



Test Monitoring Center

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

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

MEMORANDUM: 18-004
DATE: April 26, 2018
TO: Wes Venhoff, Chairman, L-37 Surveillance Panel
FROM: Dylan Beck *Dylan Beck*
SUBJECT: L-37 Testing from October 1, 2017 through March 31, 2018

Attached is a summary of reference oil testing activity this period.

DJB/djb/mem18-004.djb.doc

cc: Frank Farber
Jeff Clark
Scott Parke

L-37 Surveillance Panel

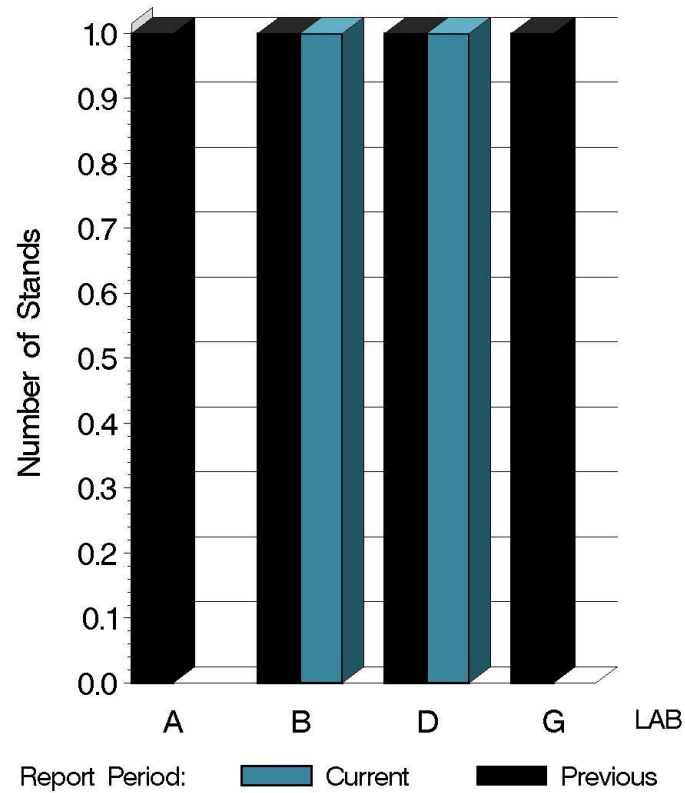
<http://www.astmtmc.cmu.edu/ftp/docs/gear/137/semiannualreports/137-04-2018.pdf>

Distribution: email

L-37 (D6121)

	Reporting Data	Calibrated on 3-31-18
Number of Labs	2	2
Number of Stands	2	2

BY-LAB STAND
DISTRIBUTION



10:34:18 04APR2018

L-37 (D6121)

Test Distribution by Oil and Validity

							Totals	
		134	134-1	152-2	155	155-1	Last Period	This Period
Accepted for calibration	AC	0	0	0	0	3	5	3
Rejected (Mild)	OC	0	0	0	0	0	0	0
Rejected (Severe)	OC	0	0	5	0	0	2	5
Rejected (Precision)	OC	0	0	0	0	0	0	0
Operationally invalid	LC	0	0	1	0	0	0	1
Aborted run	XC	0	0	1	0	0	0	1
Acceptable info run	NI	0	0	0	0	0	2	0
Aborted info run	XI	0	0	0	0	0	0	0
Total		0	0	7	0	3	9	10

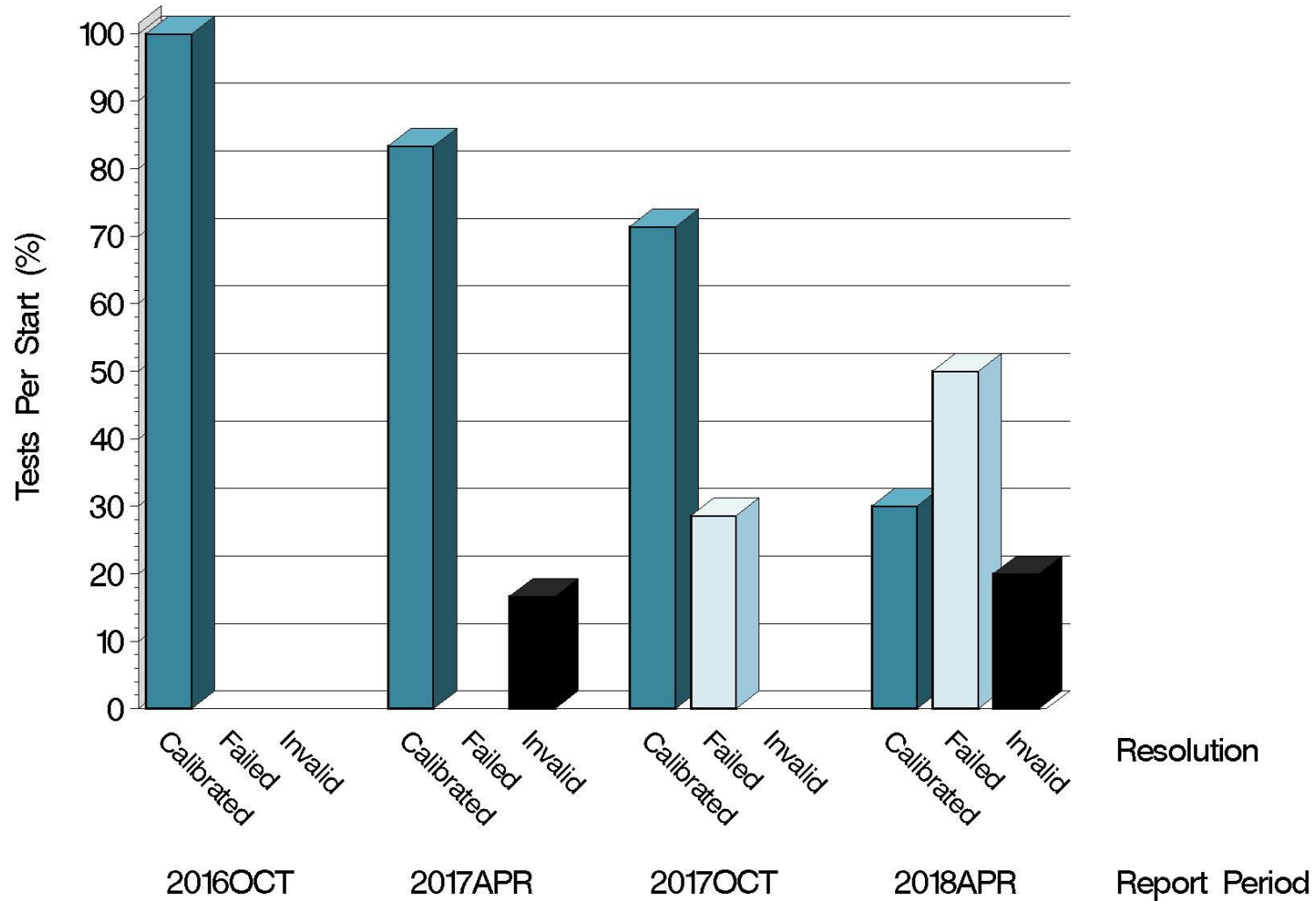
L-37 (D6121)

Calibration Attempt Detail

	Gear Batch	Acceptable	Failed	Total
LUBRITED	V1L500/P4T813	0	0	0
	V1L528/P4T883A	1	5	6
	Total	1	5	6
NONLUBRITED	V1L500/P4T813	0	0	0
	V1L528/P4T883A	2	0	2
	Total	2	0	2

L-37 (D6121)

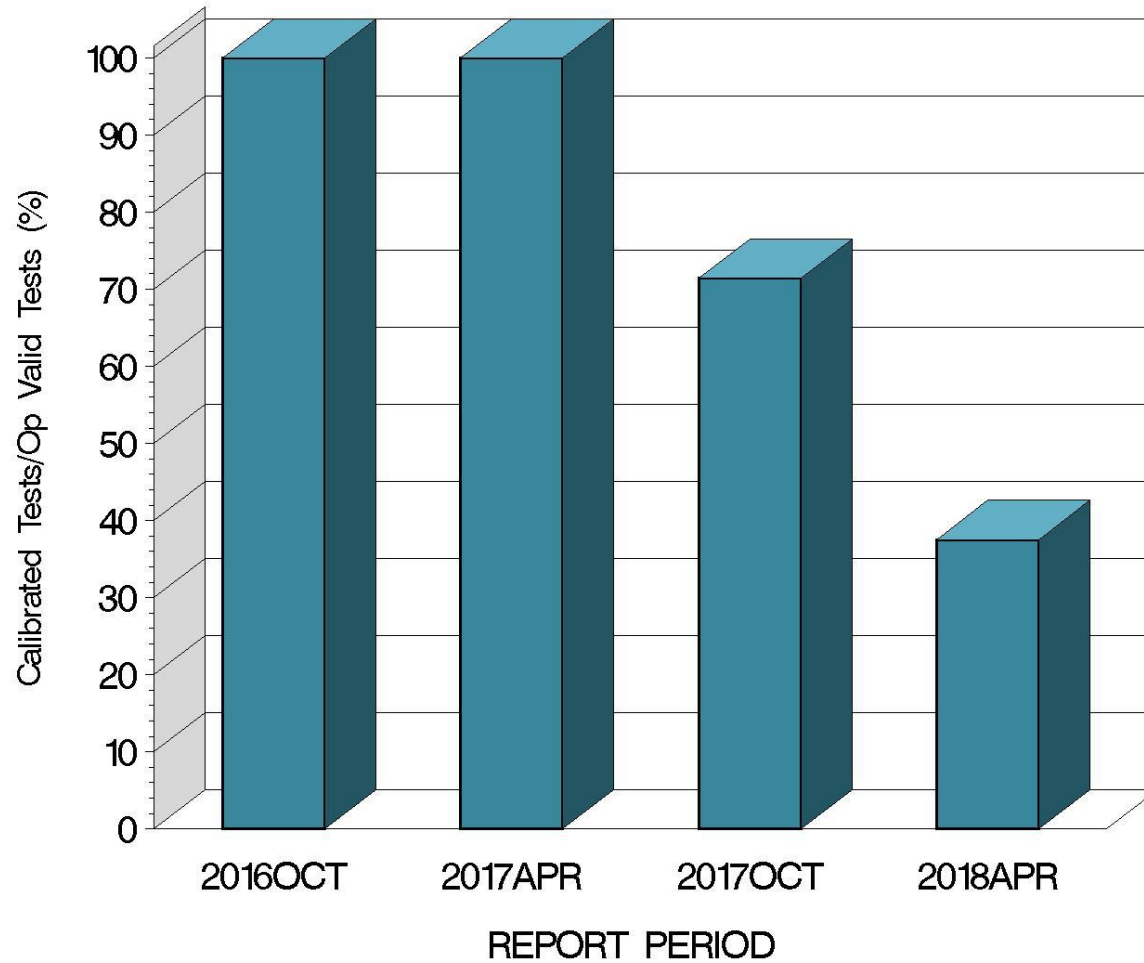
CALIBRATION ATTEMPT SUMMARY



10:34:18 04APR2018

L-37 (D6121)

OPERATIONALLY VALID TESTS
MEETING ACCEPTANCE CRITERIA



10:34:18 04APR2018

L-37 (D6121)

CAUSES FOR LOST TESTS

		Oil					Validity			Loss Rate		
Lab	Cause	134	134-1	152-2	155	155-1	XC	LC	XI	Lost	Starts	%
D	Water in axle			●			●			1	3	33%
B	Shim fail			●				●		1	7	14%
	Lost	0	0	2	0	0	1	1	0			
	Starts	0	0	7	0	3	10	10	10			
	%	0%	0%	29%	0%	0%	10%	10%	0%			

L-37 (D6121)

GEAR BATCH SEVERITY

LUBRITED HARDWARE						
Parameter	Gear Batch	N	Δ/s	s^A	Overall Δ/s	Overall Shift (in Merits) ^B
RIDG	V1L528/P4T883A	6	-2.658	3.532	-2.658	-3.802
RIPP	V1L528/P4T883A	6	-0.462	1.130	-0.462	-0.220
SPIT	V1L528/P4T883A	6	-53.252	48.379	-53.252	-30.833
WEAR	V1L528/P4T883A	6	-3.823	2.721	-3.823	-1.984

^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 published in the LTMS document.

L-37 (D6121)

GEAR BATCH SEVERITY (continued)

NON-LUBRITED HARDWARE						
Parameter	Gear Batch	N	Δ/s	s^A	Overall Δ/s	Overall Shift (in Merits) ^B
RIDG	V1L528/P4T883A	2	-0.068	0.802	-0.068	-0.045
RIPP	V1L528/P4T883A	2	-0.434	1.395	-0.434	-0.242
SPIT	V1L528/P4T883A	2	0.444	0.359	0.444	0.376
WEAR	V1L528/P4T883A	2	0.499	0.000	0.499	0.356

^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 published in the LTMS document.

L-37 (D6121)

LAB SEVERITY

LUBRITED HARDWARE AVERAGE Δ/s						
Gear Batch	Lab	N	RIDG	RIPP	SPIT	WEAR
V1L528/P4T883A	B	5	-3.481	-0.305	-63.902	-4.132
	D	1	1.455	-1.246	0.000	-2.275

NON-LUBRITED HARDWARE AVERAGE Δ/s						
Gear Batch	Lab	N	RIDG	RIPP	SPIT	WEAR
V1L528/P4T883A	B	1	0.499	0.552	0.697	0.499
	D	1	-0.635	-1.420	0.190	0.499

L-37 (D6121)

SUMMARY OF SEVERITY & PRECISION

Severity

Nonlubrited – RIDG is currently exceeding the action limit due to several severe 152-2 tests (from the same lab). SPIT and WEAR exceeded the action limit last period but have return in line this period.

Lubrited – WEAR, RIDG, and SPIT are all currently exceeding the action limit for severity. All have had 152-2 tests reporting very severe values during this period.

L-37 (D6121)

SUMMARY OF SEVERITY & PRECISION (cont.)

Precision

Nonlubrited – RIDG & SPIT both exceeded the action limit for precision last period, but have return in line this period.

Lubrited – WEAR, RIDG, and SPIT are all currently exceeding the action limit for precision. A series of recent severe 152-2 tests (from the same lab) is the cause of this.

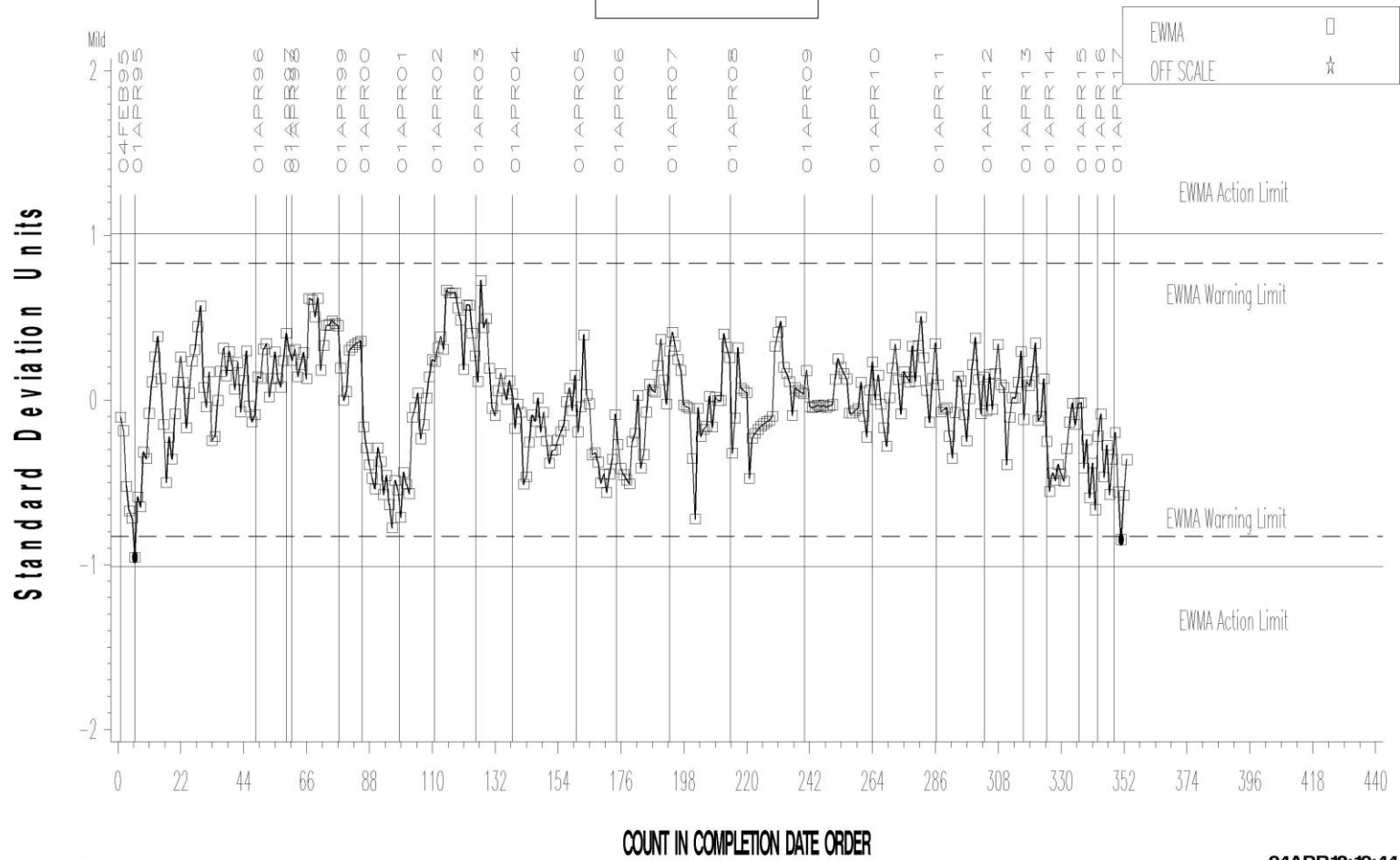
Industry control charts follow.

L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

LTMS Severity Analysis

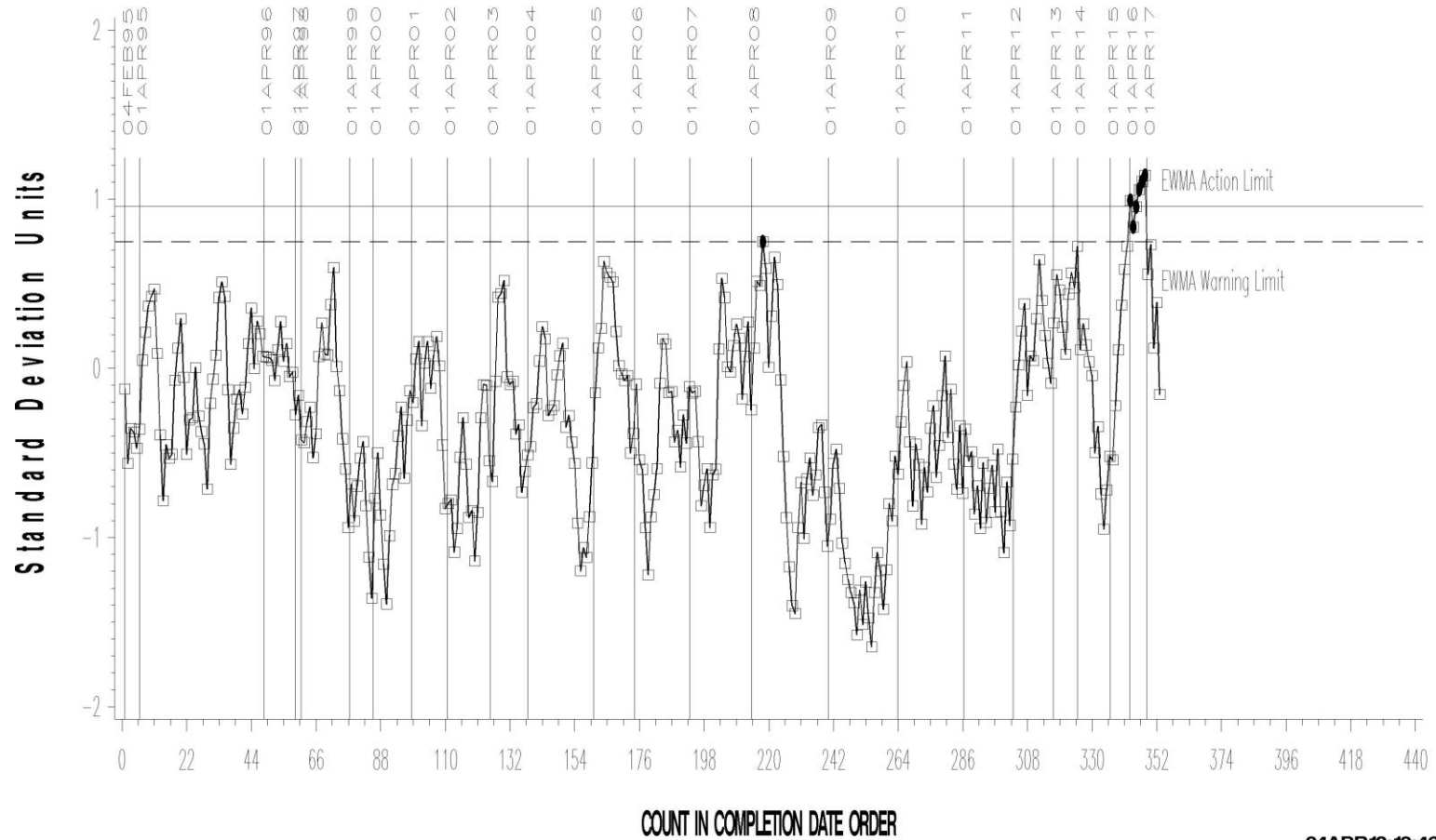


L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

LTMS Precision Analysis



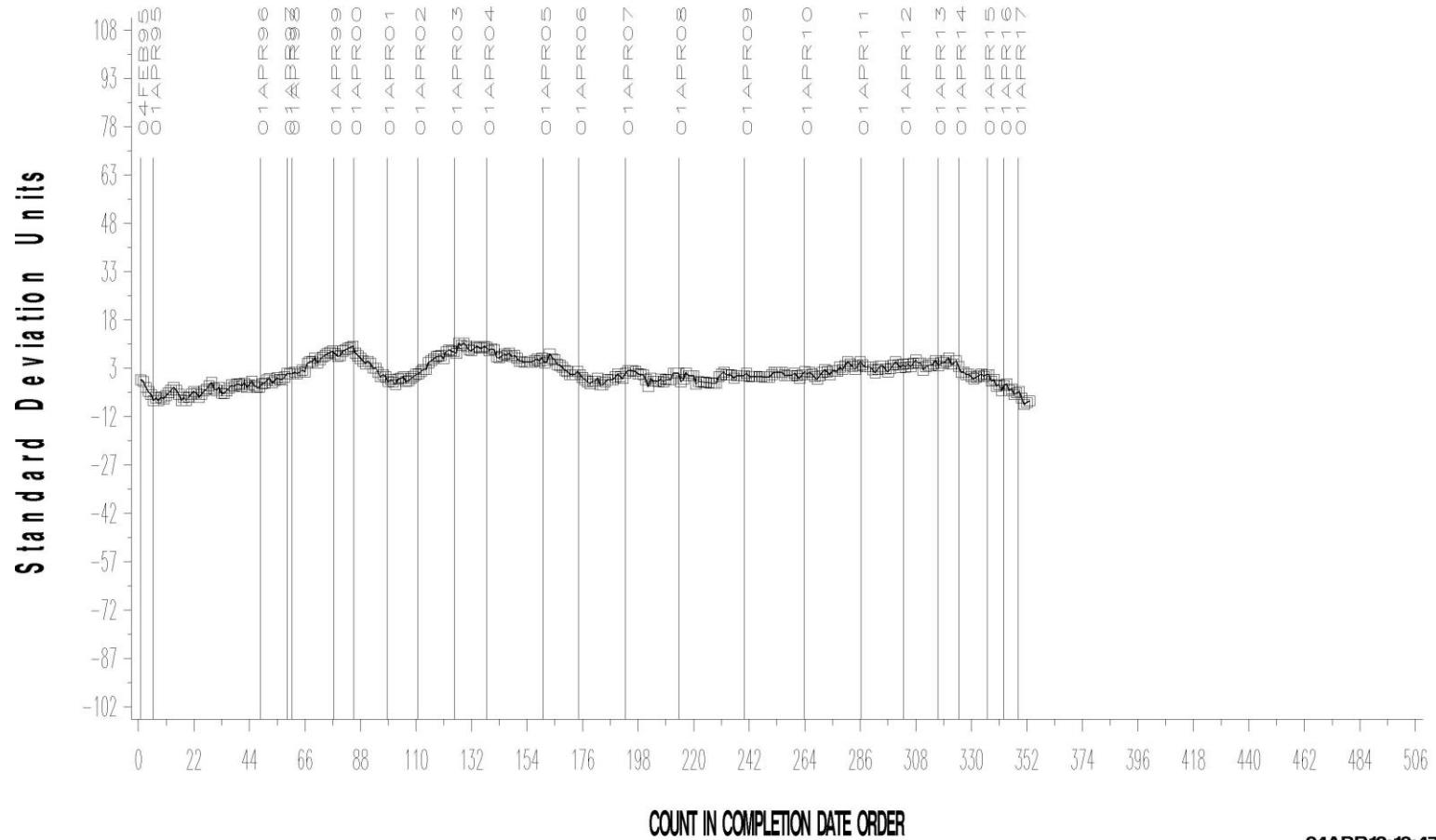
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L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

CUSUM Severity Analysis



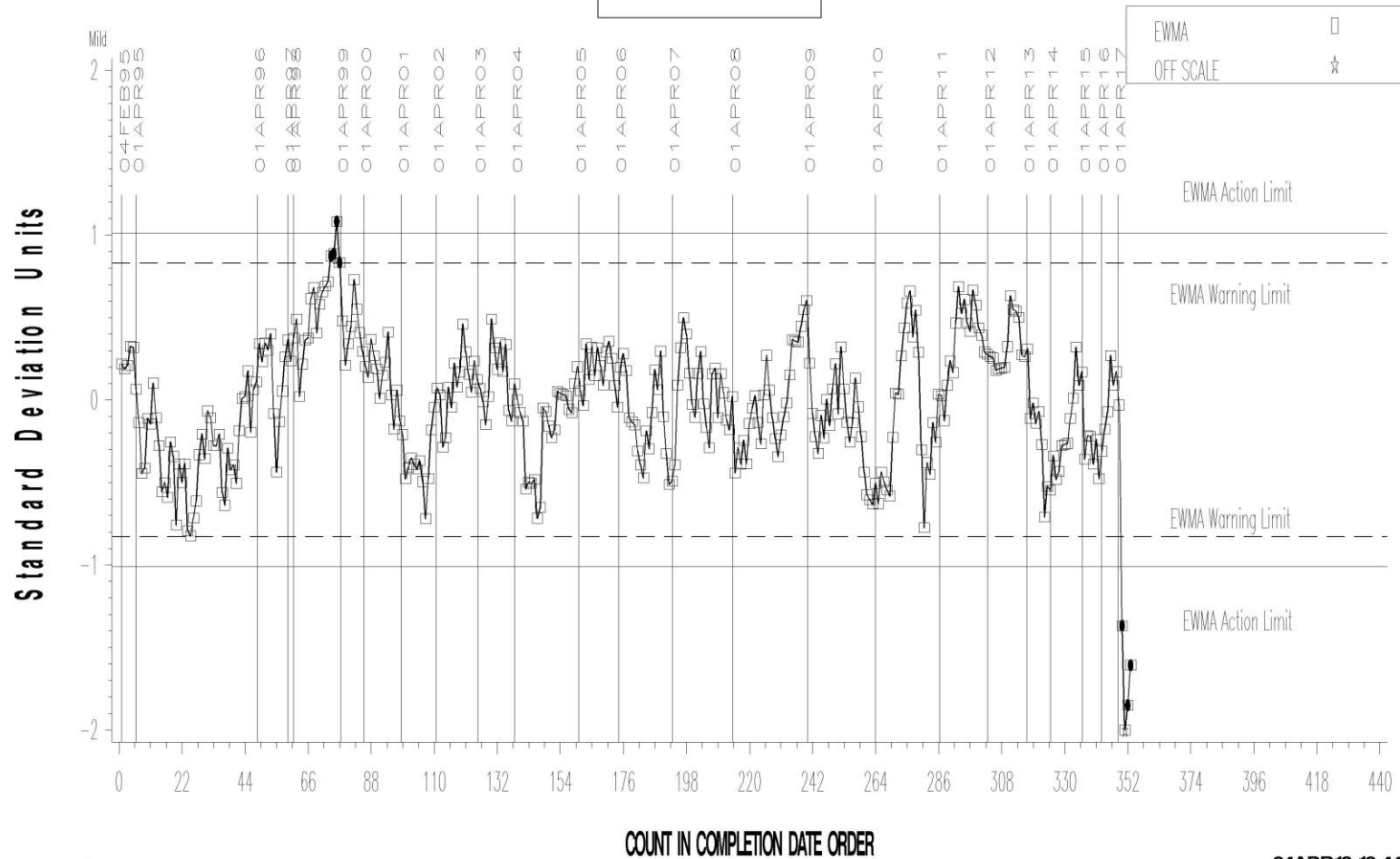
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L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING

LTMS Severity Analysis



Severe

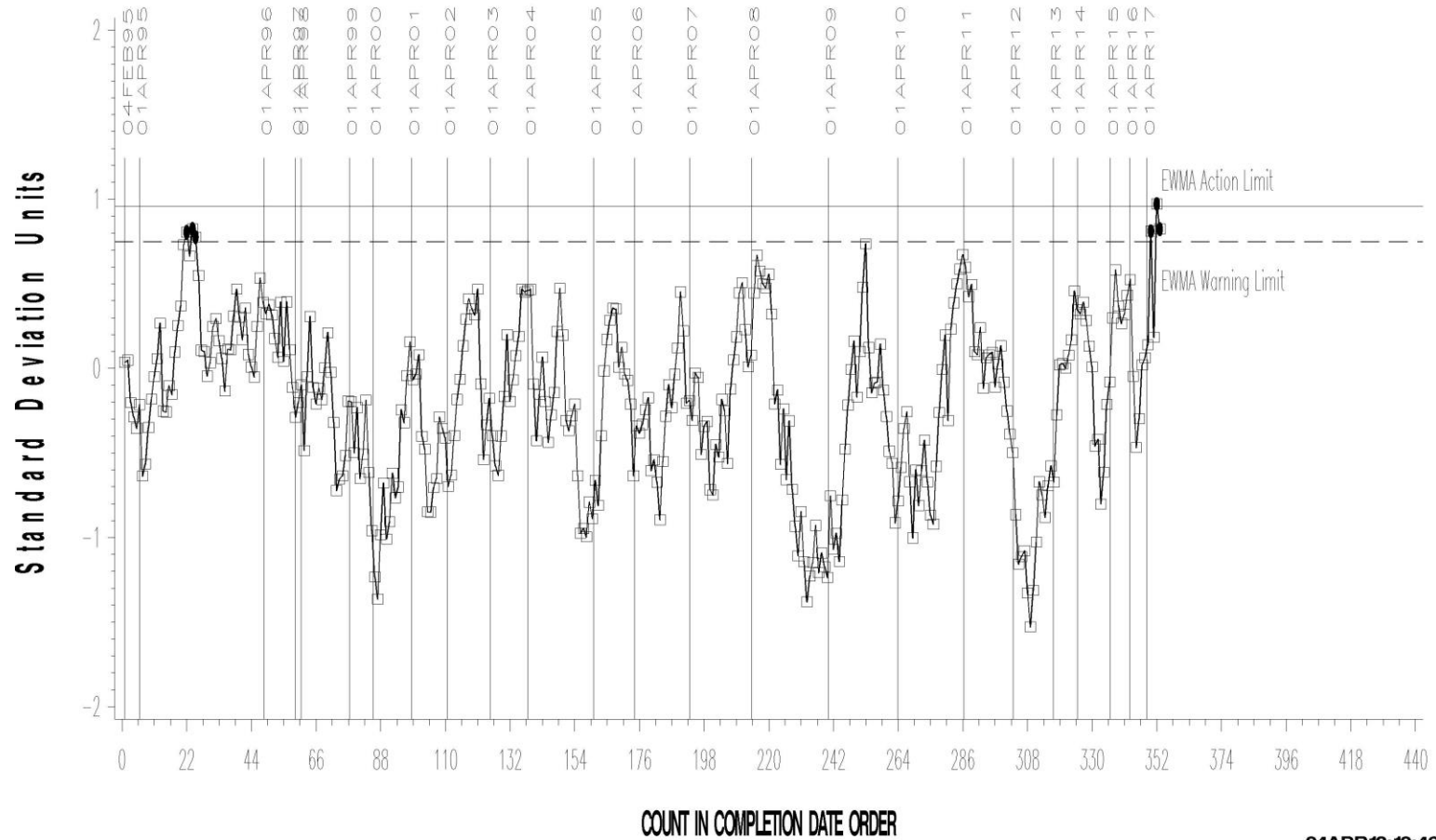
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L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING

LTMS Precision Analysis



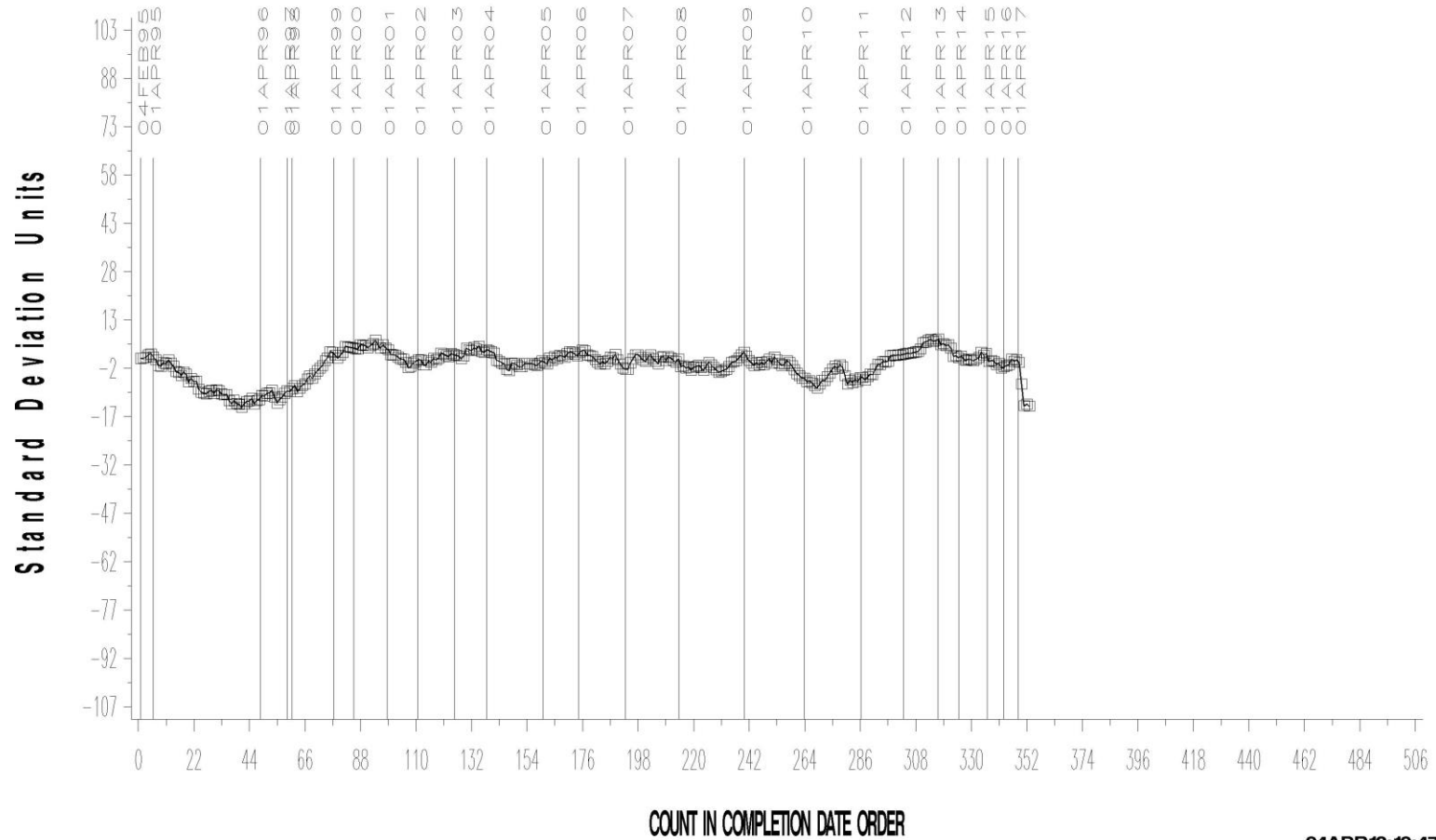
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L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING

CUSUM Severity Analysis



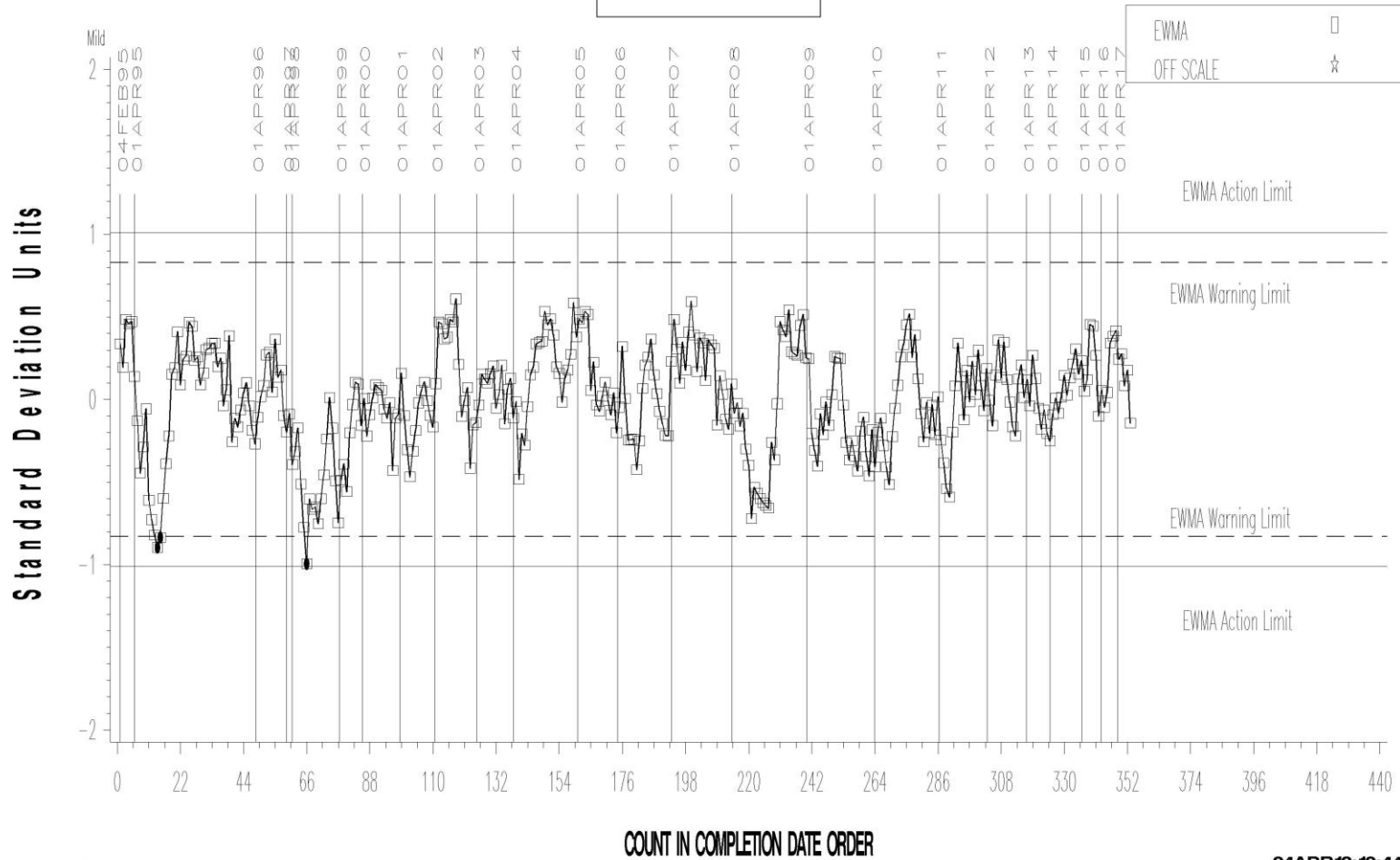
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L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIPPLING

LTMS Severity Analysis



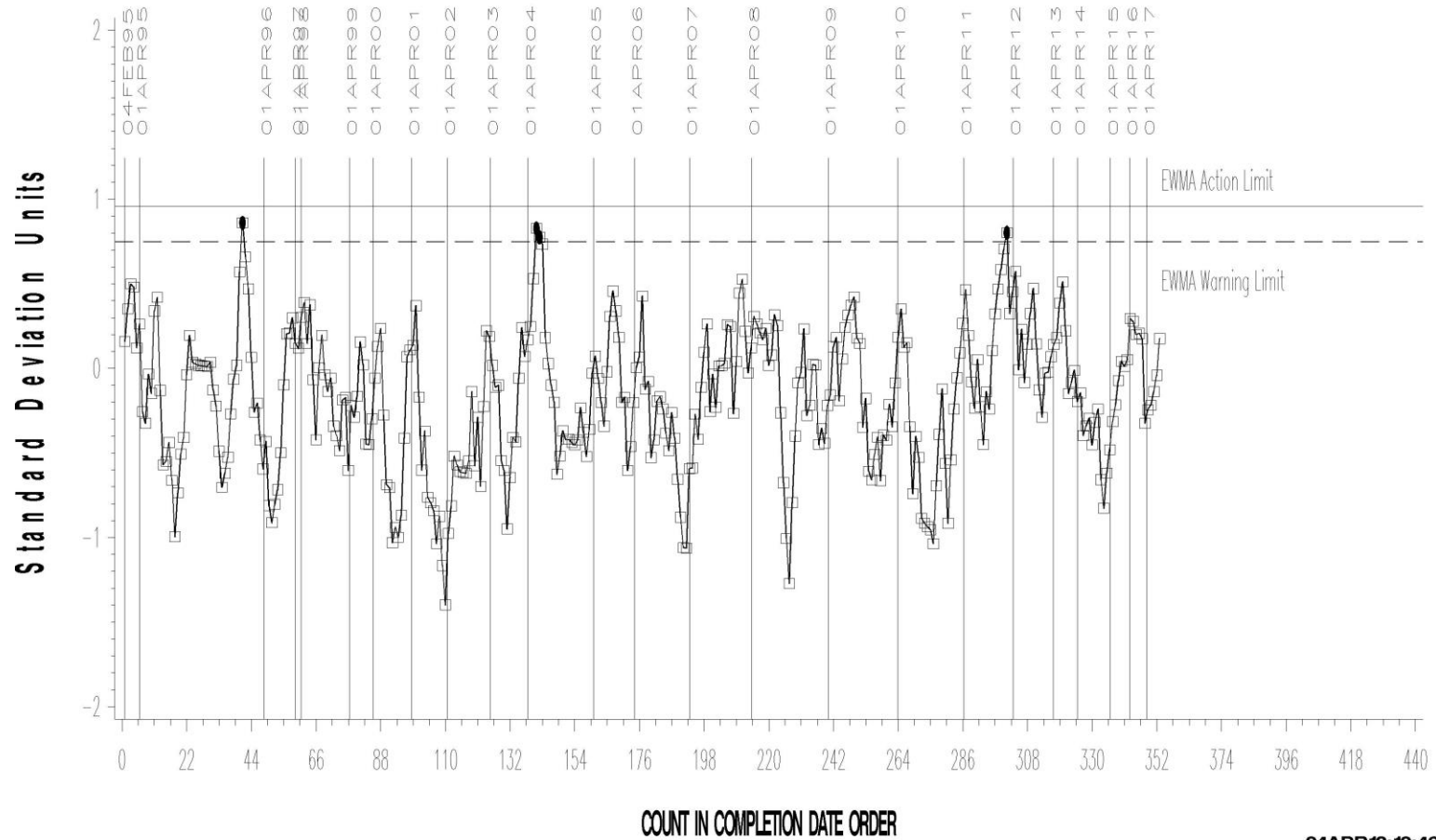
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L-37 (D6121)

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FINAL PINION GEAR RIPPLING

LTMS Precision Analysis



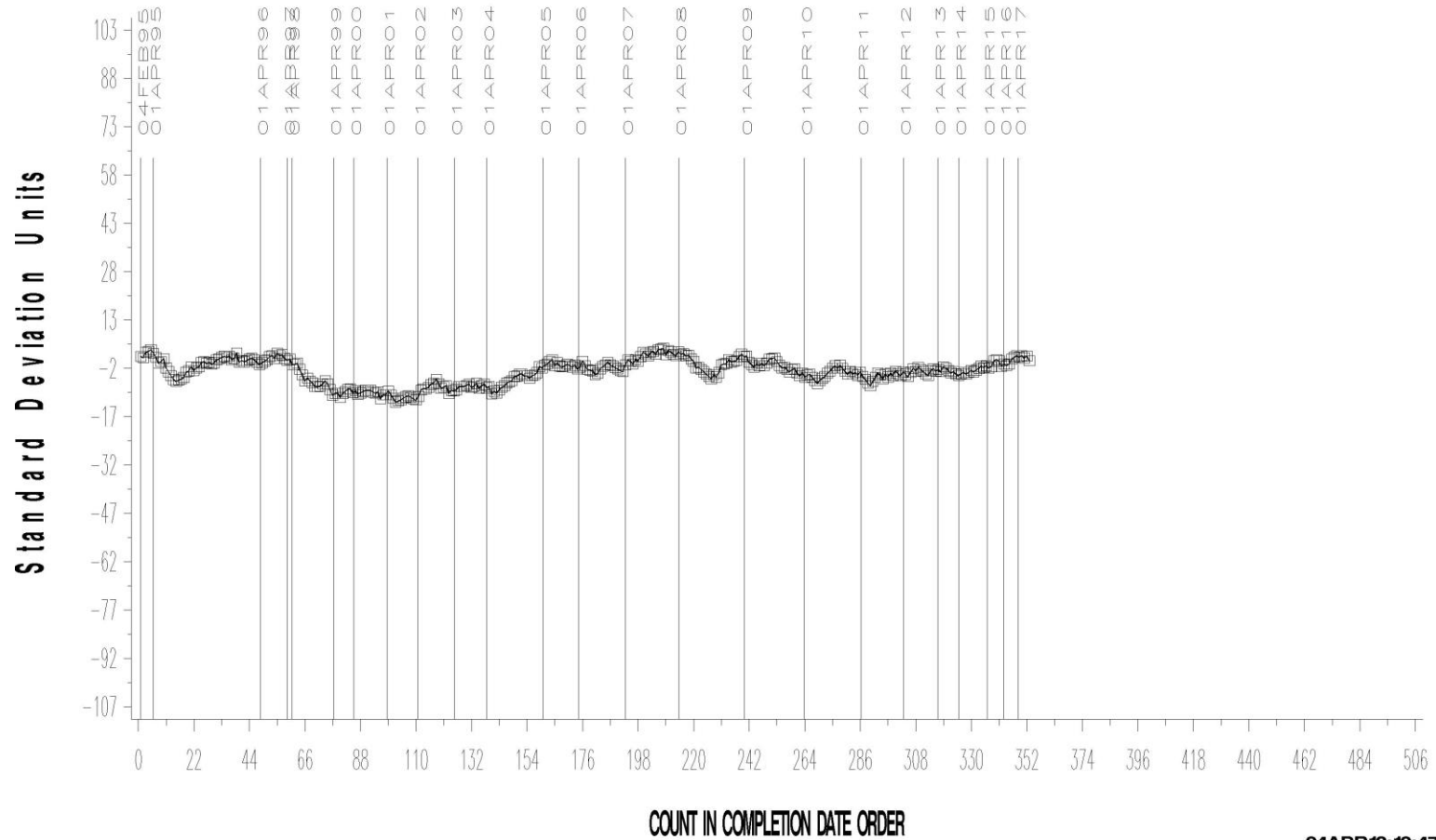
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L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIPPLING

CUSUM Severity Analysis



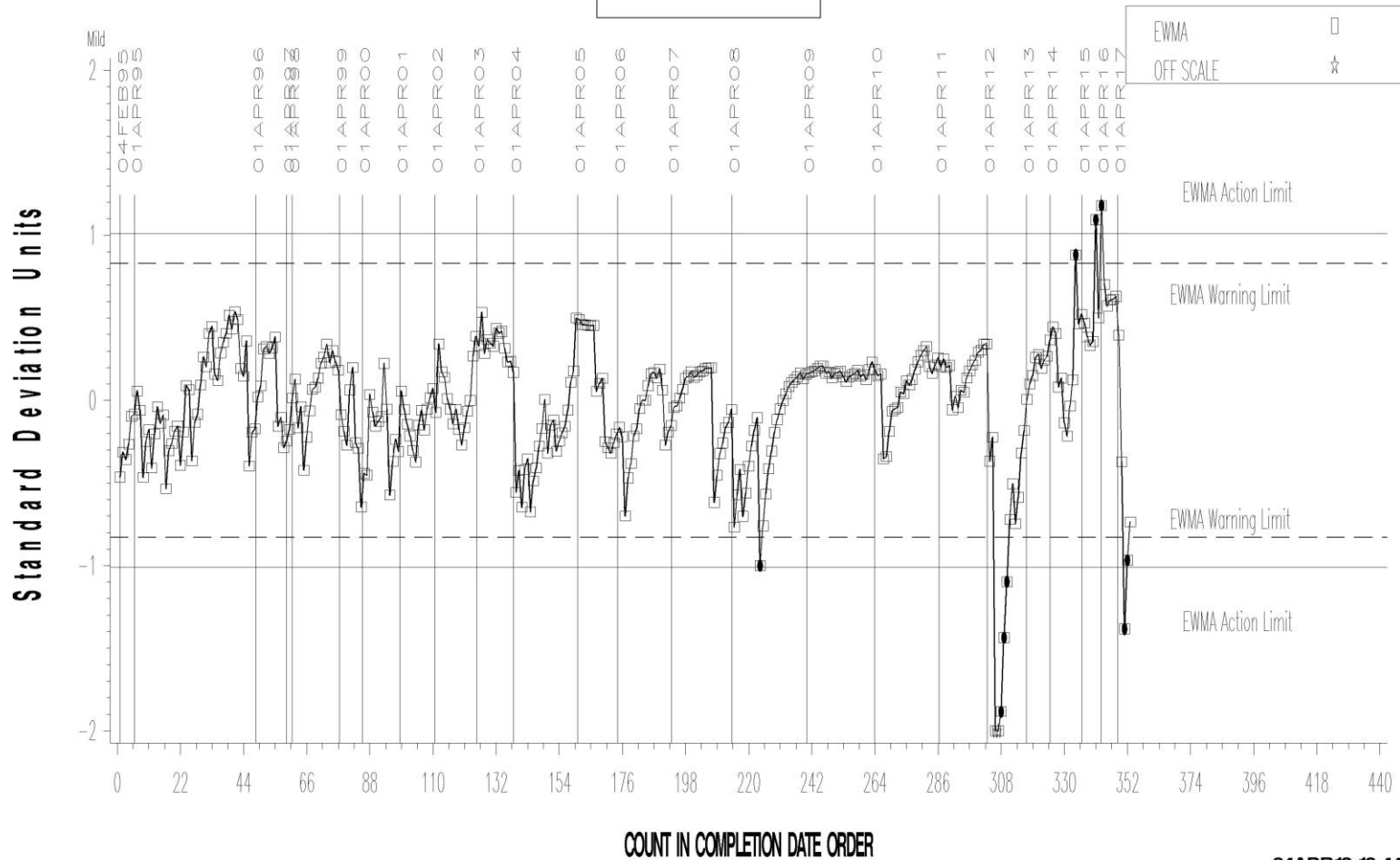
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L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR PITTING/SPALLING

LTMS Severity Analysis



Severe

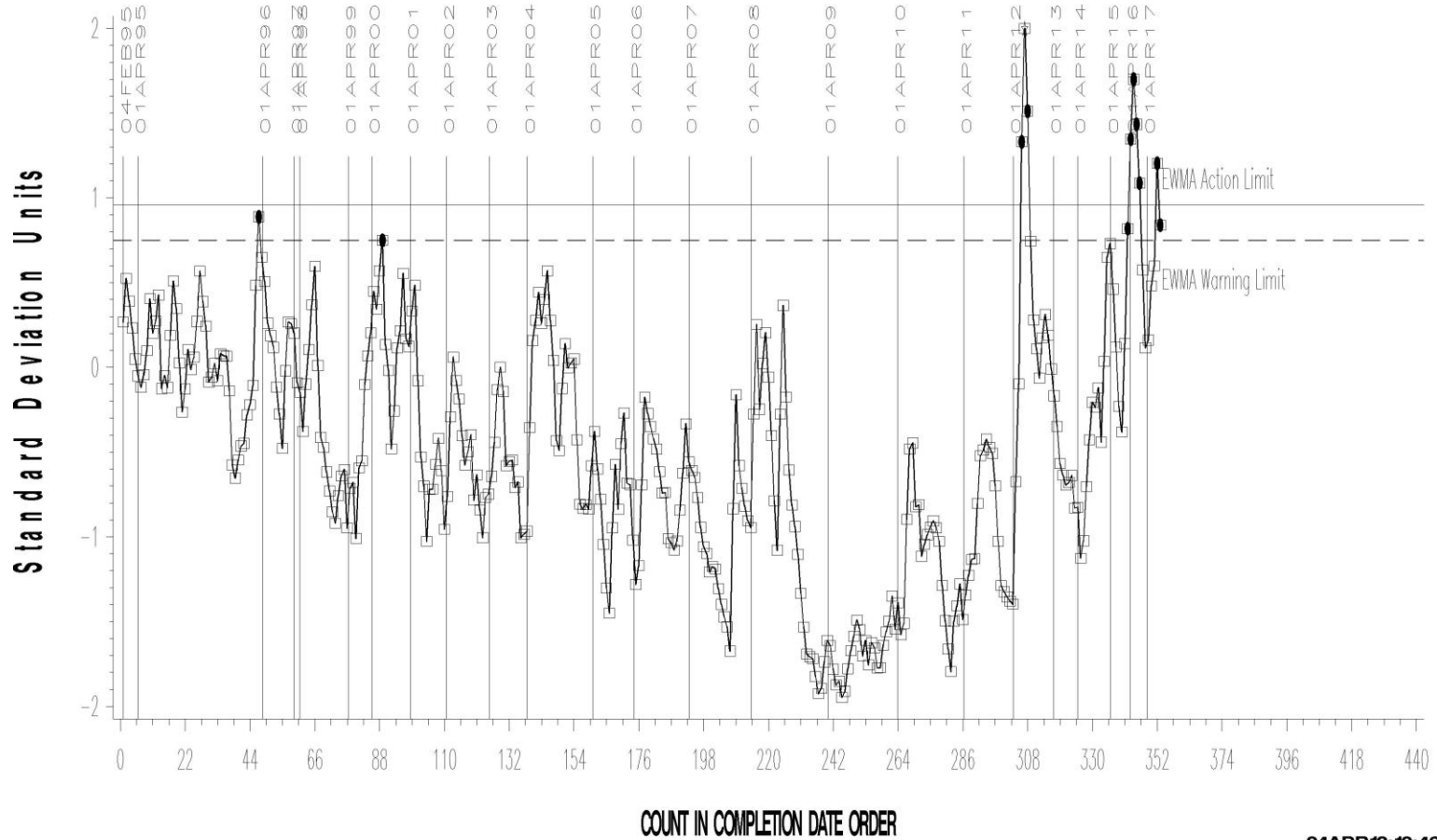
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L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR PITTING/SPALLING

LTMS Precision Analysis



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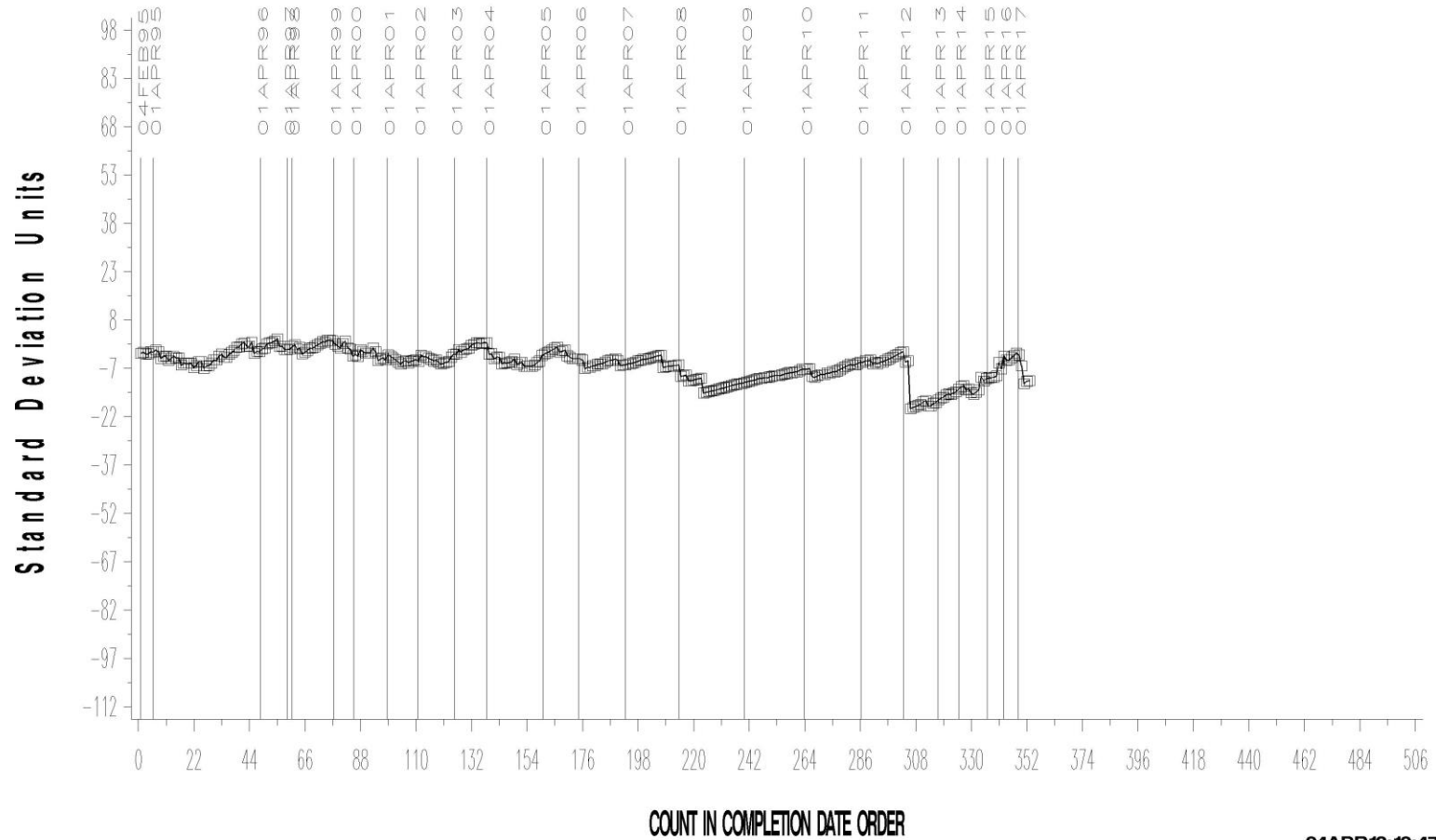
A Program of ASTM International

L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR PITTING/SPALLING

CUSUM Severity Analysis



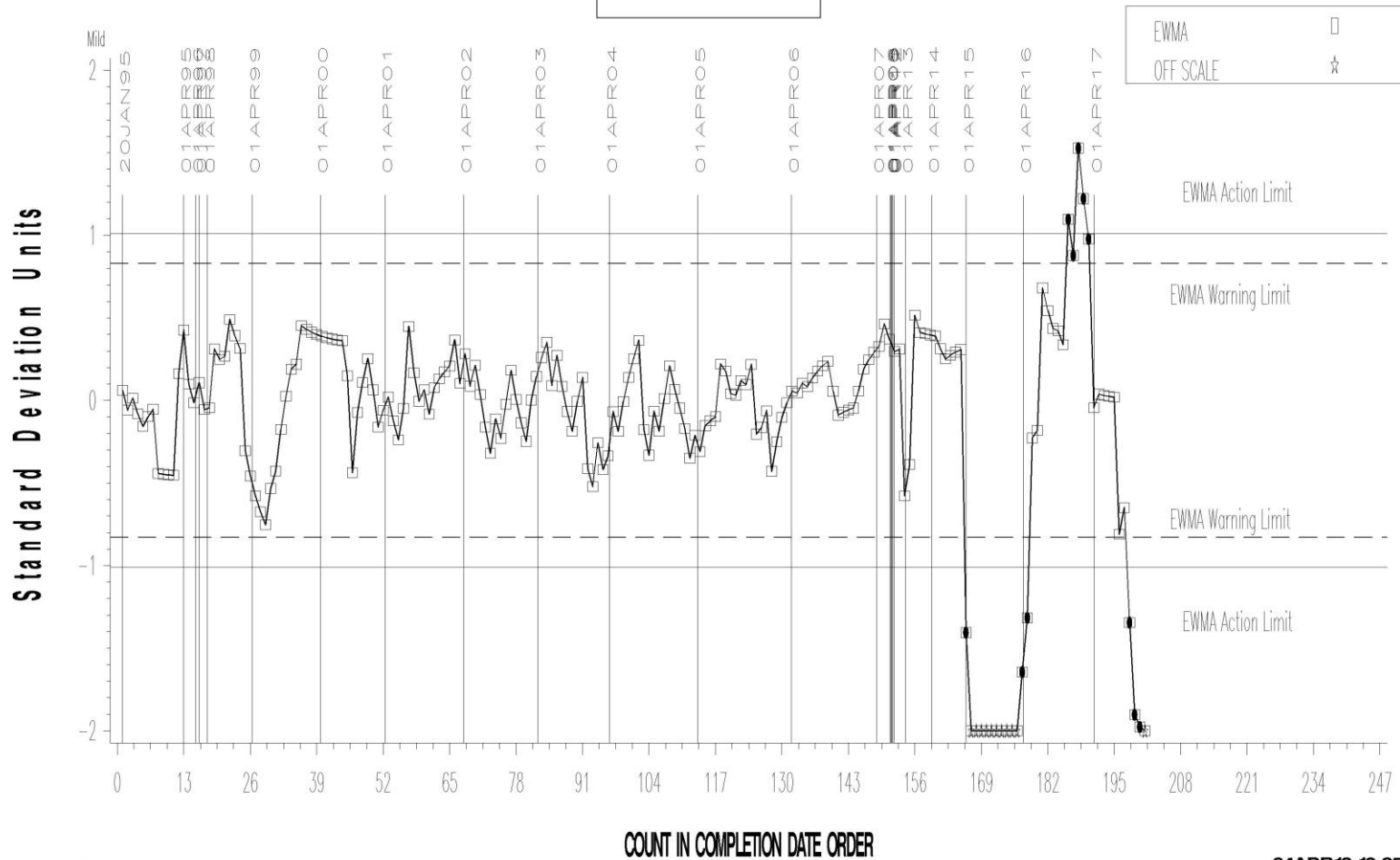
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L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

LTMS Severity Analysis



Severe

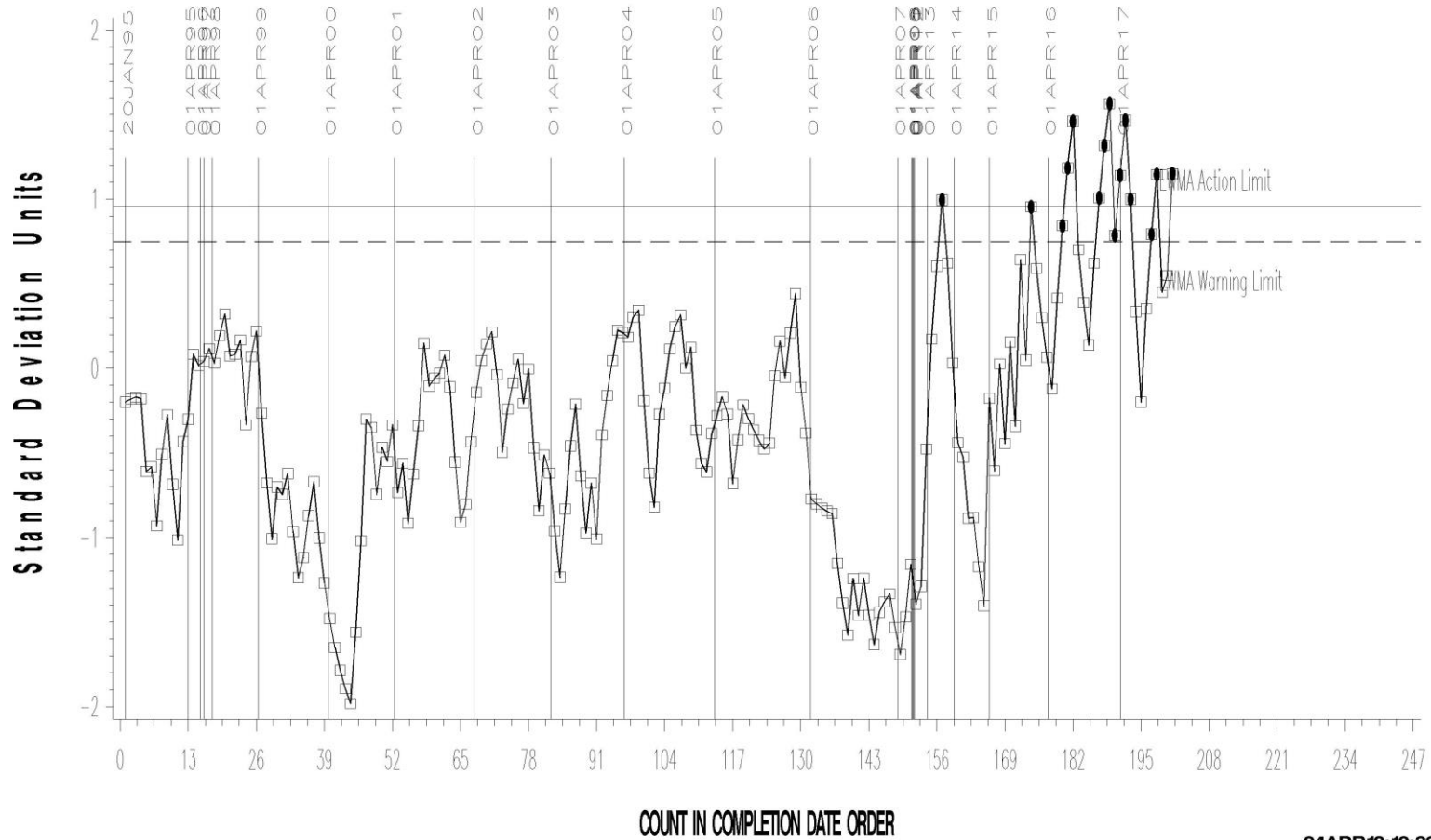
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L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

LTMS Precision Analysis



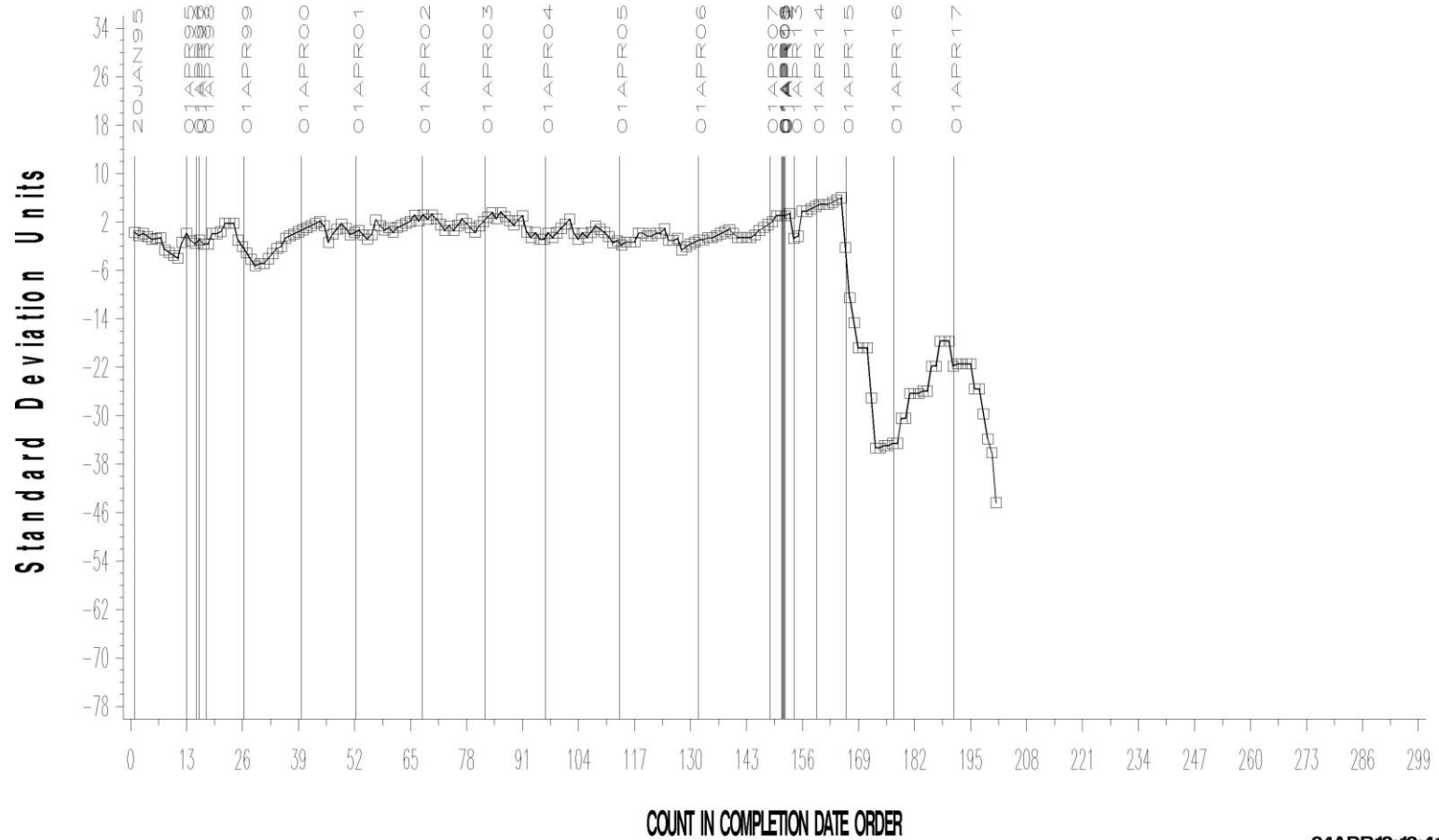
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L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

CUSUM Severity Analysis



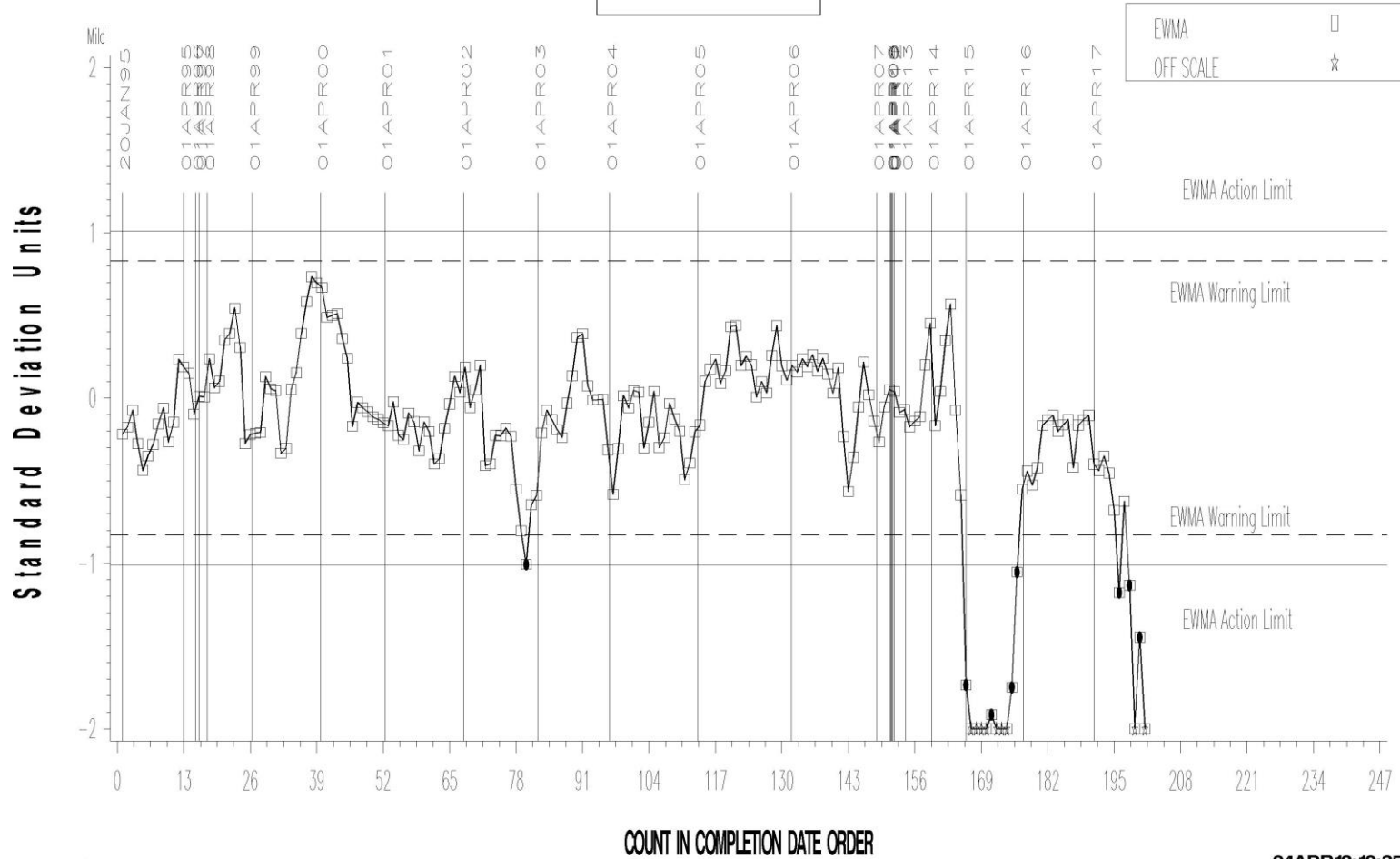
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L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING

LTMS Severity Analysis



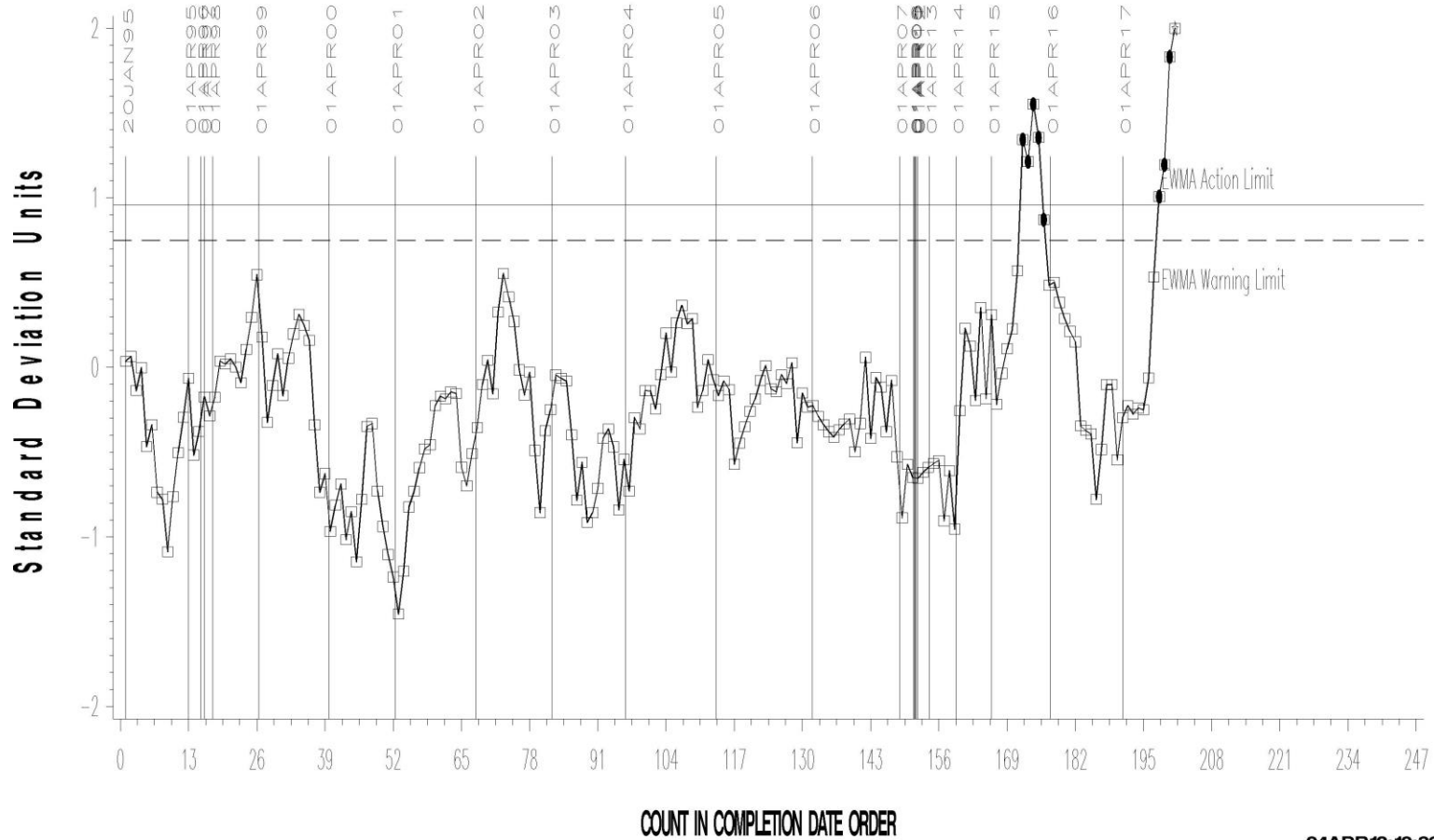
Severe

L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING

LTMS Precision Analysis



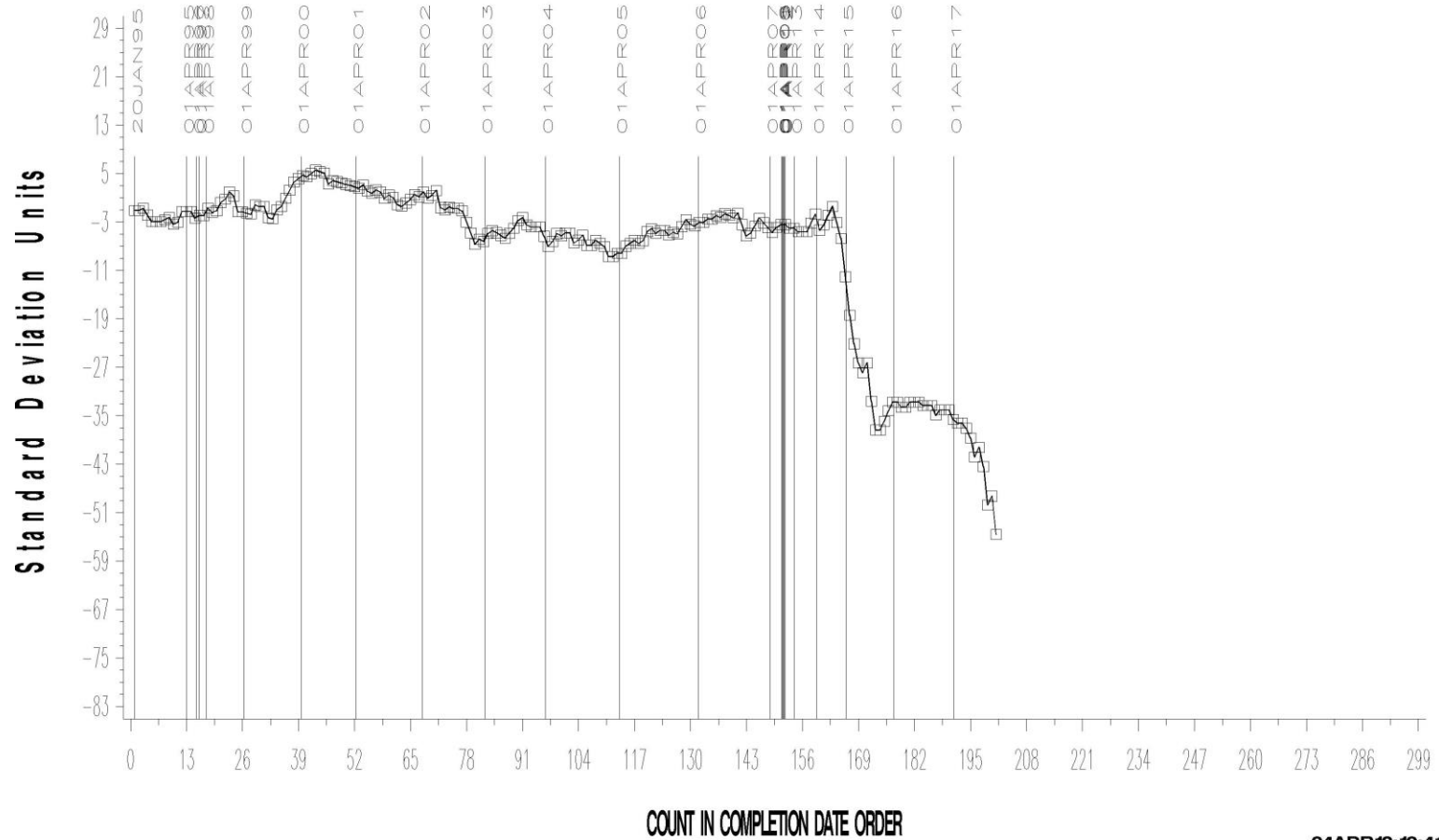
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L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING

CUSUM Severity Analysis



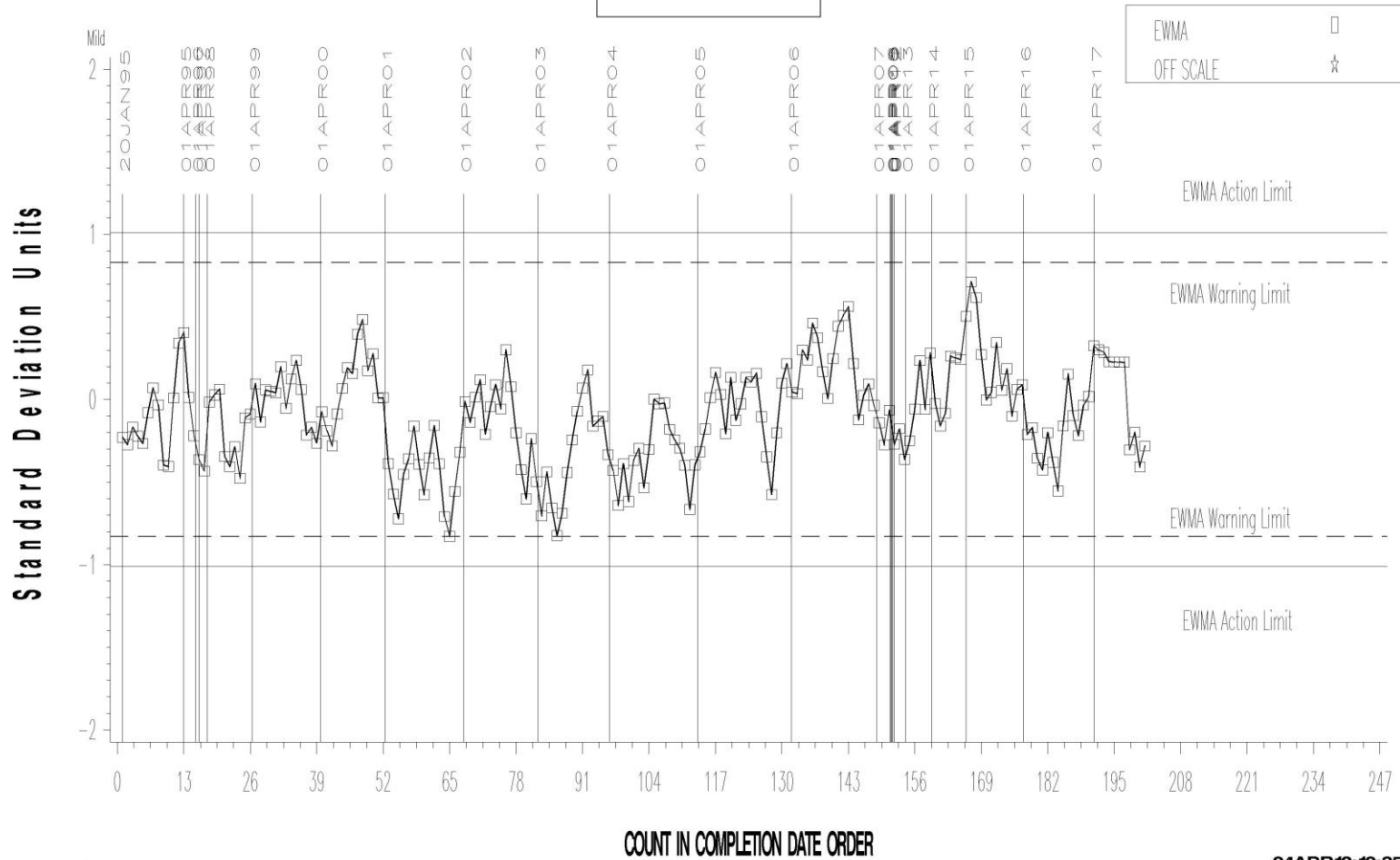
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L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIPPLING

LTMS Severity Analysis



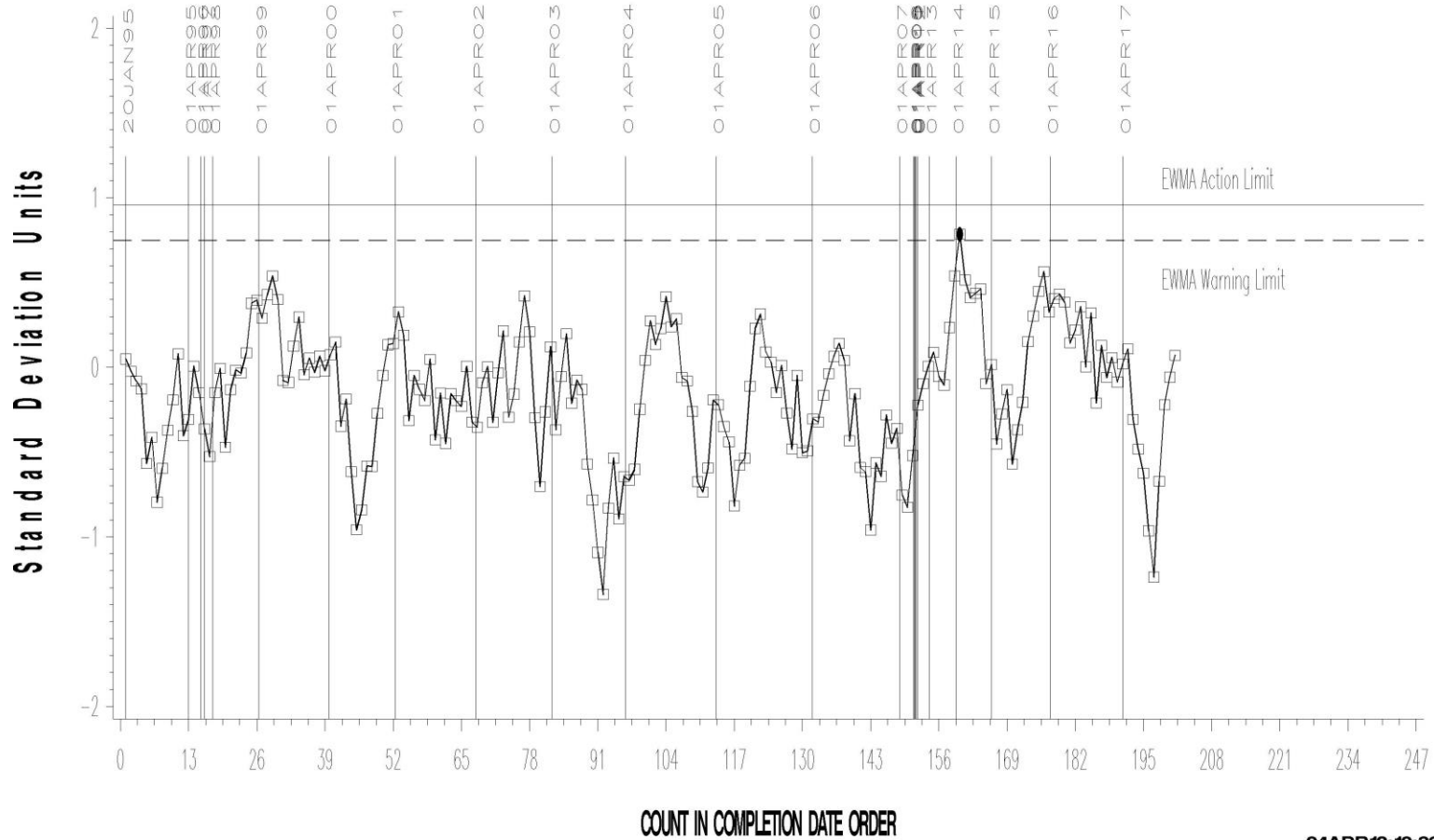
Severe

L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIPPLING

LTMS Precision Analysis



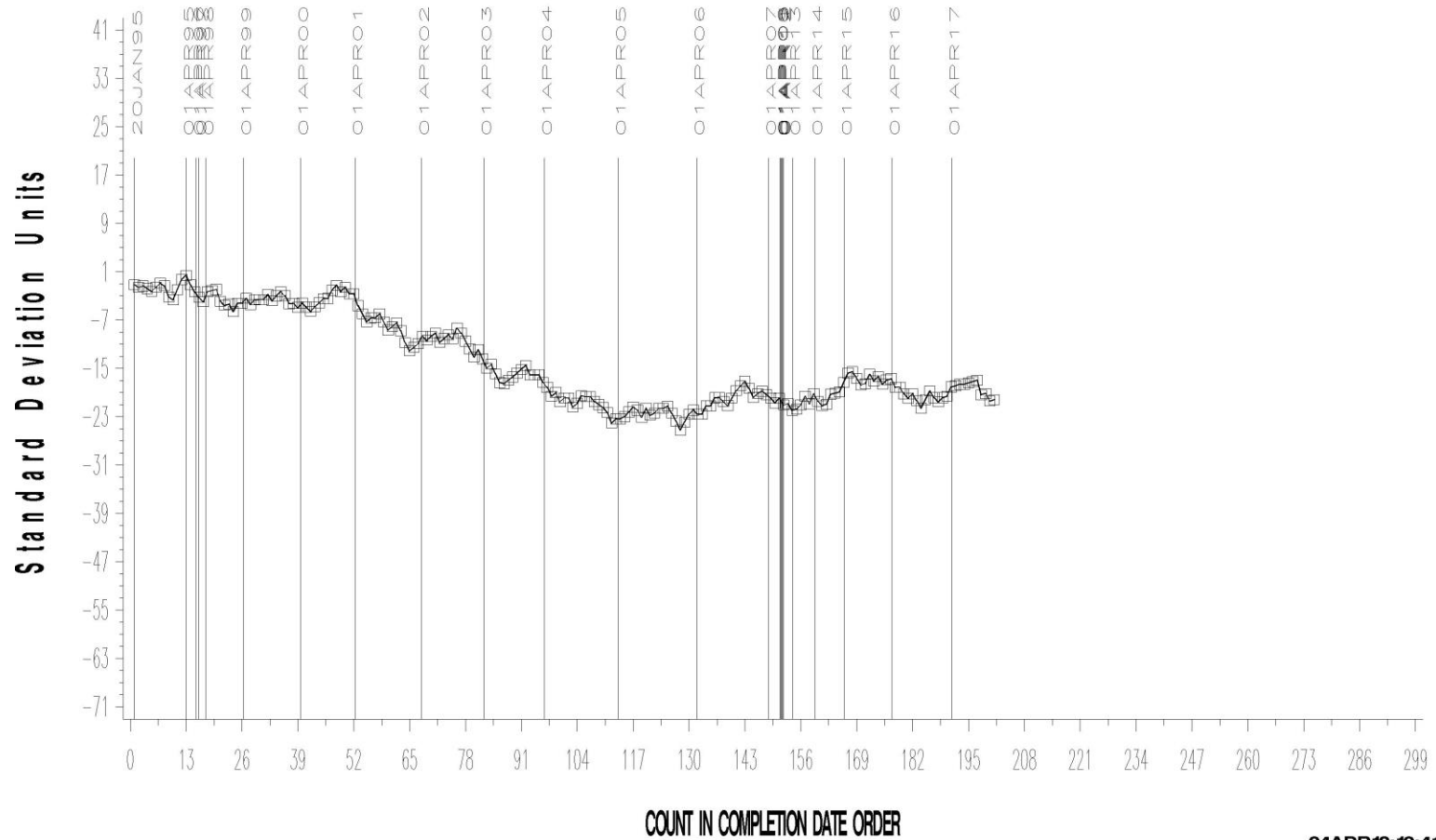
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L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RИPLING

CUSUM Severity Analysis



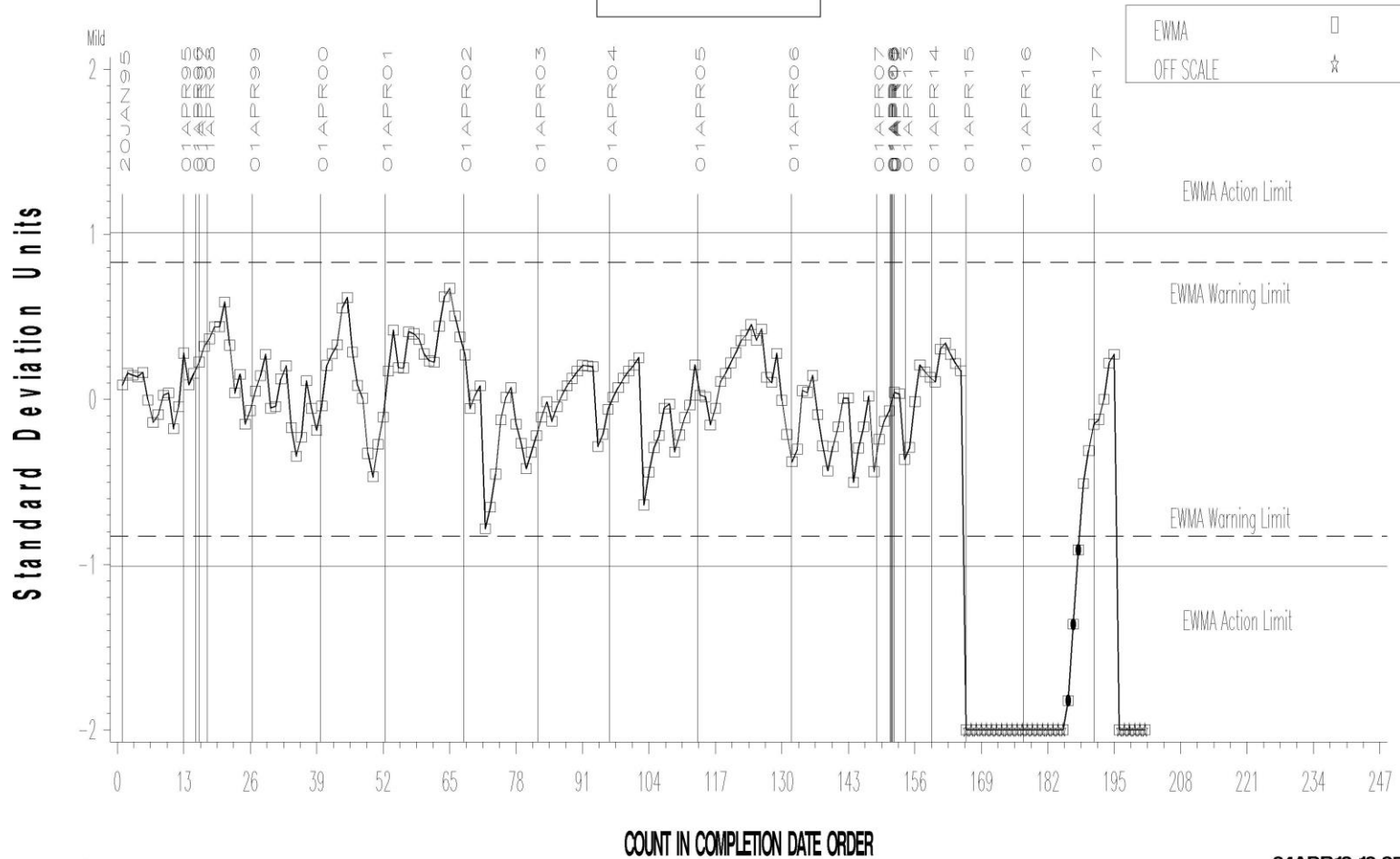
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L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR PITTING/SPALLING

LTMS Severity Analysis



Severe

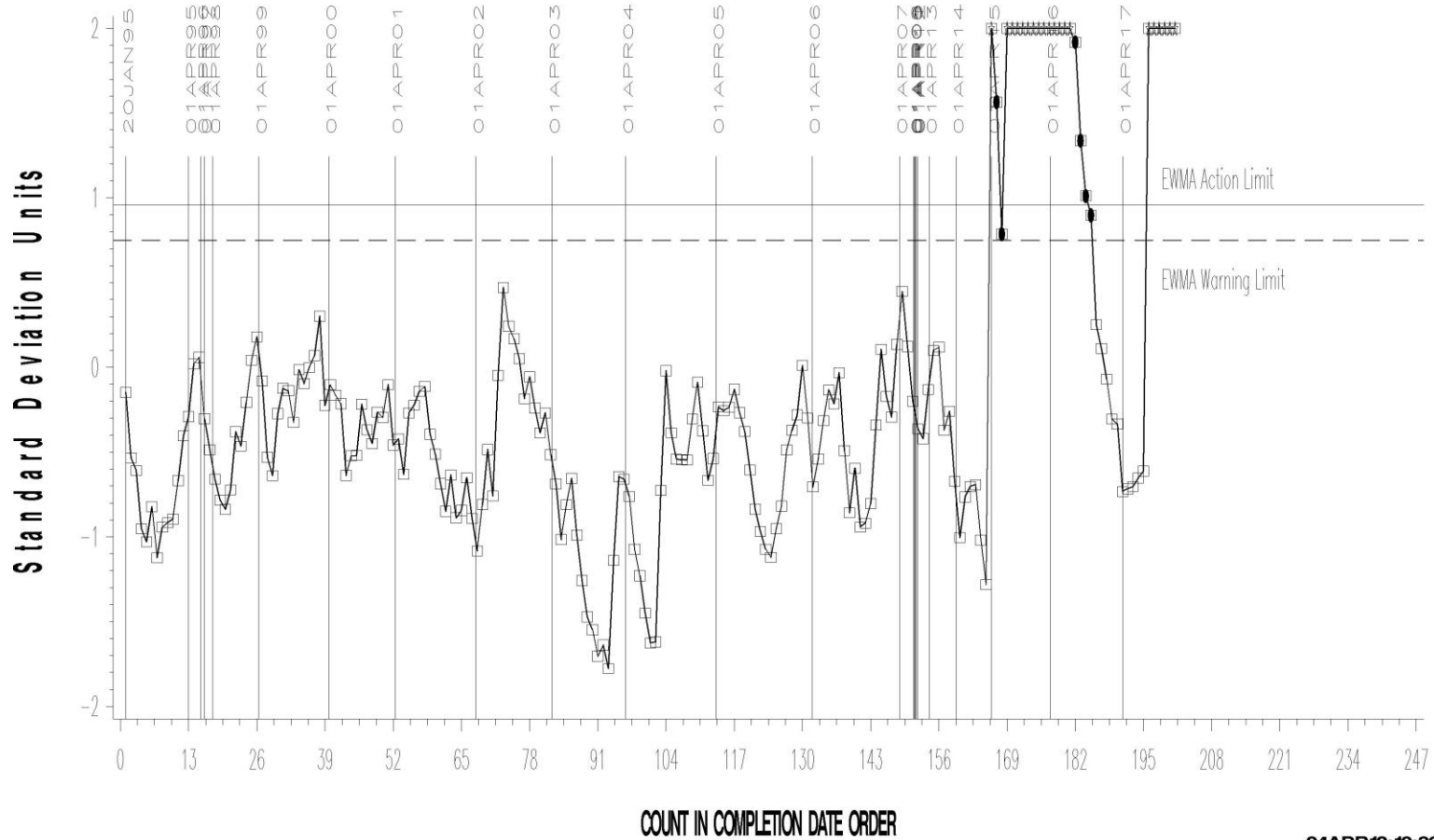
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L-37 (D6121)

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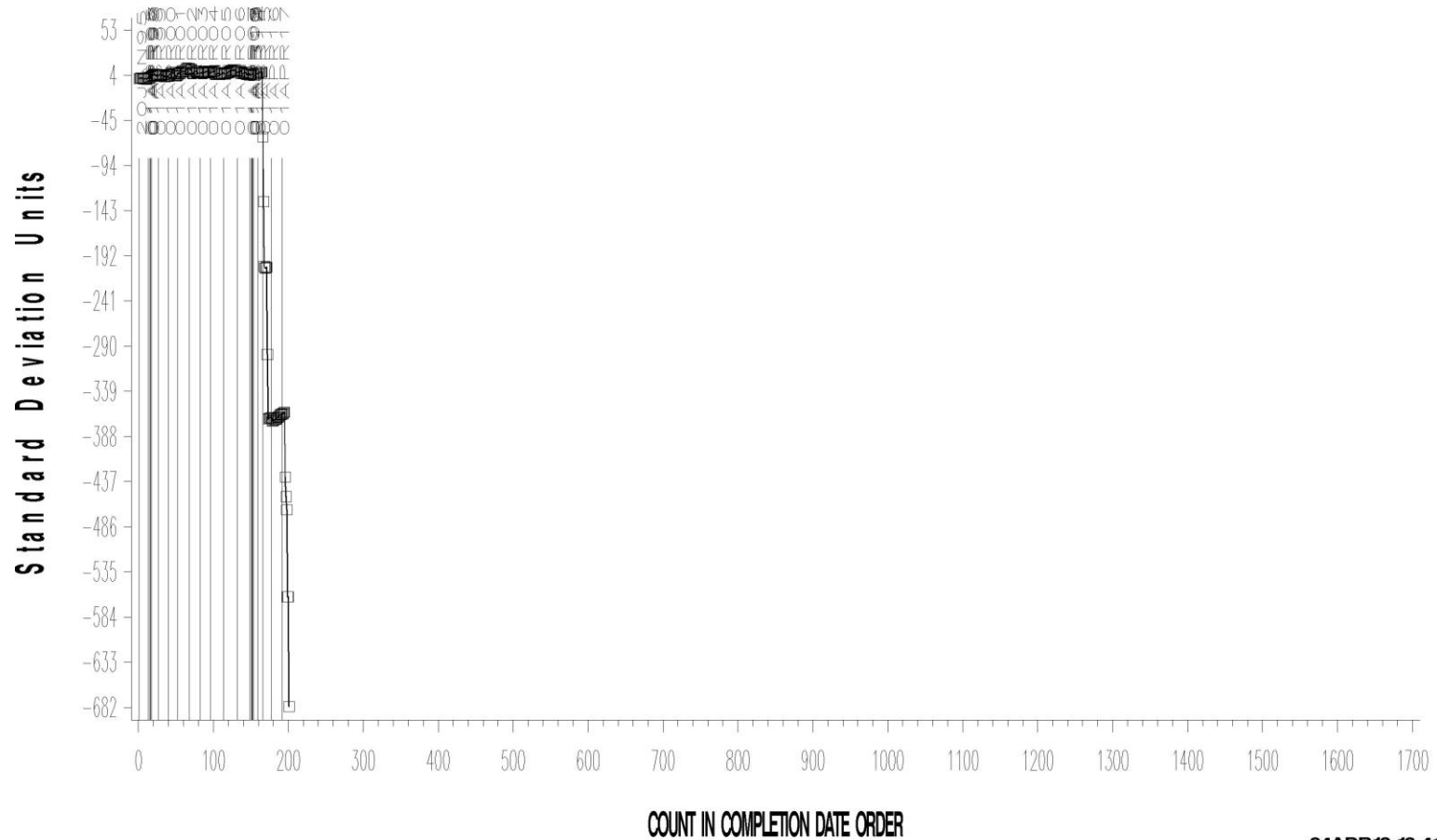
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L-37 (D6121)

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FINAL PINION GEAR PITTING/SPALLING

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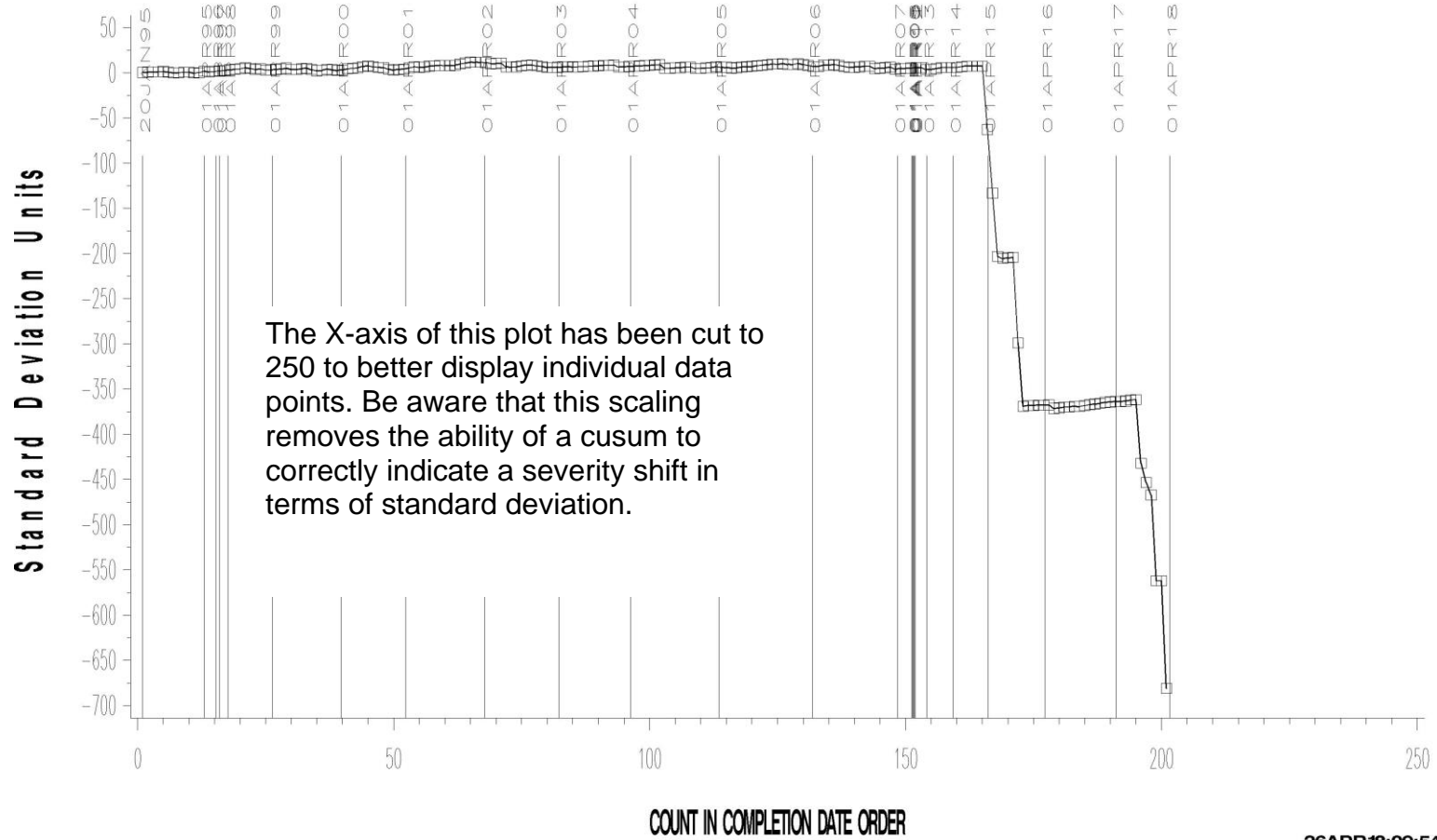
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L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR PITTING/SPALLING

CUSUM Severity Analysis



26APR18:09:54

L-37 (D6121)

TIMELINE ADDITIONS

Effective Date	Information Letter	Event
		No new timeline additions this period.

L-37 (D6121)

LAB VISITS

One L-37 lab visit was conducted this period. All of the aspects examined were found to be in compliance with the documented test procedures.

INFORMATION LETTERS

No information letters were issued this period.

L-37 (D6121)

LTMS DEVIATIONS

No LTMS deviations were written this report period.

L-37 (D6121)

STATUS OF REFERENCE OIL SUPPLY

Oil	Cans @ Labs	@ TMC	
		Cans	Gallons
117	0	381	381.0
134	2	0	0.0
134-1	10	197	197.0
152-2	12	137	137.9
153-1	35	0	0.0
155	6	15	15.0
155-1	6	176	176.5
Total	71	906	907.3

The TMC quantity remaining presumes usage only for L-37 testing. Oil 155/155-1 is also used in other test areas (L-33-1, L-60-1, and HTCT). The 155-1 total also reflects that the L-60-1 surveillance panel has requested that TMC reserve a quantity of that oil (currently 38.6 gal) for use in that test.

TMC stocks of oil 134 have been depleted. The 134-1 reblend has been introduced to testing.