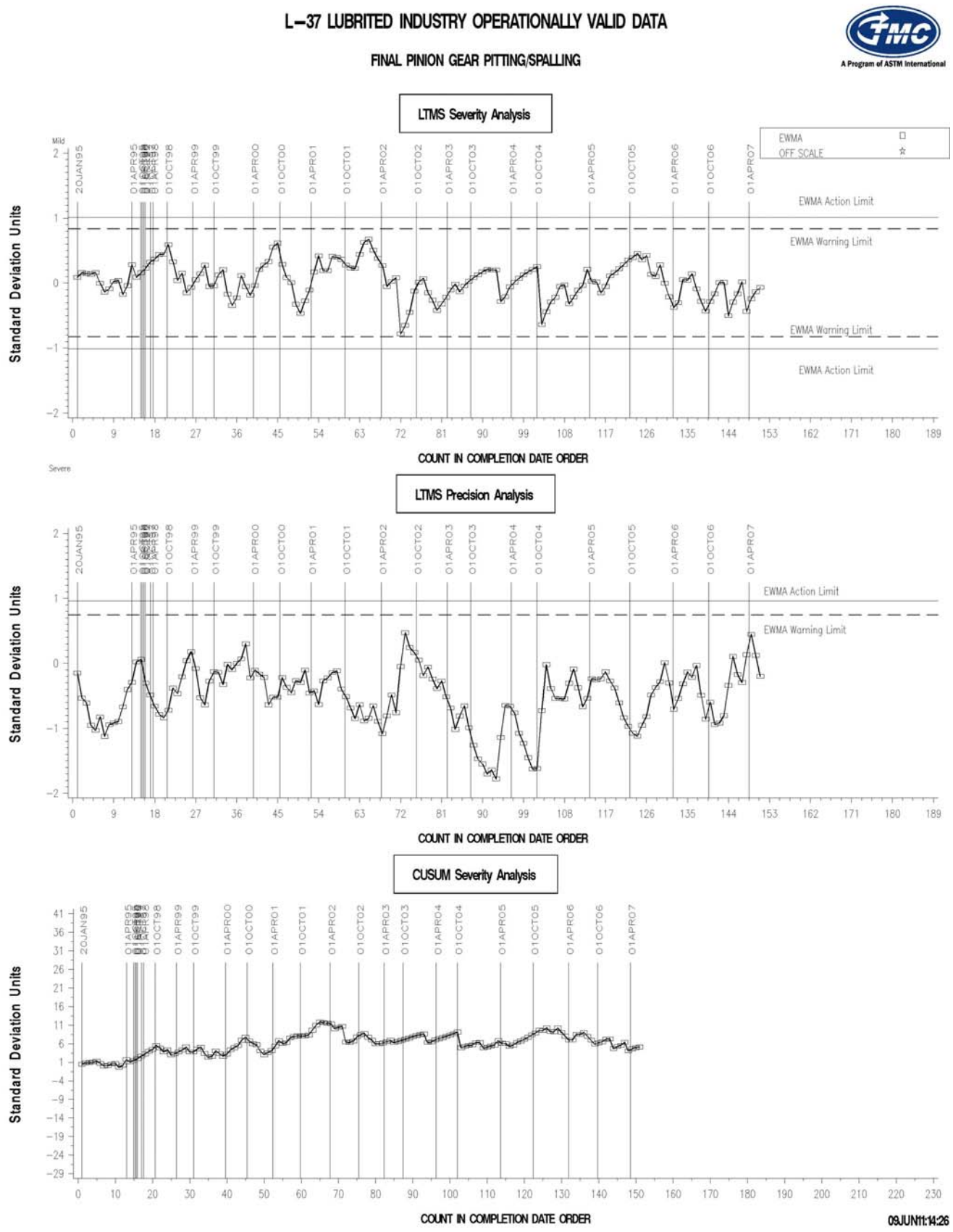
L–37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA
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01OCT98
01APR99
01OCT99
01APR00
01OCT00
01APR01
01OCT01
01APR02
01OCT02
01APR03
01OCT03
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01OCT04
01APR05
01OCT05
01APR06
01OCT06
01APR07
COUNT IN COMPLETION DATE ORDER
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EWMA Warning Limit
COUNT IN COMPLETION DATE ORDER
CUSUM Severity Analysis
COUNT IN COMPLETION DATE ORDER
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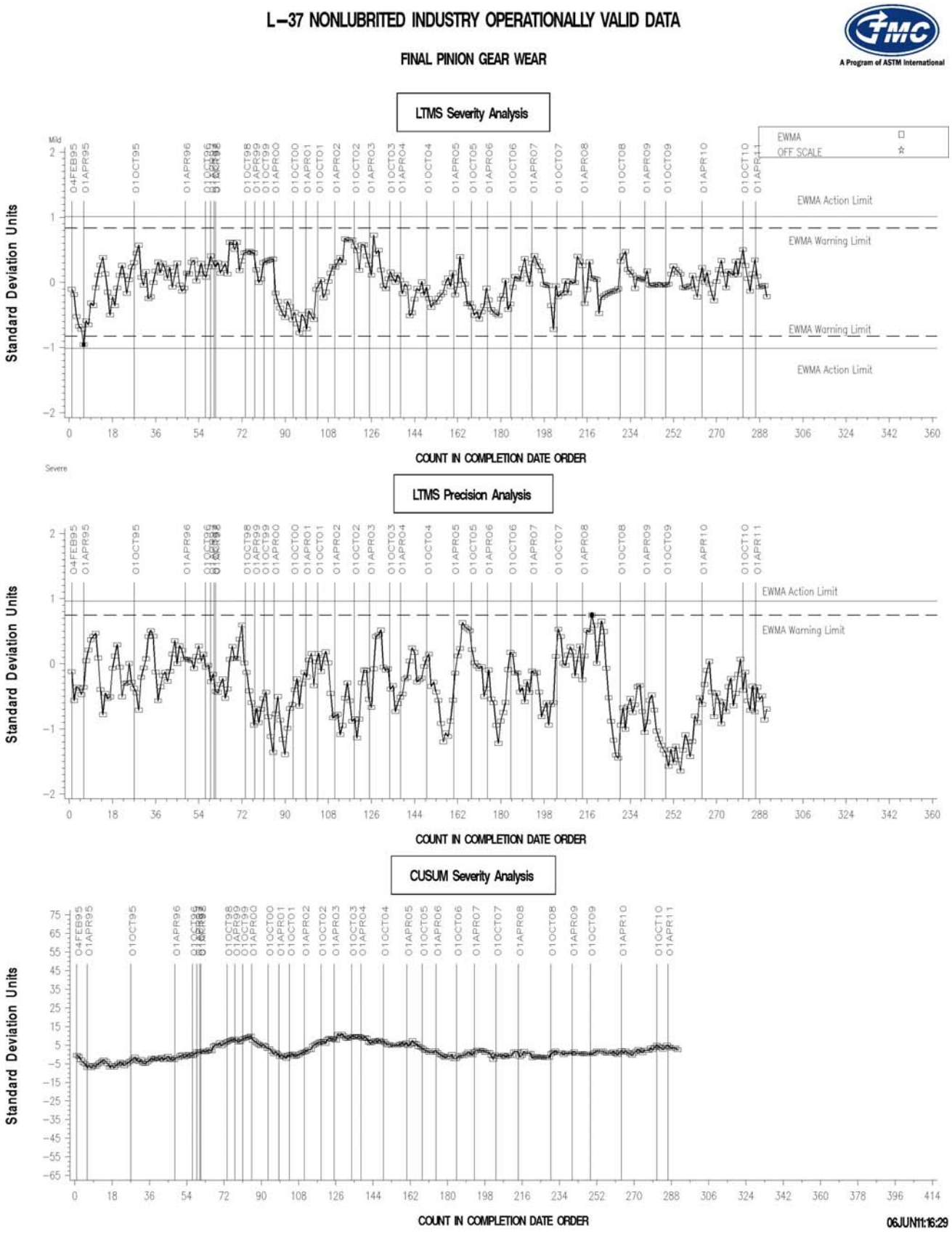
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EWMA Warning Limit
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CUSUM Severity Analysis
COUNT IN COMPLETION DATE ORDER
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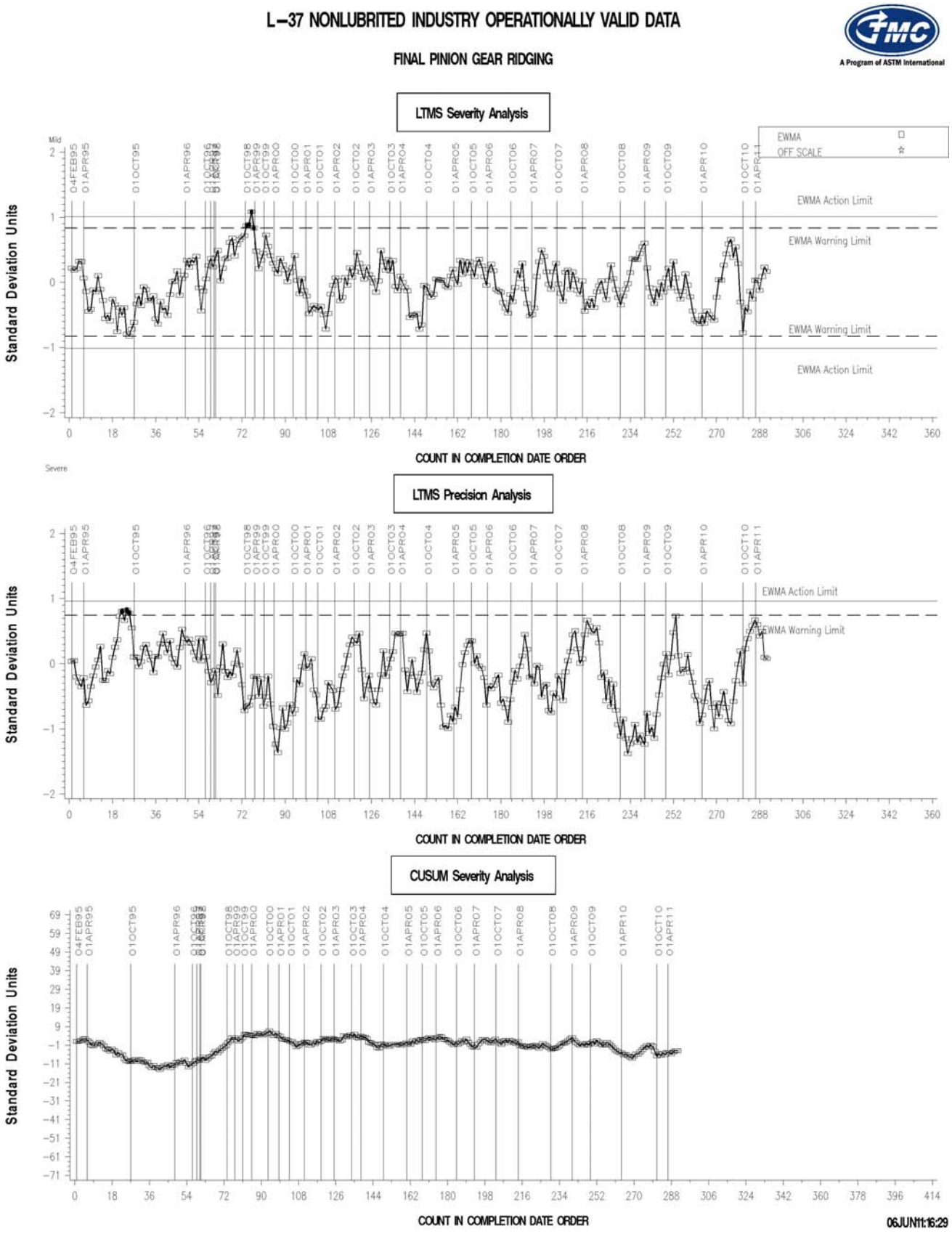
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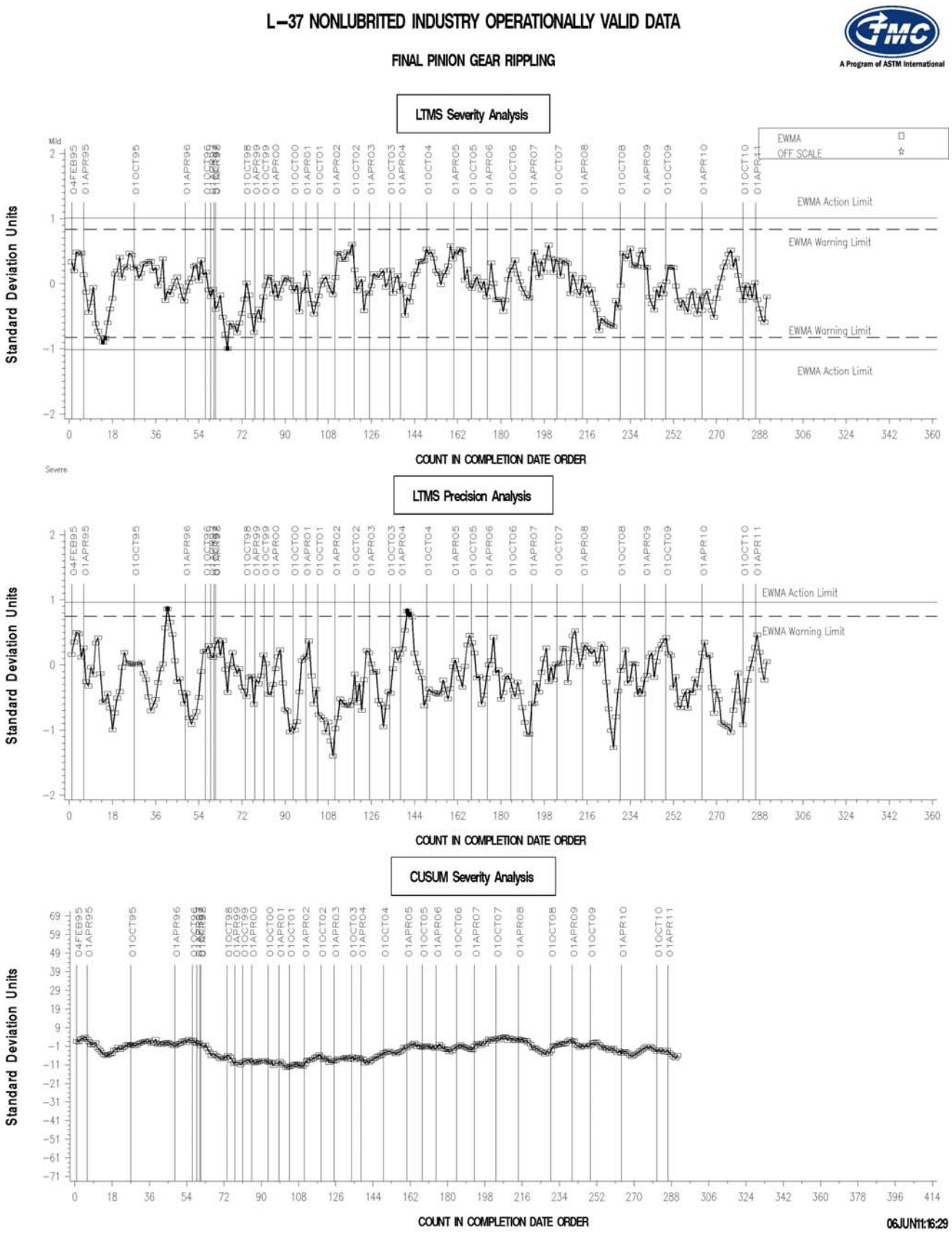
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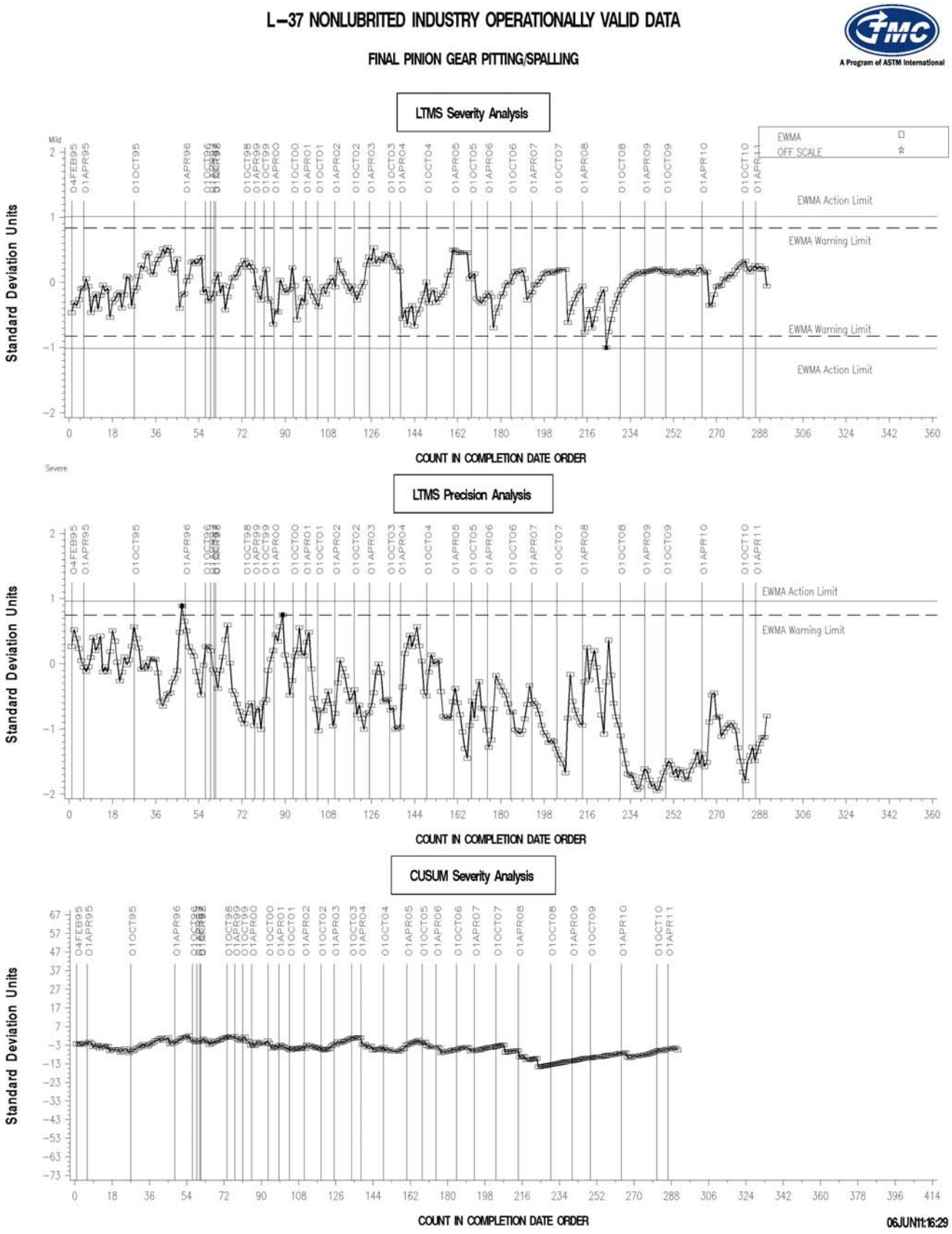
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06JUN11:16:29

TIMELINE OF SIGNIFICANT EVENTS IN THE L-37 TEST:

Effective Date	Information Letter	Event
19931221	1	Report Forms and Dictionary Version 19931209
19940104	2	Rear Cover Plate Sensor Loc.
19940104	2	Data Reporting Response Time
19940317	3	Referencing Schedule
19940428	4	Report Forms and Dictionary Version 19940422
19940728	5	Report Forms and Dictionary Version 19940707
19950820	6	Rating Scale Revision
19950820	6	Report Form 5 Wording Change
19950820	6	Report Forms and Dictionary Version 19950424
19960116	96-2	TMC Address
19960309	96-1	Rating Revisions
19960317	96-4	Revised rating procedure for non-lubrited gear set C1L426/P4L415A
19960325	96-2	Rating Revisions
19960603	96-3	Report Forms and Dictionary Version 19960425
19960603	96-3	Revised Wording of Rating Scale
19970721	97-1	Revised Calibration Schedule and Calibration Requirements
19971014		Reference Test Targets Approved for Non-Lubrited Pinion Batches C1l308 & C1L426
19980309	98-1	Updated Report Forms & Data Dictionary Version 19971223
19980309	98-1	Revised alternate rating method for drive side pinion gear pitting values on gear set C1L426/P4L415A
19980309	98-1	Test Reporting Clarifications
19980309	98-2	Revisions to stand calibration requirements
19980309	98-2	Restrictions on Reference Oil Analysis
19980309	98-2	Reporting of non-standard tests to the TMC
19980310		Start of LTMS
19980310	98-3	Report Forms and Data Dictionary Version 19980203
19980310	98-4	Deviation Percentage Calculation Clarification
19980603	98-4	Combining of Pitting and Spalling Ratings
19981116	98-5	Numerical Rating Precision Clarification
19990101		Developed Reference Oil Test Targets by Gear Batch (Grandfathered for all tests starting 19950101)
19990113	99-1	Addition of exclusion zone for determining the pitt/spall result on non-lubrited gear batch V1L303/P3L514A
19990113	99-1	Deletion of Section A8.3.5
19990503		Updated ref oil 128-1 targets (18 tests), gear batch V1L303/P4L514A (Grandfathered all tests starting 19950101)
19990510	99-2	Revisions to precision and bias statement
19990728	99-3	Cover plate thremocouple location
20000613	00-1	Root/Tip Line Polishing Comment for V1L686/P4L626A Non-lubrited Gears
20001101	00-2	CRC Reference Photography of Gear Distress Photographs
20001115	01-1	Pinion Correction Factor for V1L686/P4L626A Lubrited Gears
20010612	01-2	Ring Correction Factor V1L686/P4L626A Lubrited Gears
20011101	01-2	Addition of Annex 12 Addressing Distress Rating Exclusion Comments
20011101	01-2	Revised Report Forms
20020101	02-1	CRC Rating Manual 21
20020211	02-1	Remove Report Forms and Data Dictionary from Standard

Effective Date	Information Letter	Event
20020211	02-2	Rating with magnification Change
20021125		Gear Batch V1L176/P4L741A approval
20030327	03-2	Revised Wear Rating Definitions
20030401	03-1	Rater Calibration Monitoring System
20030421	03-3	Deletion of catastrophic ditress levels for wear, rippling, and ridging
20030421	03-3	Non-interpretable tests
20030421	03-3	Tooth breakage
20030421	03-3	Rating corrosion on ring and pinion
20030909	03-4	Addition of SAE J2360 As a Reference Document
20030909	03-4	Revised Speed Specification for Balancing Dynamometer Connecting Shafts
20030909	03-4	Revised Speed Specification for Balancing Drive Shafts
20030909	03-4	Revised Test Axle Preparation
20030909	03-4	Revised Note 1
20030909	03-4	Discontinue Optional Inspection of Gear Set
20030909	03-4	Shutdown and Downtime Revisions
20030909	03-4	Recording Test Parameters
20030909	03-4	New Note 2 for Gear Test Phase Conditions
20040101	03-4	Revised Cleaning Solvent Specification
20040630	04-1	Standardization Revisions
20040825	04-1	Lubrited Hardware, Gear Batch V1L686/P4L626A Correction Factor
20040917	04-1	Intermediate Precision and Reproducibility Revisions
20040922	04-2	Drive Shaft Wall Thickness
20040922	04-2	Alternating Lubrited and Non-lubrited Hardware
20041115	04-3	Revised Drive Shaft and Axle Shaft Specifications
20041115	04-3	Revised Drawing for the Spray Nozzles Location
20050204		Non-lubrited Hardware, Gear Batch V1L351/P4T771 Approval
20050218	05-1	Revise Solvent Specification
20050218	05-1	Donated Reference Oil Test Programs/Calibration Period Length Adjustment
20050504	05-2	Updated Test Precision
20050504	05-2	Rounding Test Results Using ASTM E 29
20060208	06-1	Correction Factor for L247/T758A Lubrited Gear Batch (Canadian Tests Only)
20070627	07-1	Revised Calibration Requirement
20071213	07-2	Revised Backlash Measurement Procedure
20090228	09-1	Revisions to Preparation of Apparatus Procedure
20090228	09-1	Revision to Percent Deviation Calculation
20090228	09-1	Chipping Definition
20101101		End of transformations for ridging, rippling, and spitting
20110430	11-1	New gear rating photo introduction
20110413	11-2	Revised instrument calibration frequency and clarified wording for load during warmup following unscheduled shutdown

TMC LAB VISITS

Two L37 lab visits were conducted during this report period. No significant procedural deviations were noted during either visit.

INFORMATION LETTERS:

Information Letter 11-1 was issued during this report period to require use of the new printing of gear rating photographs.

STATUS OF REFERENCE OIL SUPPLY:

At the end of this report period, the testing oil supply stood as outlined in the table below:

		@ TMC	
Oil	Cans @ Labs	Cans	Gallons
127	2	1	1.0
134	11	126	126.0
151-2	6	8	8.8
151-3	3	0	0.0
152-1	10	58	58.0
153-1	39	57	58.0
155	13	135	136.0
155-1	0	495	495.0
Total	84	880	882.7

The TMC quantity remaining presumes usage only for L-37 testing. Oils 151-2 and -3 and 155 are also used in other test areas. In 2005, the now nearly-depleted 151-3 was replaced by 155 which is itself nearing depletion. TMC has recently acquired a reblend of oil 155 which is ready for introduction. The Surveillance Panel has not yet devised a scheme for introducing 155-1. The supply of 152-1 is also running low. TMC is in the process of acquiring two drums of a reblend. Adequate quantities of all other oils are on hand.

SDP/sdp/astm0411.doc/mem11-025.sdp.doc
cc: Frank Farber
Jeff Clark
ftp://ftp.astmtmc.cmu.edu/docs/gear/l37/semiannualreports/l37-04-2011.pdf

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