



## Test Monitoring Center

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

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

MEMORANDUM: 17-032  
DATE: November 17, 2017  
TO: Wes Venhoff, Chairman, L-37 Surveillance Panel  
FROM: Dylan Beck *Dylan Beck*  
SUBJECT: L-37 Testing from April 1, 2017 through September 30, 2017

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

DJB/djb/mem17-032.djb.doc

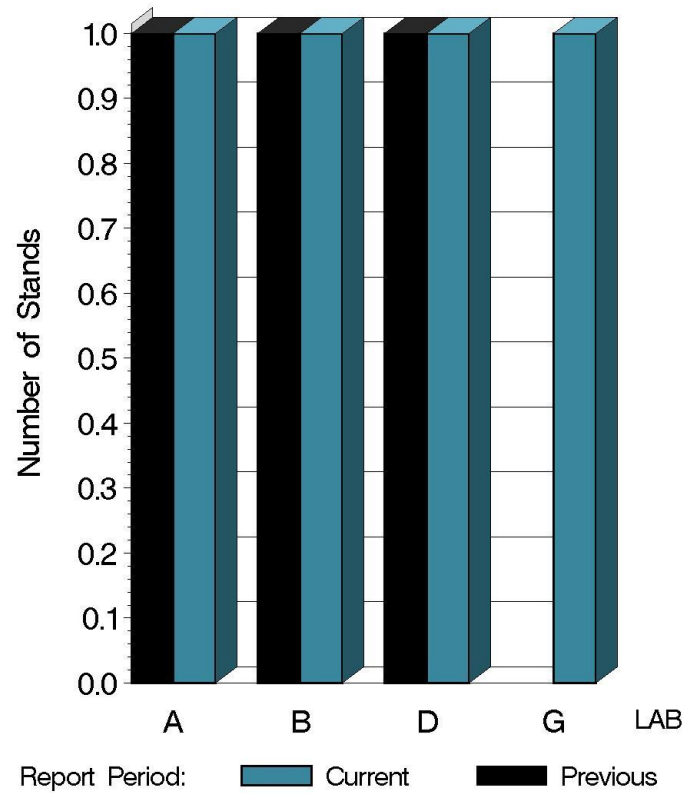
cc: Frank Farber  
Jeff Clark  
Scott Park  
L-37 Surveillance Panel  
<http://www.astmtmc.cmu.edu/ftp/docs/gear/137/semiannualreports/137-10-2017.pdf>

Distribution: email

# L-37 (D6121)

	Reporting Data	Calibrated on 9-30-17
Number of Labs	4	4
Number of Stands	4	4

## BY-LAB STAND DISTRIBUTION



14:33:56 01NOV2017

# 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	2	0	2	0	1	5	5
Rejected (Mild)	OC	0	0	0	0	0	0	0
Rejected (Severe)	OC	0	0	2	0	0	0	2
Rejected (Precision)	OC	0	0	0	0	0	0	0
Invalidated calibration	RC	0	0	0	0	0	1	0
Acceptable info run	NI	0	0	2	0	0	0	2
Unacceptable info run	MI	0	0	0	0	0	0	0
Aborted info run	XI	0	0	0	0	0	0	0
<b>Total</b>		<b>2</b>	<b>0</b>	<b>6</b>	<b>0</b>	<b>1</b>	<b>6</b>	<b>9</b>

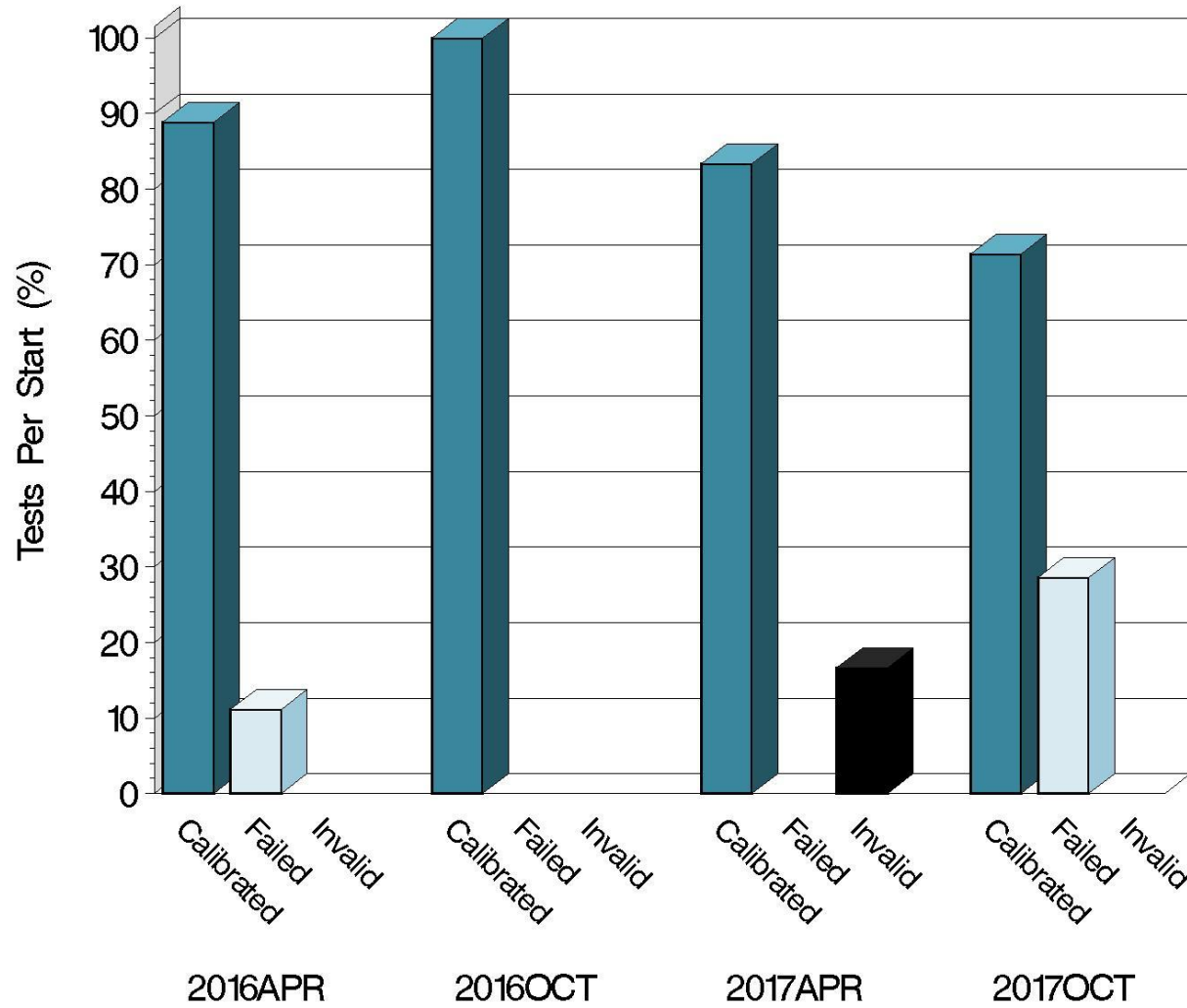
# L-37 (D6121)

## Calibration Attempt Detail

	Gear Batch	Acceptable	Failed	Total
LUBRITED	V1L500/P4T813	0	0	0
	V1L528/P4T883A	4	0	4
	Total	4	0	4
NONLUBRITED	V1L500/P4T813	0	0	0
	V1L528/P4T883A	1	2	3
	Total	1	2	3

# L-37 (D6121)

## CALIBRATION ATTEMPT SUMMARY



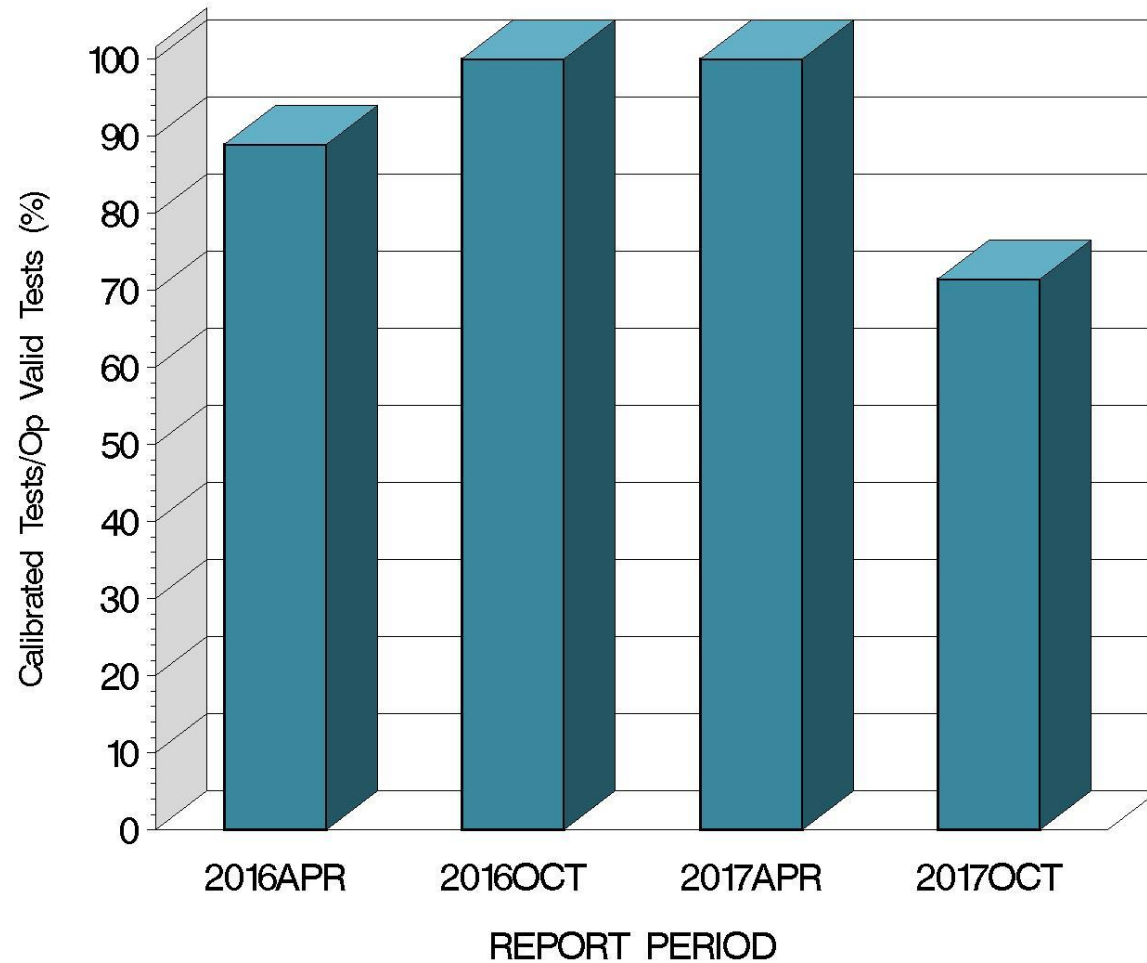
Resolution

Report Period

14:33:56 01NOV2017

# L-37 (D6121)

OPERATIONALLY VALID TESTS  
MEETING ACCEPTANCE CRITERIA



14:33:56 01NOV2017

# L-37 (D6121)

## CAUSES FOR LOST TESTS

		Oil					Validity			Loss Rate		
Lab	Cause	134	134-1	152-2	155	155-1	RC	LC	XI	Lost	Starts	%
	No test were lost this period	0	0	0	0	0	0	0	0	0	9	0%
	Lost	0	0	0	0	0	0	0	0			
	Starts	2	0	6	0	1	9	9	9			
	%	0%	0%	0%	0%	0%	0%	0%	0%			

# L-37 (D6121)

## GEAR BATCH SEVERITY

LUBRITED HARDWARE						
Parameter	Gear Batch	N	$\Delta/s$	$s^A$	Overall $\Delta/s$	Overall Shift (in Merits) <sup>B</sup>
RIDG	V1L528/P4T883A	4	-0.761	0.656	-0.761	-1.088
RIPP	V1L528/P4T883A	4	0.164	0.110	0.164	0.078
SPIT	V1L528/P4T883A	4	0.519	0.450	0.519	0.300
WEAR	V1L528/P4T883A	4	0.093	0.185	0.093	0.048

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

<sup>B</sup> 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	$\Delta/s$	$s^A$	Overall $\Delta/s$	Overall Shift (in Merits) <sup>B</sup>
RIDG	V1L528/P4T883A	3	-4.758	3.396	-4.758	-3.169
RIPP	V1L528/P4T883A	3	-0.244	0.574	-0.244	-0.136
SPIT	V1L528/P4T883A	3	-3.138	2.461	-3.138	-2.658
WEAR	V1L528/P4T883A	3	-1.184	1.413	-1.184	-0.844

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

<sup>B</sup> As computed using SA standard deviation published in the LTMS document.

# L-37 (D6121)

## LAB SEVERITY

LUBRITED HARDWARE AVERAGE $\Delta/s$						
Gear Batch	Lab	N	RIDG	RIPP	SPIT	WEAR
V1L528/P4T883A	A	2	-1.088	0.214	0.244	0.185
	D	1	-0.866	0.000	1.099	0.000
	G	1	0.000	0.226	0.488	0.000

NON-LUBRITED HARDWARE AVERAGE $\Delta/s$						
Gear Batch	Lab	N	RIDG	RIPP	SPIT	WEAR
V1L528/P4T883A	B	2	-6.719	-0.142	-4.437	-2.000
	D	1	-0.837	-0.447	-0.539	0.447

# L-37 (D6121)

## SUMMARY OF SEVERITY & PRECISION

### Severity

Nonlubrited – Two extremely severe tests on oil 152-2 caused severe alarms for SPIT and RIDG. Both had RIDG ratings of 4 with SPIT values of 6 and 4. WEAR and RIPP remained within limits throughout this period.

Lubrited – All parameters remained within limits throughout this period.

# L-37 (D6121)

## SUMMARY OF SEVERITY & PRECISION (cont.)

### Precision

Nonlubrited – Because of the two severe tests, RIDG and SPIT precision also triggered alarms. As with severity, WEAR and RIPP precision remained within limits.

Lubrited – The previous WEAR precision alarms have now cleared. The remaining parameters remained within limits throughout the period.

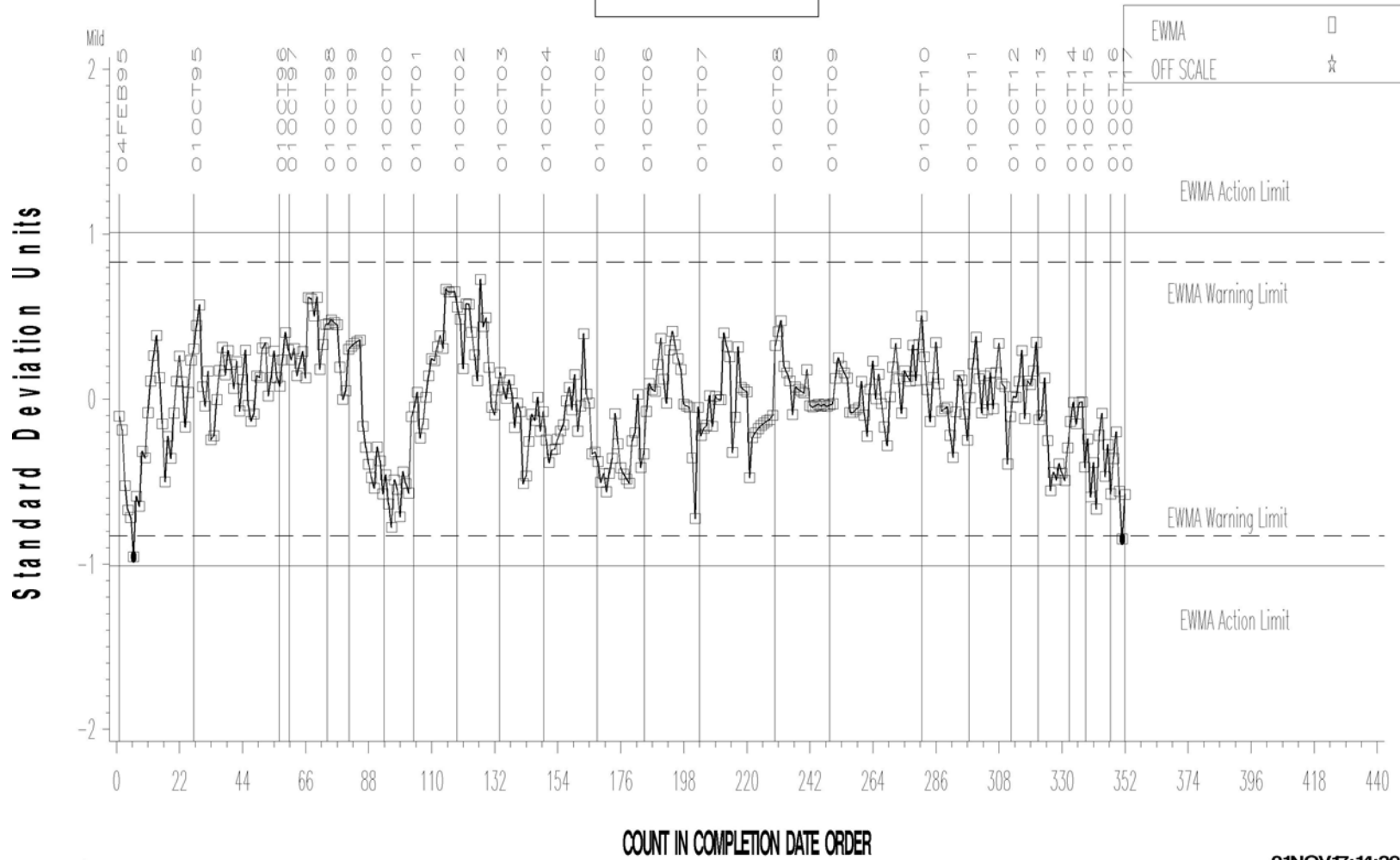
Industry control charts follow.

# L-37 (D6121)

## L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

### FINAL PINION GEAR WEAR

LTMS Severity Analysis



Severe

COUNT IN COMPLETION DATE ORDER

01NOV17:14:29

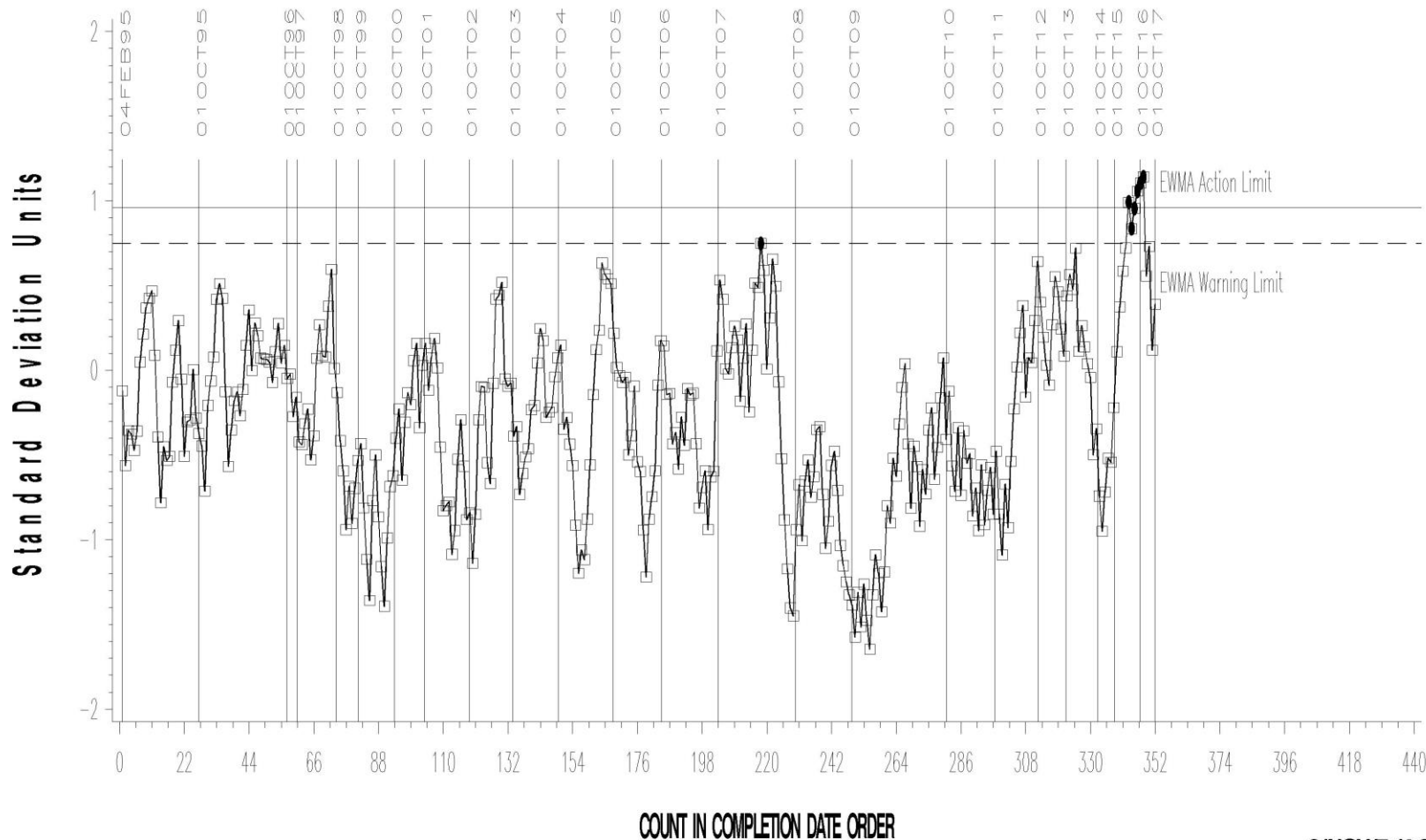
# L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA



## FINAL PINION GEAR WEAR

LTMS Precision Analysis



01NOV17:14:31

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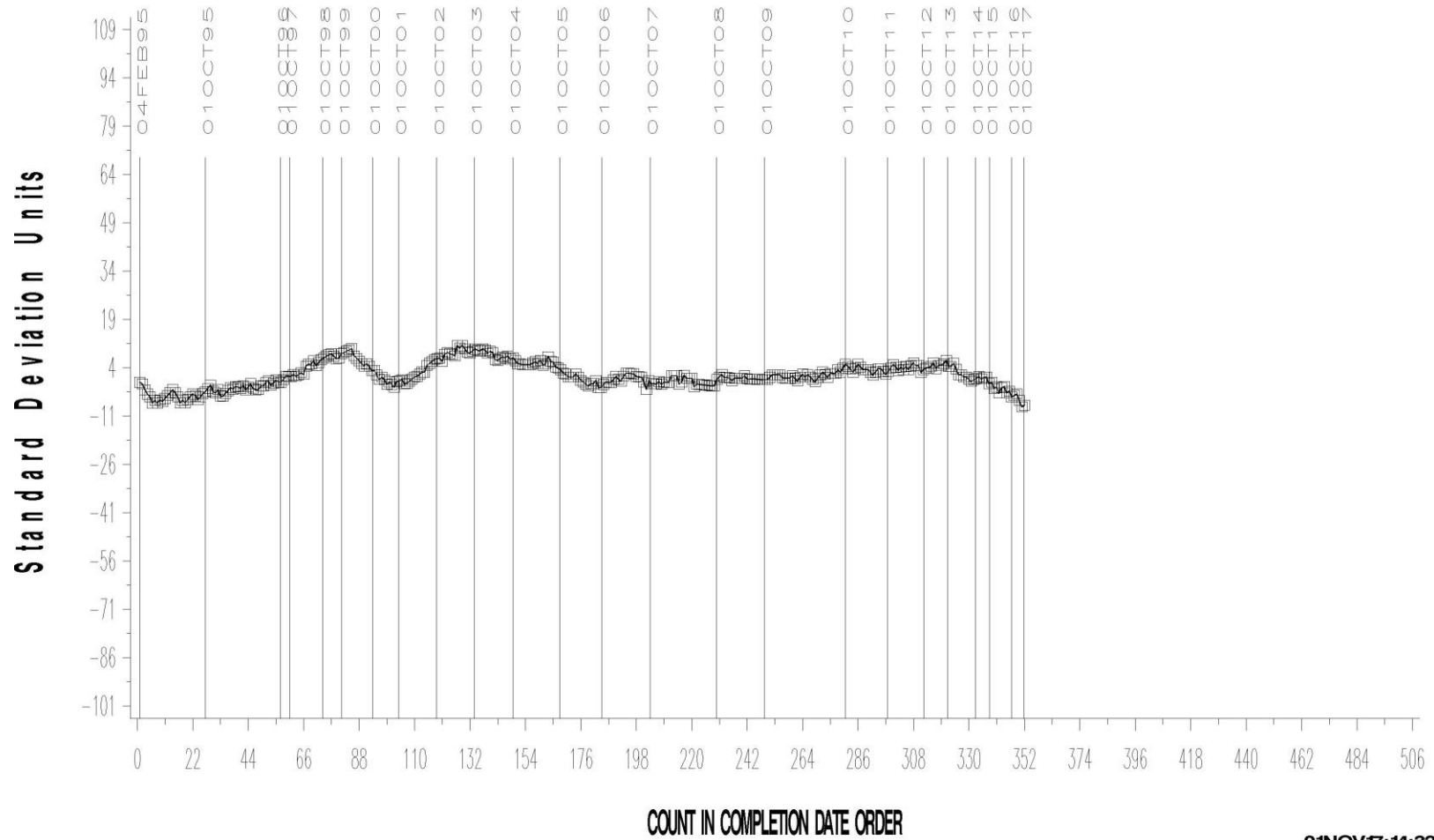
# L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA



## FINAL PINION GEAR WEAR

CUSUM Severity Analysis



01NOV17:14:32

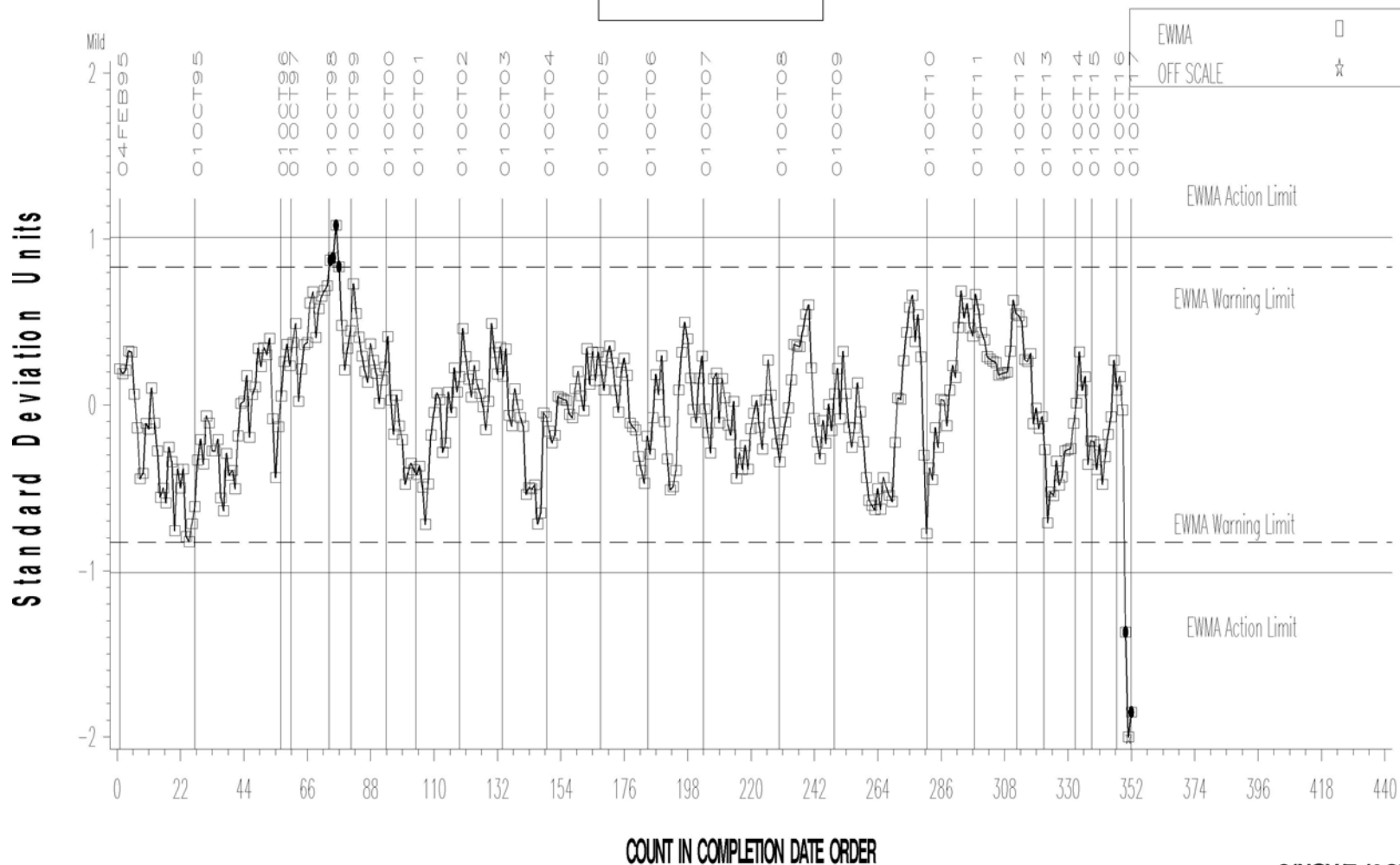
# L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA



## FINAL PINION GEAR RIDGING

LTMS Severity Analysis



Severe

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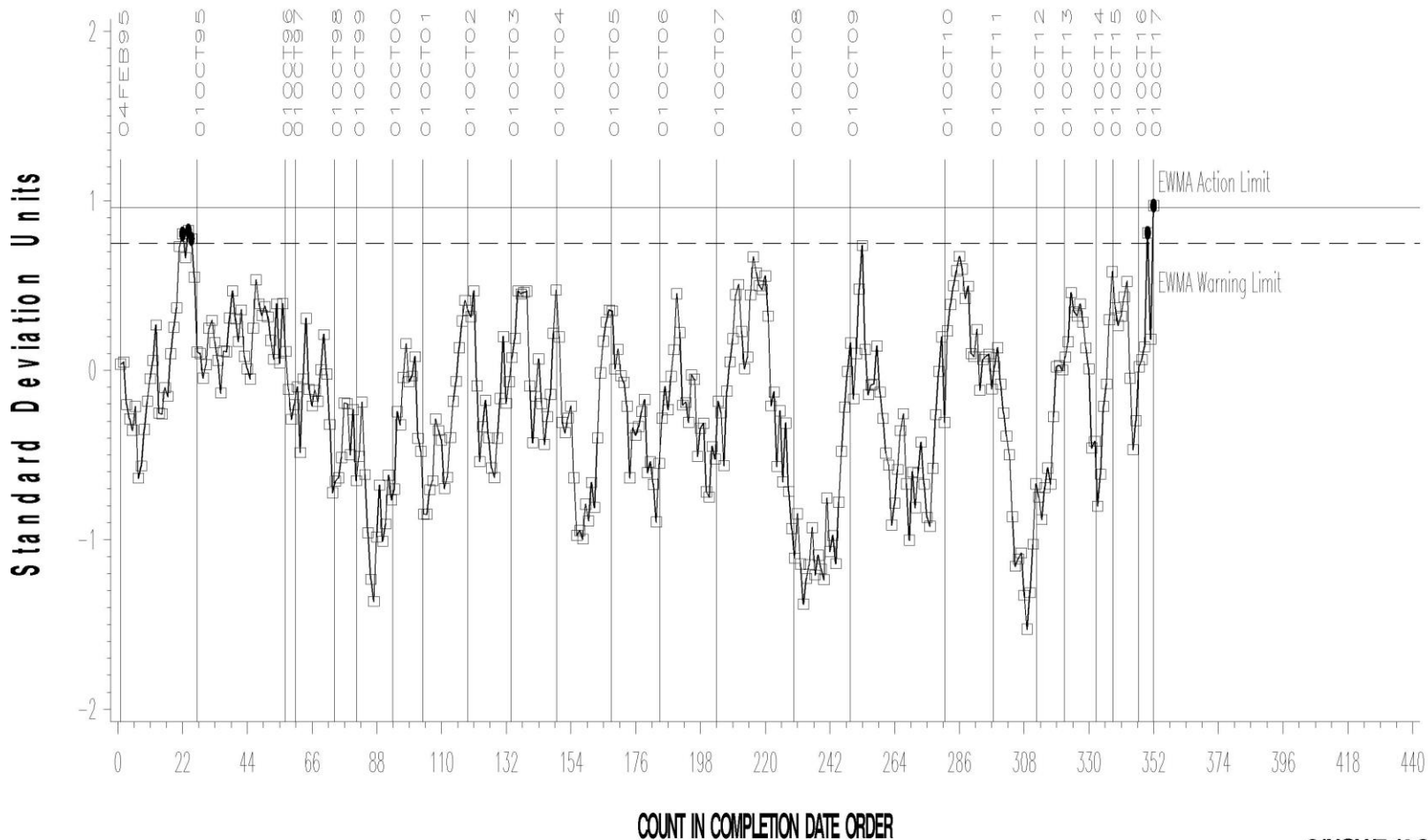
# L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA



## FINAL PINION GEAR RIDGING

LTMS Precision Analysis



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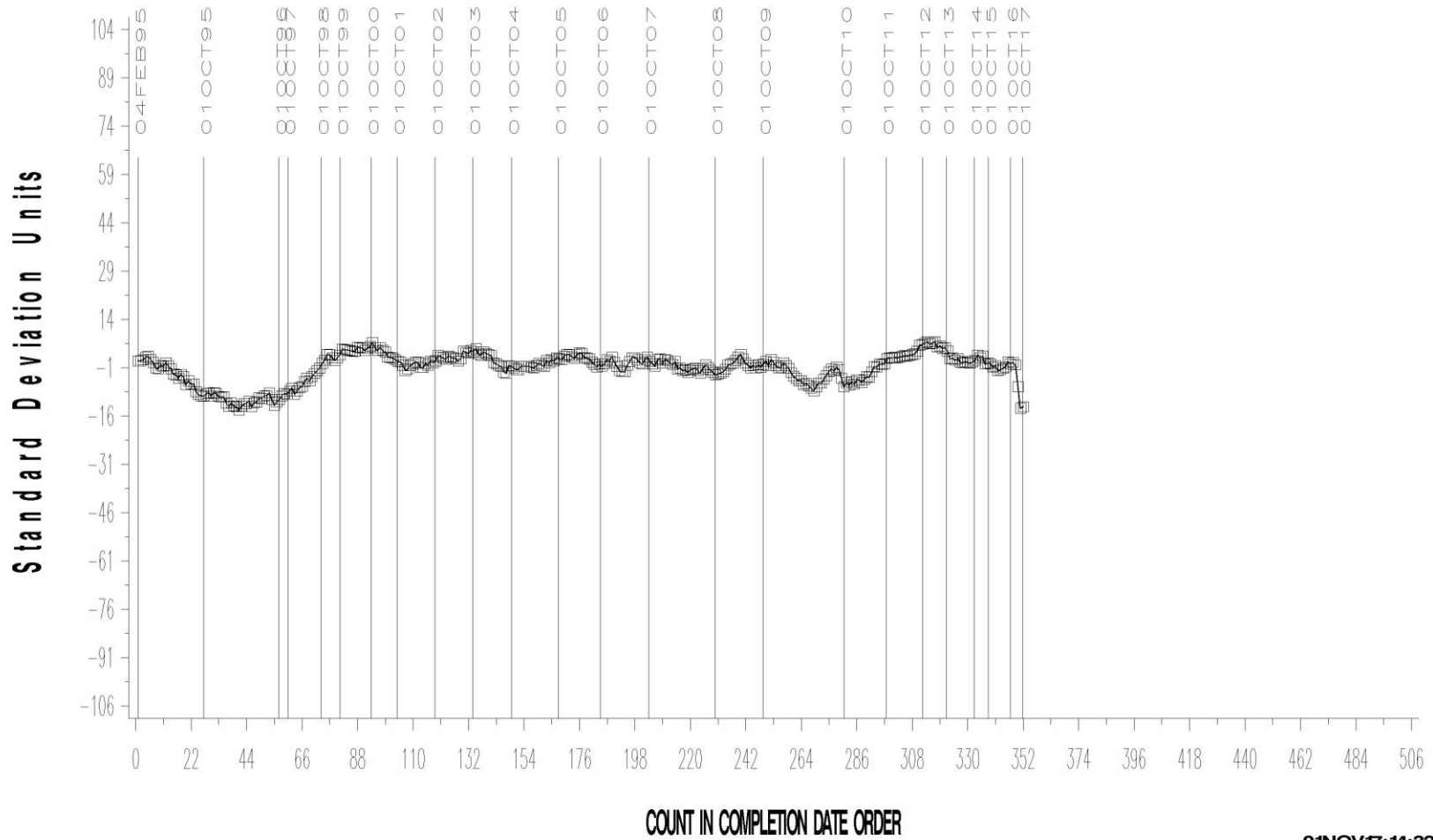
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L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA



## FINAL PINION GEAR RIDGING

CUSUM Severity Analysis



01NOV17:14:32

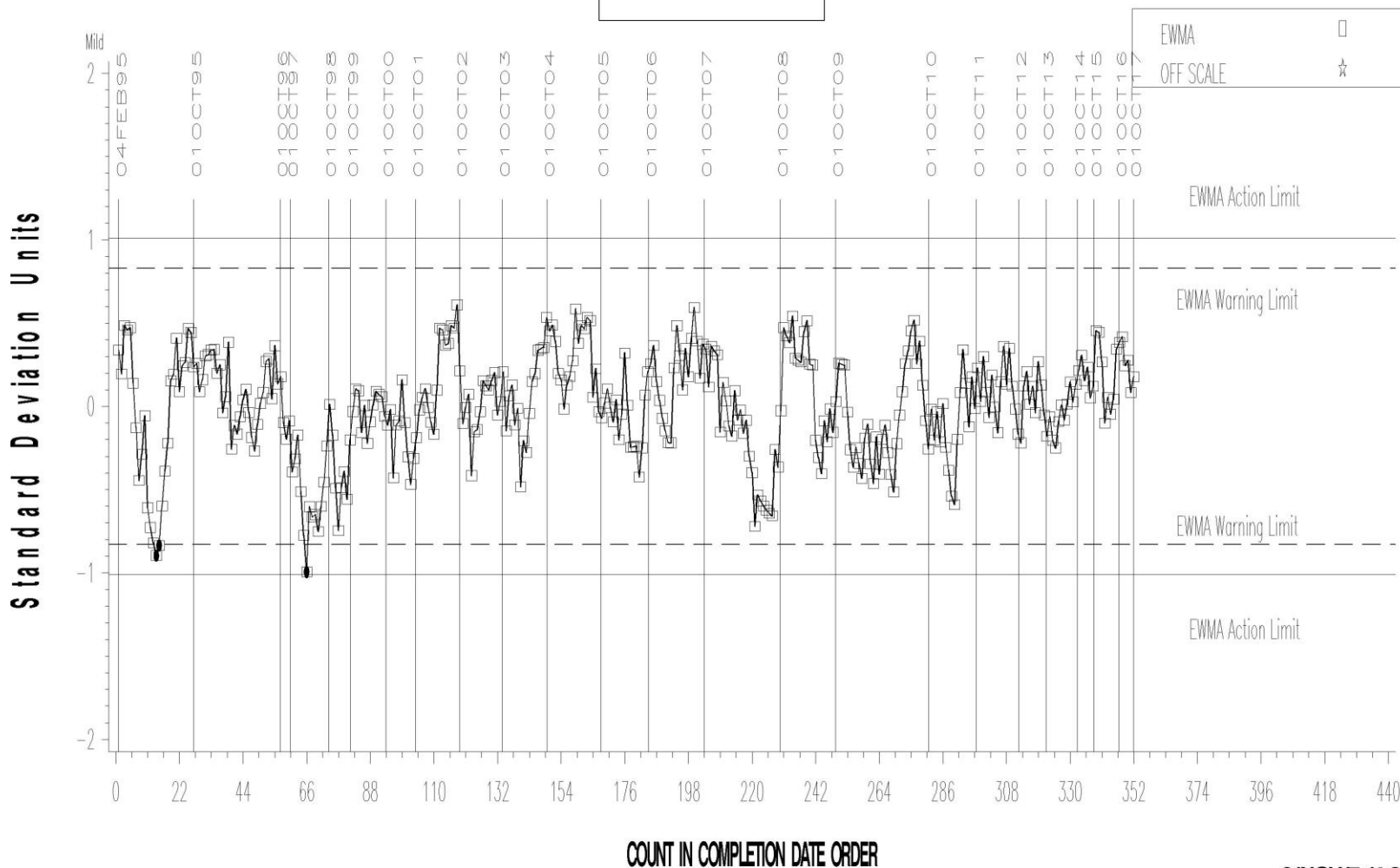
# L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA



## FINAL PINION GEAR RIPPLING

LTMS Severity Analysis



Severe

01NOV17:14:29

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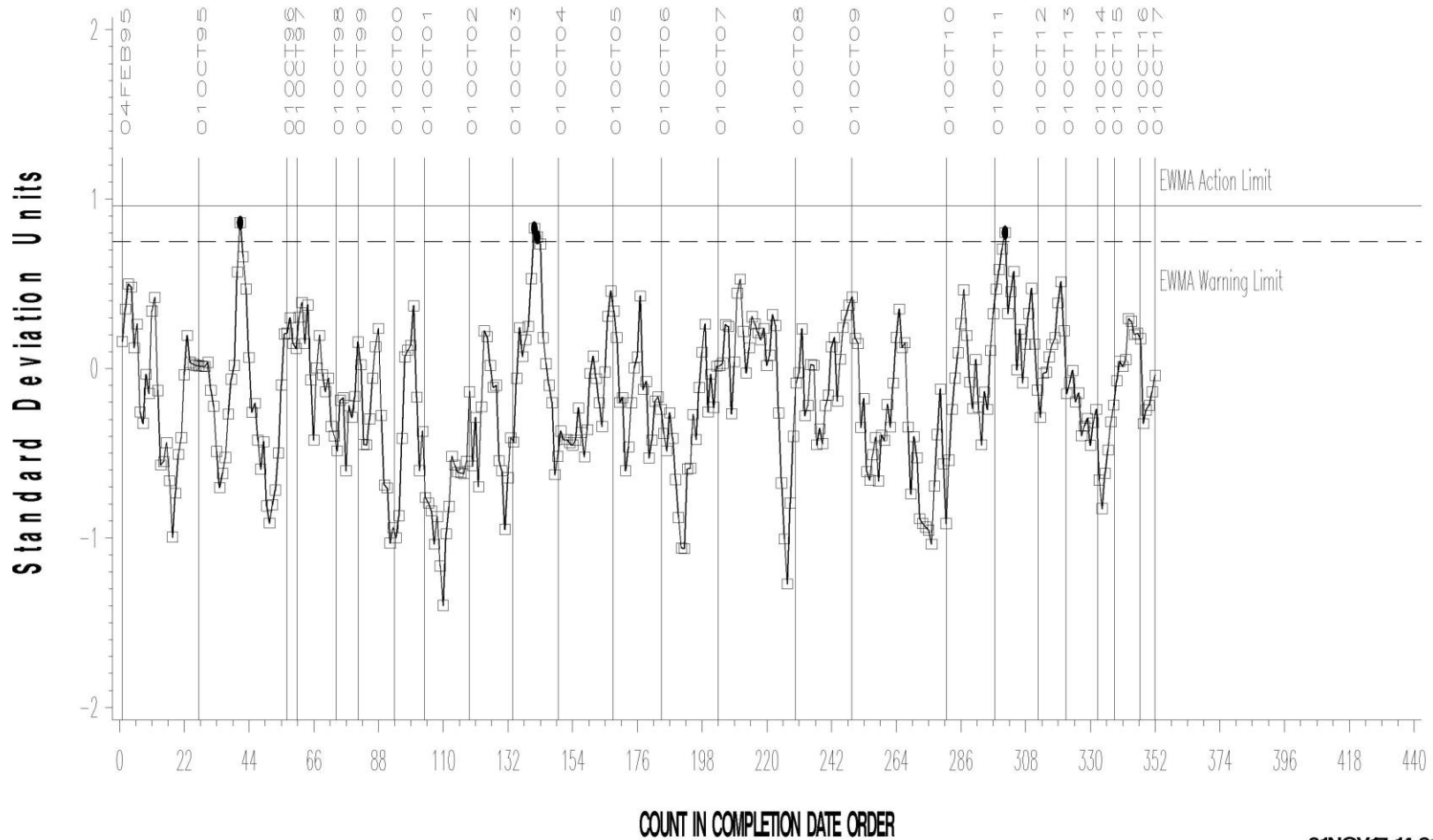
# L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA



## FINAL PINION GEAR RIPPLING

LTMS Precision Analysis



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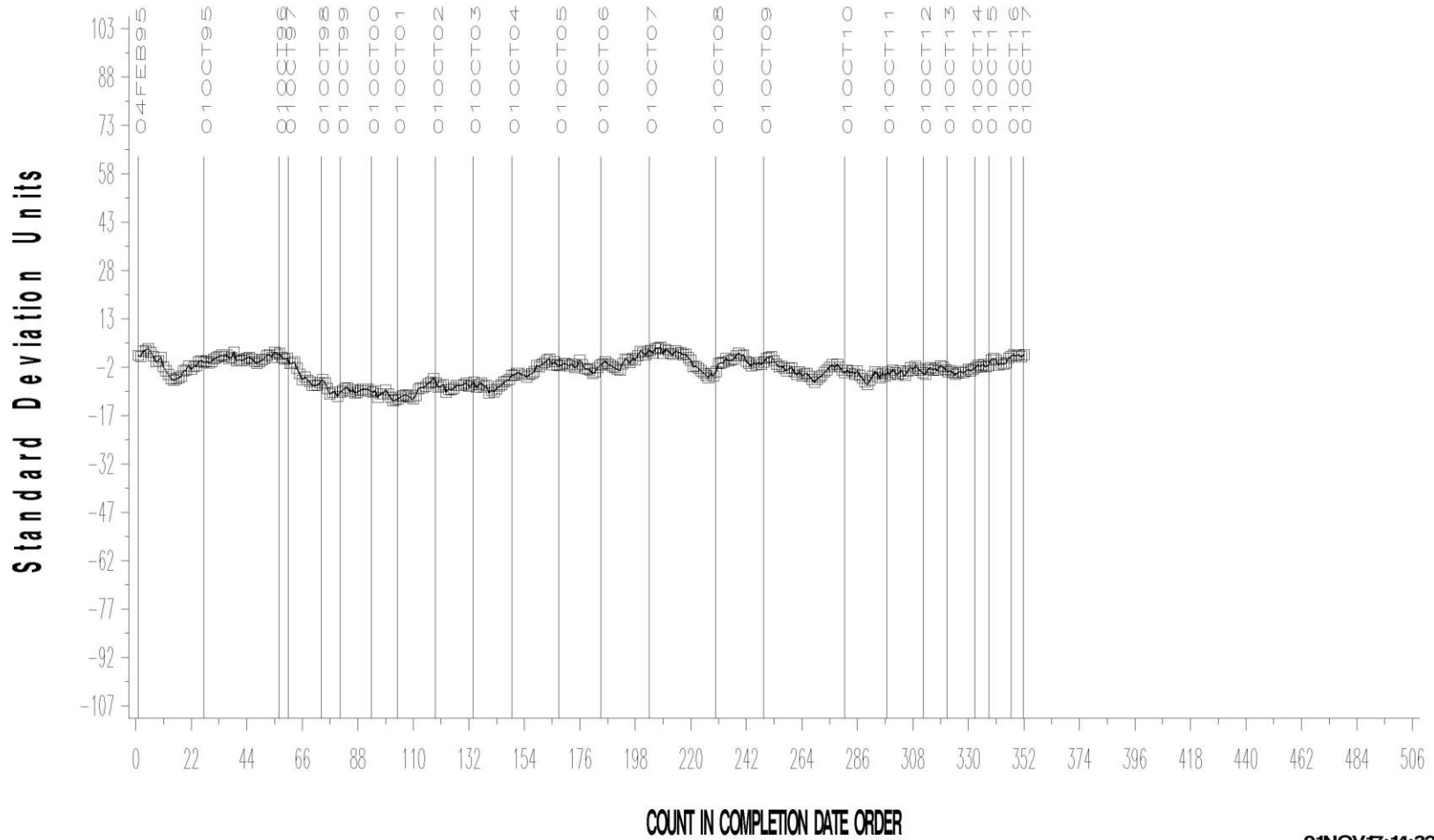
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L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA



## FINAL PINION GEAR RIPPLING

CUSUM Severity Analysis



01NOV17:14:32



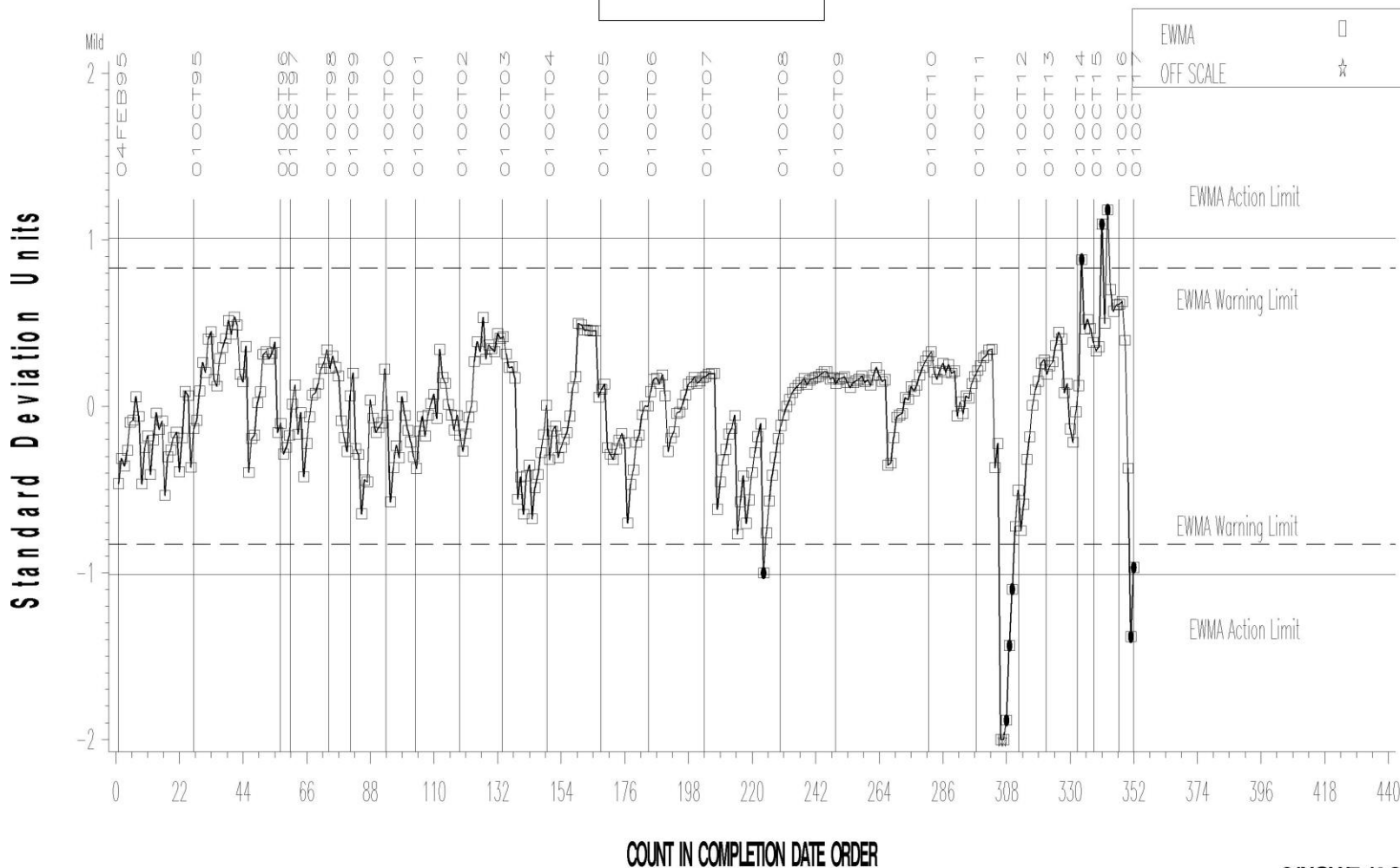
# L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA



## FINAL PINION GEAR PITTING/SPALLING

LTMS Severity Analysis



Severe

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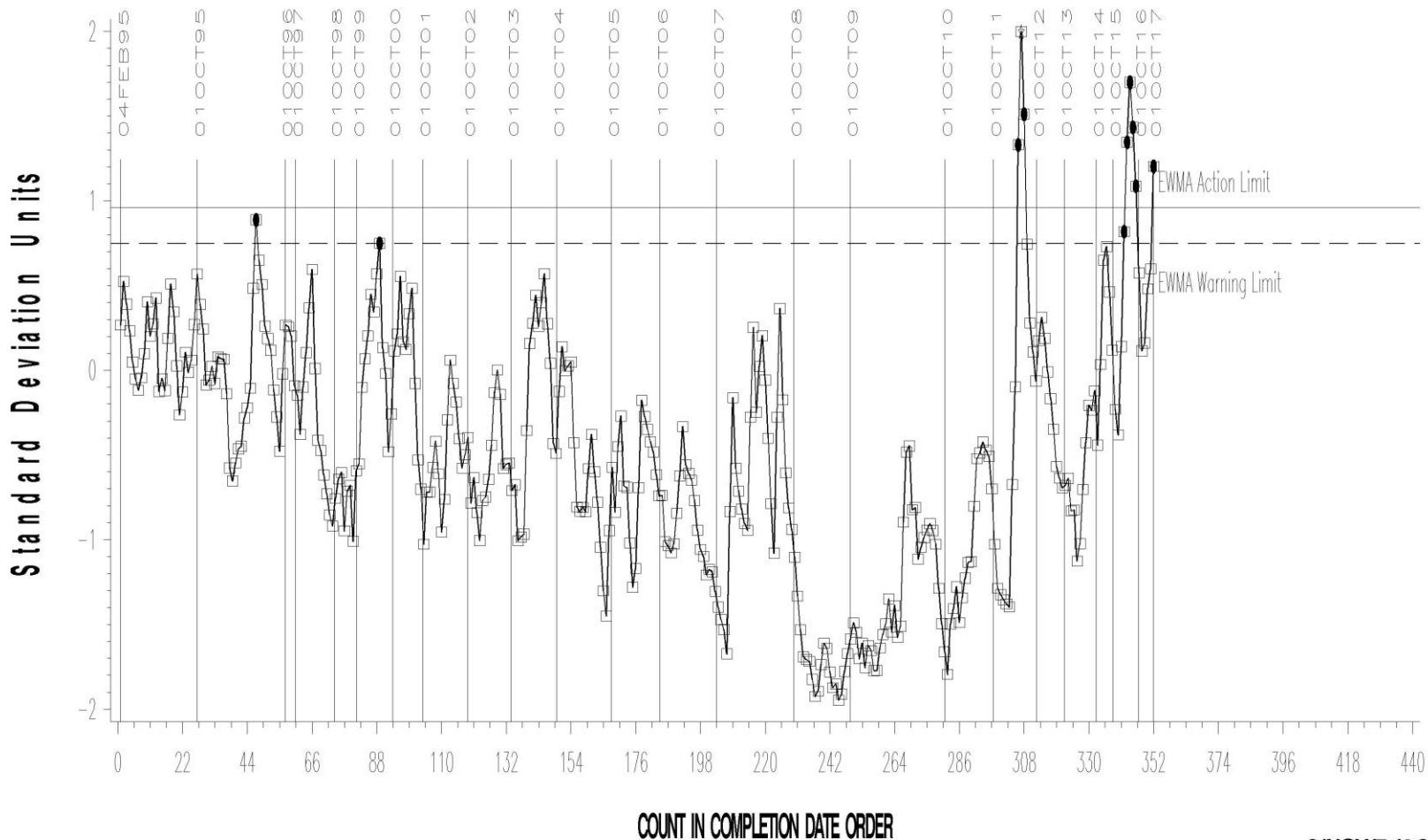
# L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA



## FINAL PINION GEAR PITTING/SPALLING

LTMS Precision Analysis



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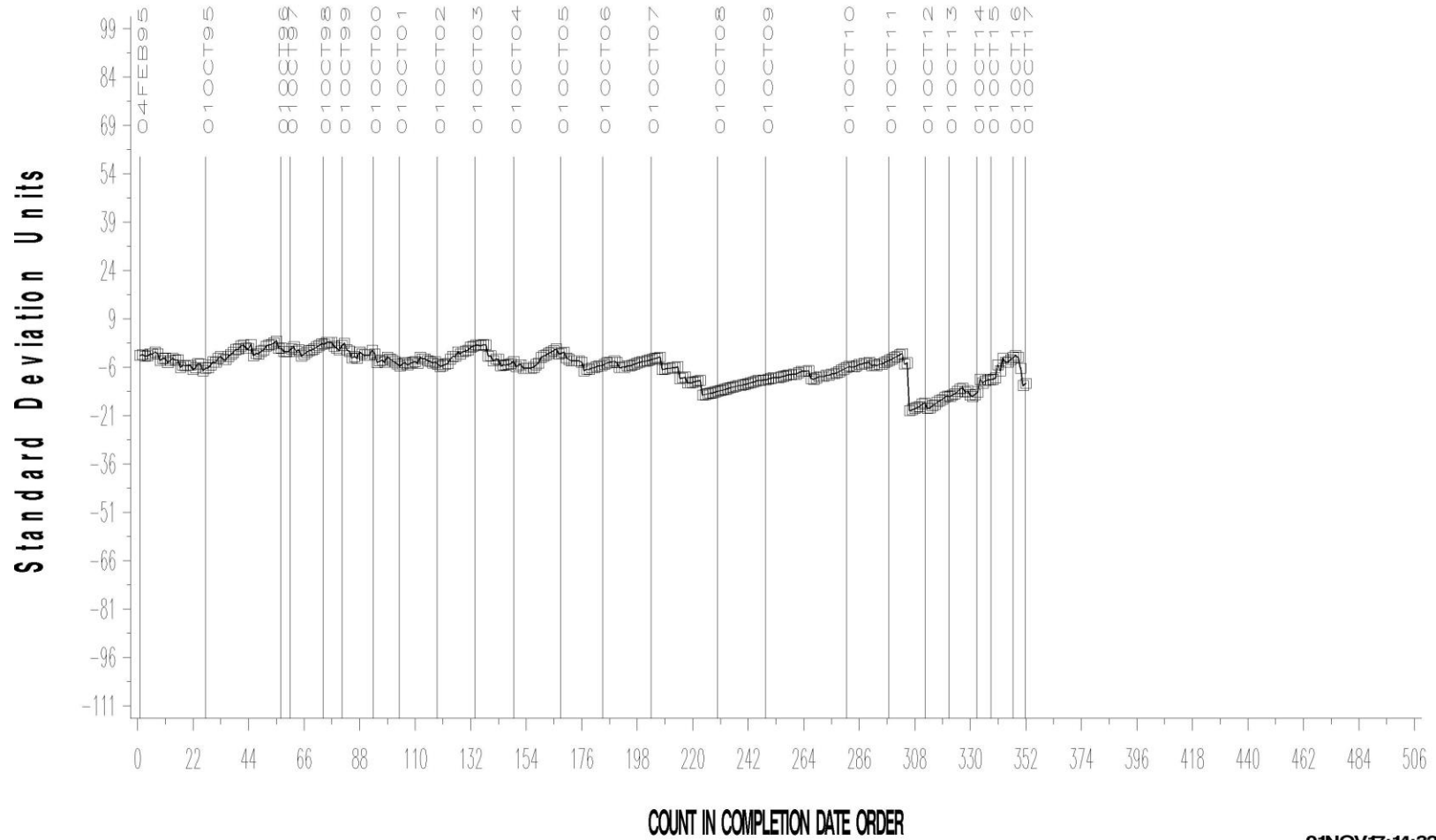
# L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA



## FINAL PINION GEAR PITTING/SPALLING

CUSUM Severity Analysis



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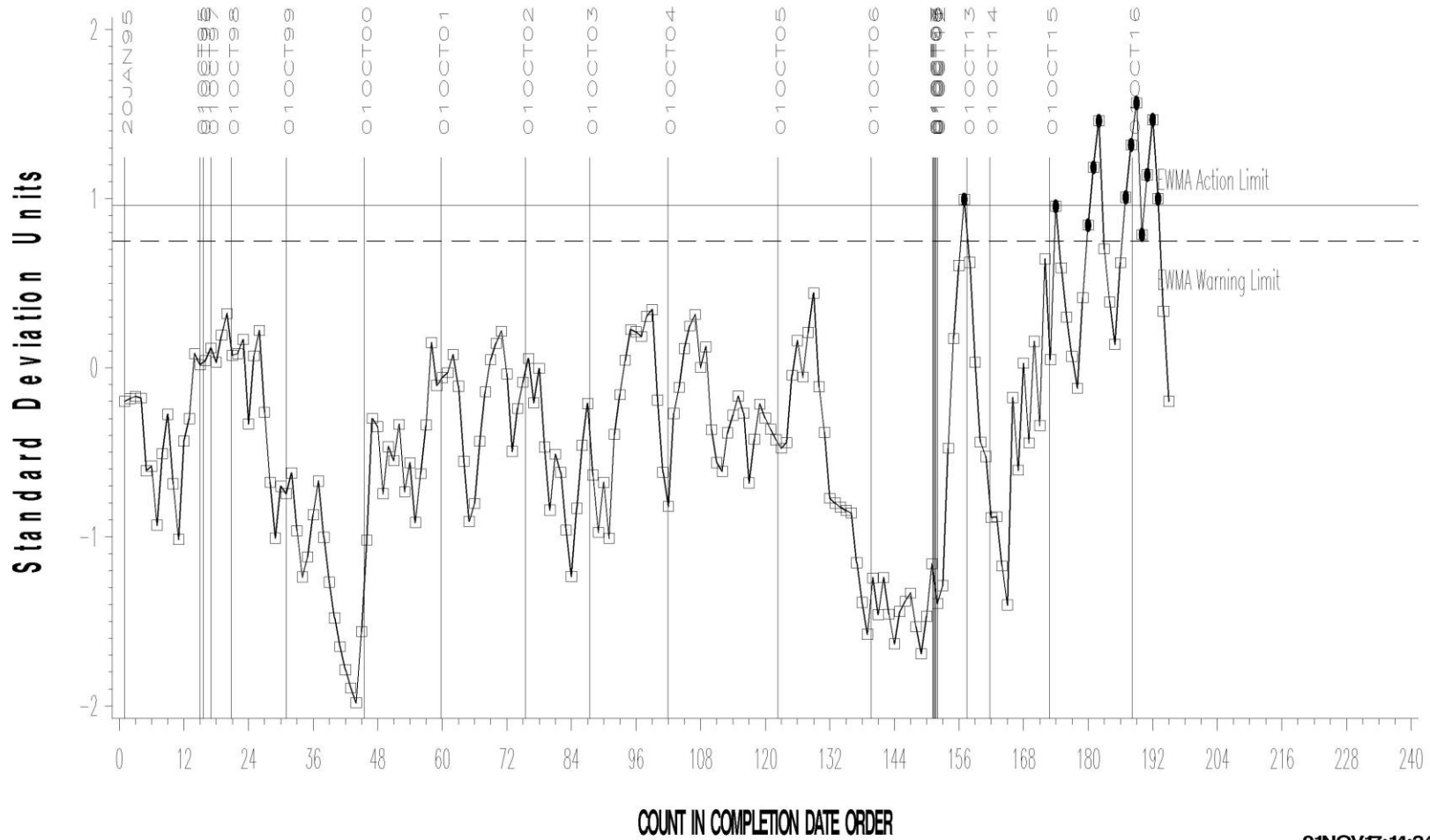


# L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

LTMS Precision Analysis



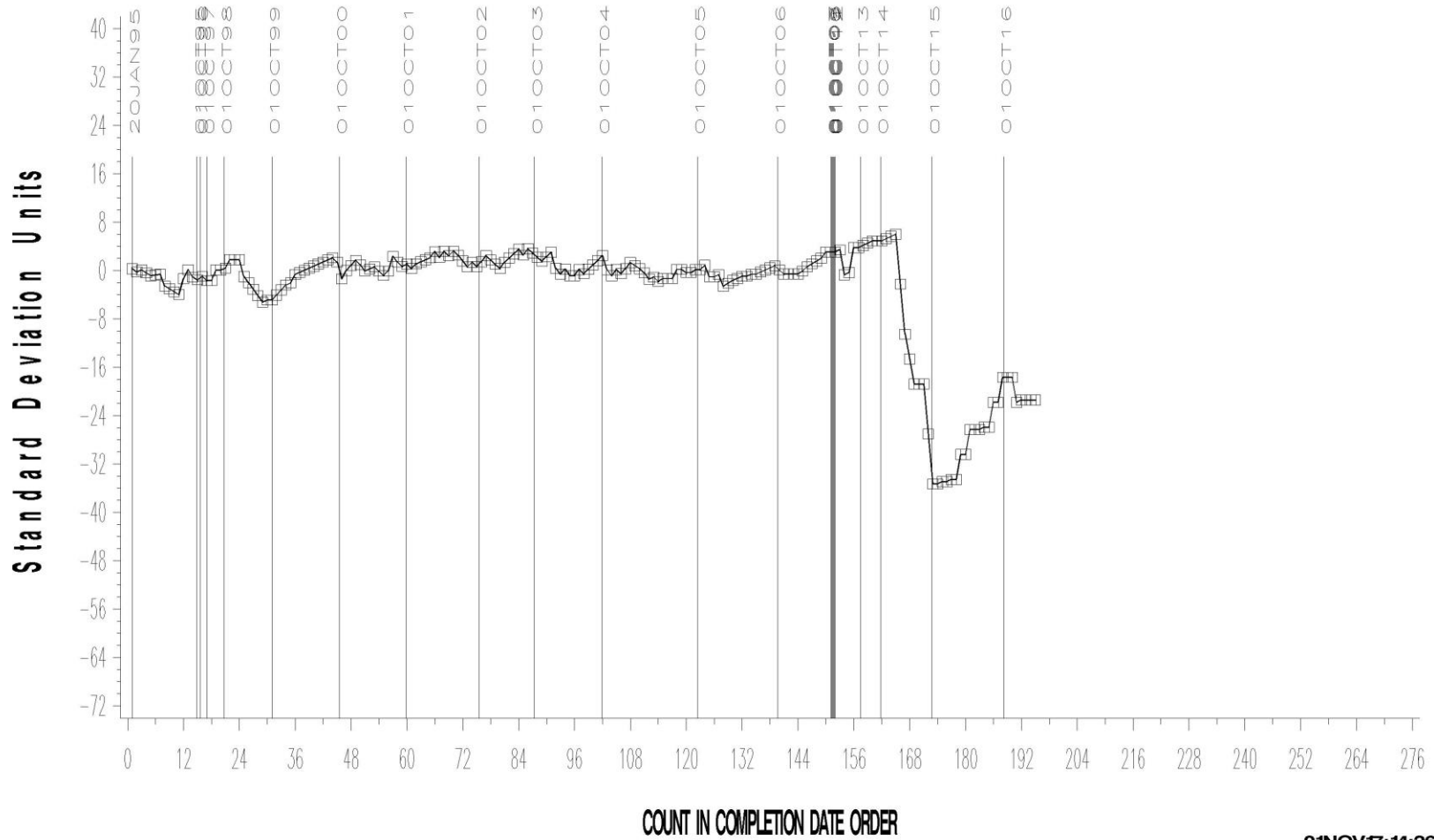
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# L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

CUSUM Severity Analysis



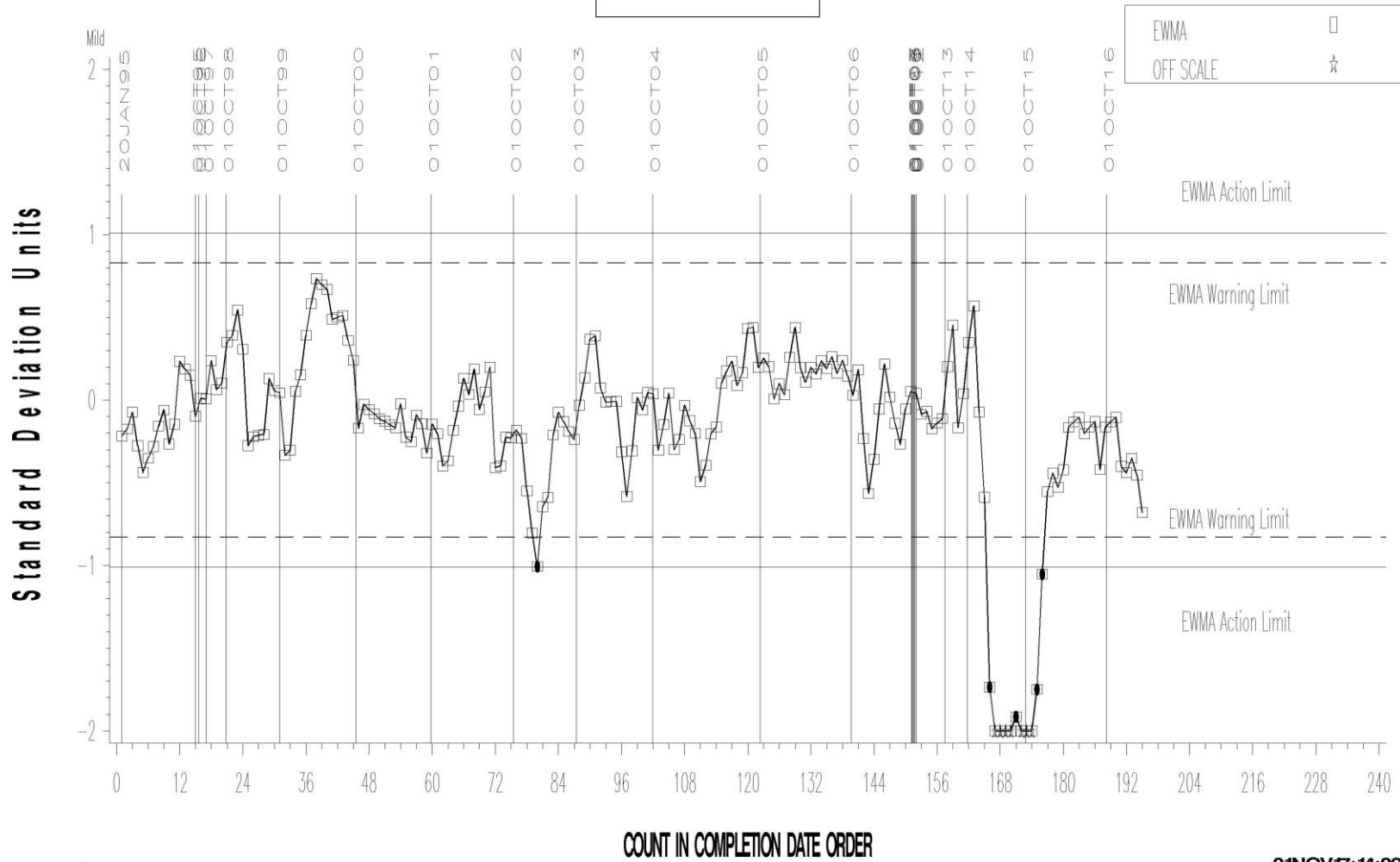
01NOV17:14:26

# L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING

LTMS Severity Analysis



Severe

COUNT IN COMPLETION DATE ORDER

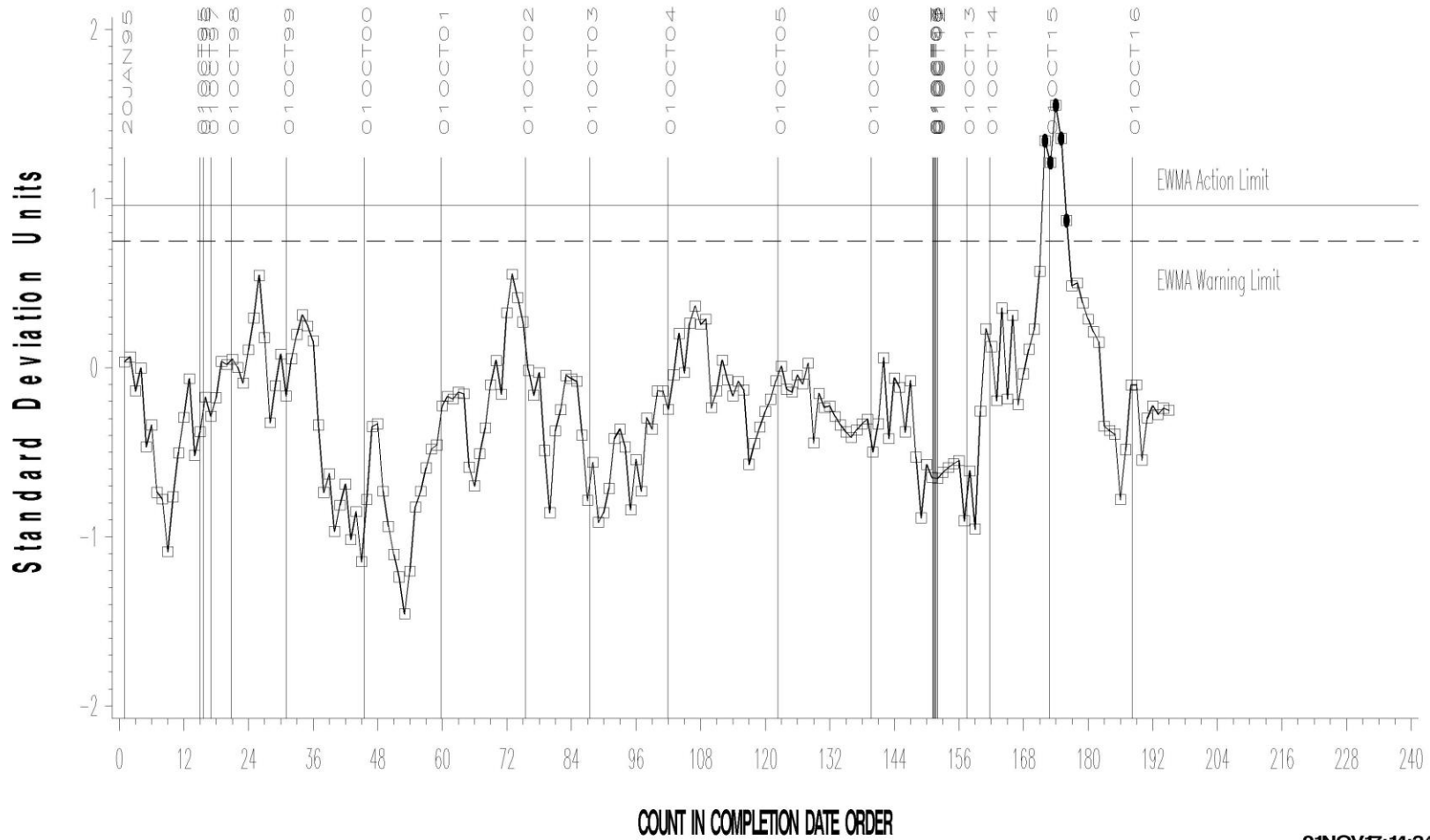
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# L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING

LTMS Precision Analysis



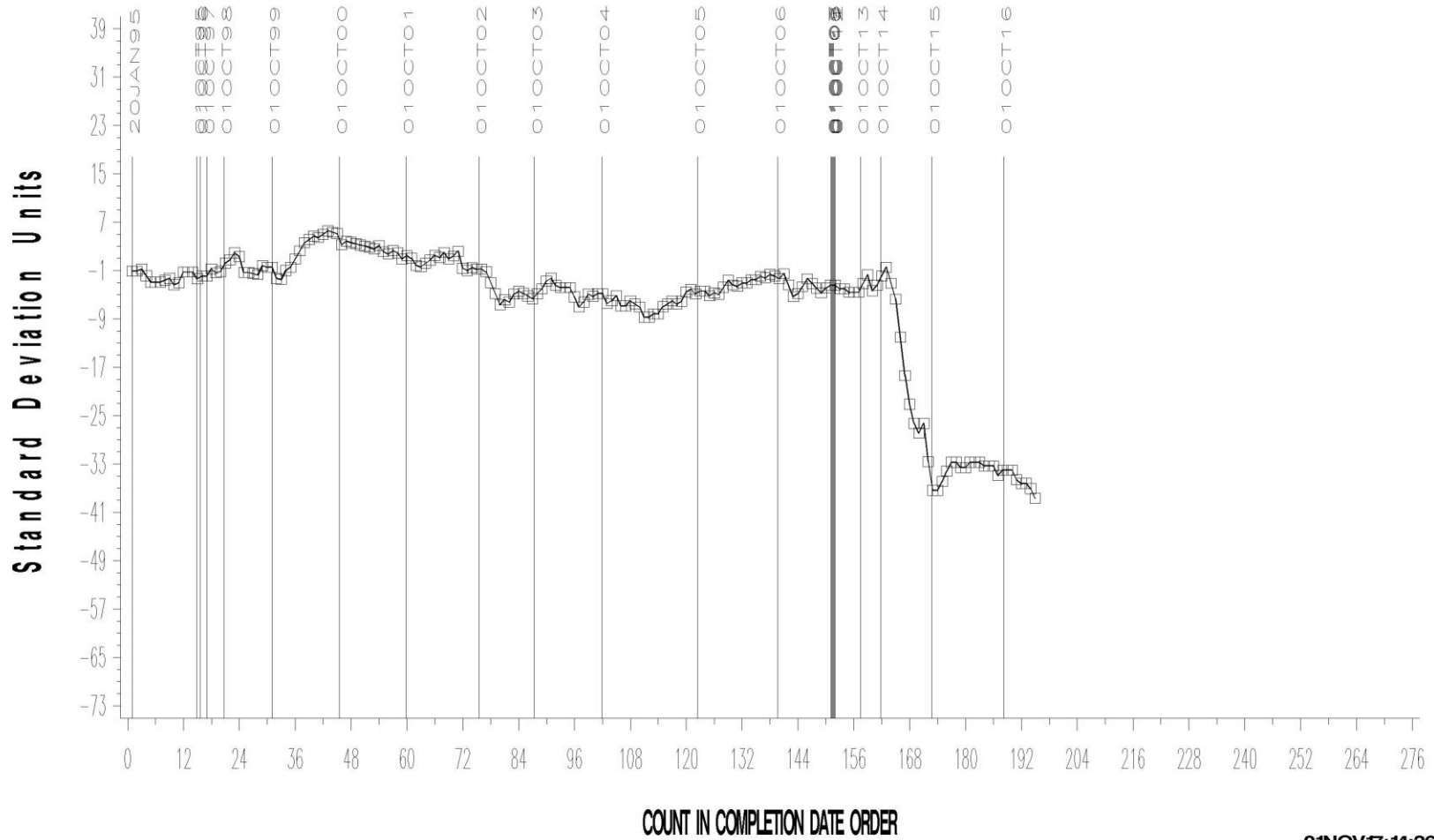
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# L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING

CUSUM Severity Analysis



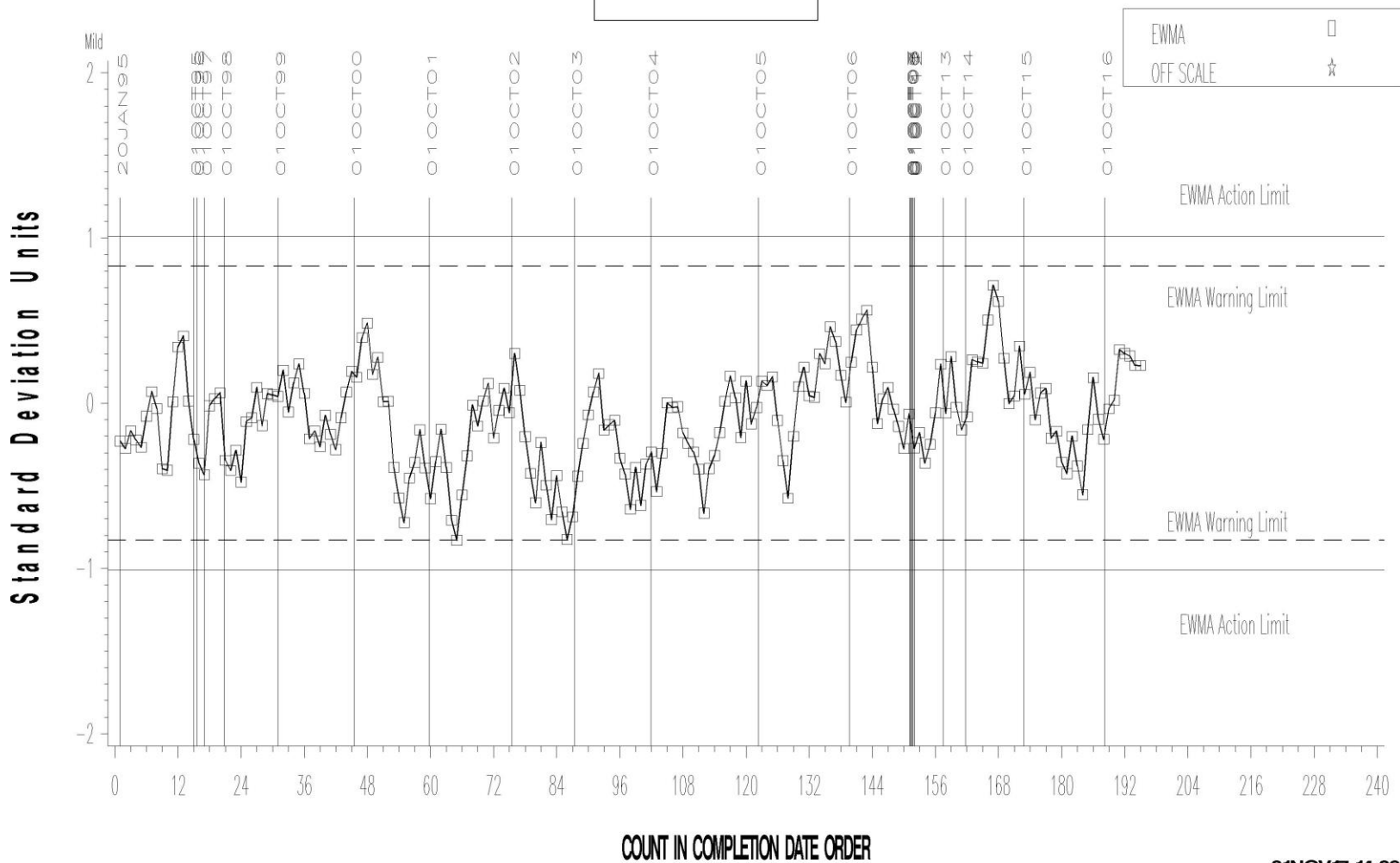
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# L-37 (D6121)

## L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

### FINAL PINION GEAR RIPPLING

LTMS Severity Analysis



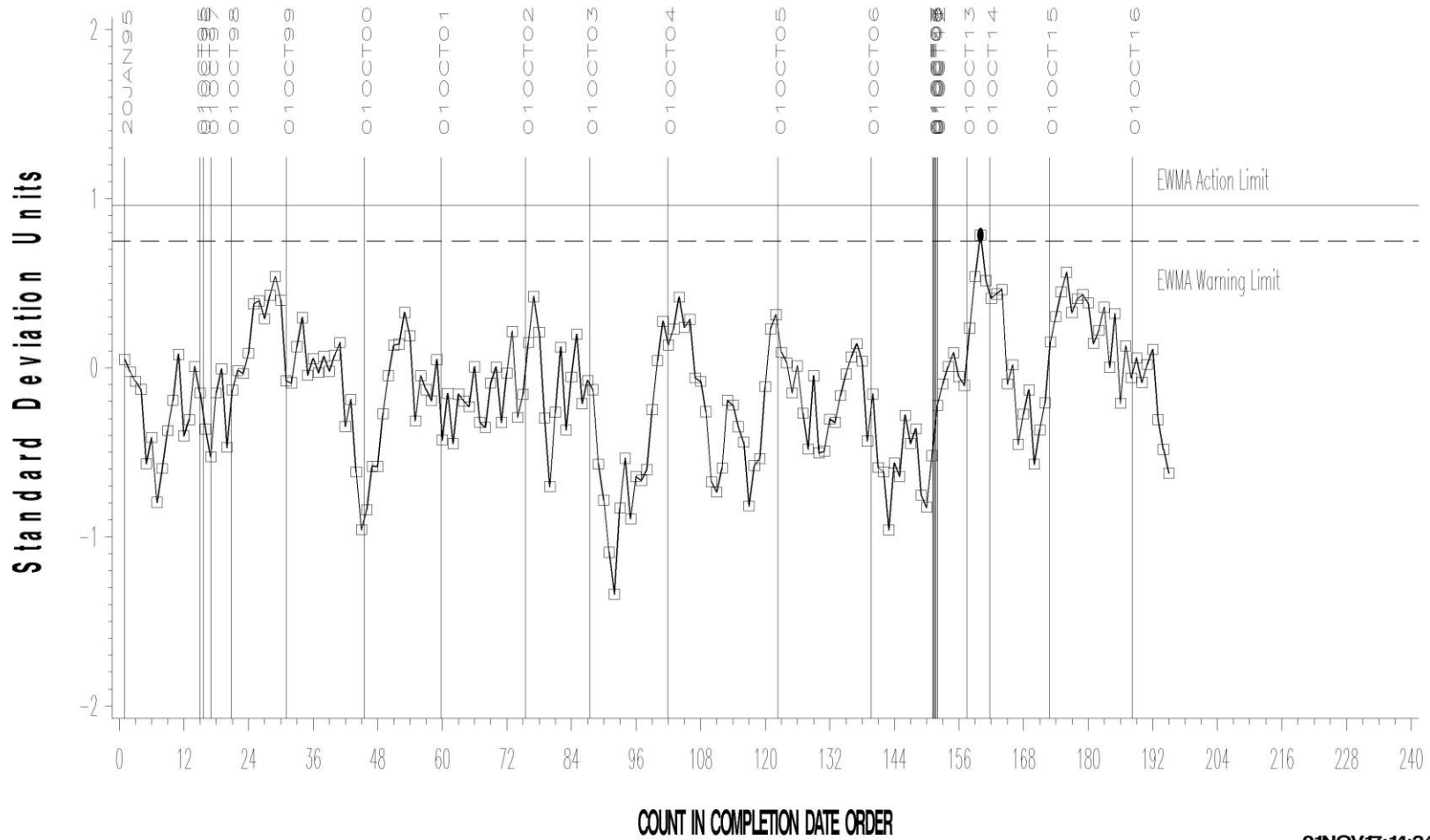


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L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIPPLING

LTMS Precision Analysis



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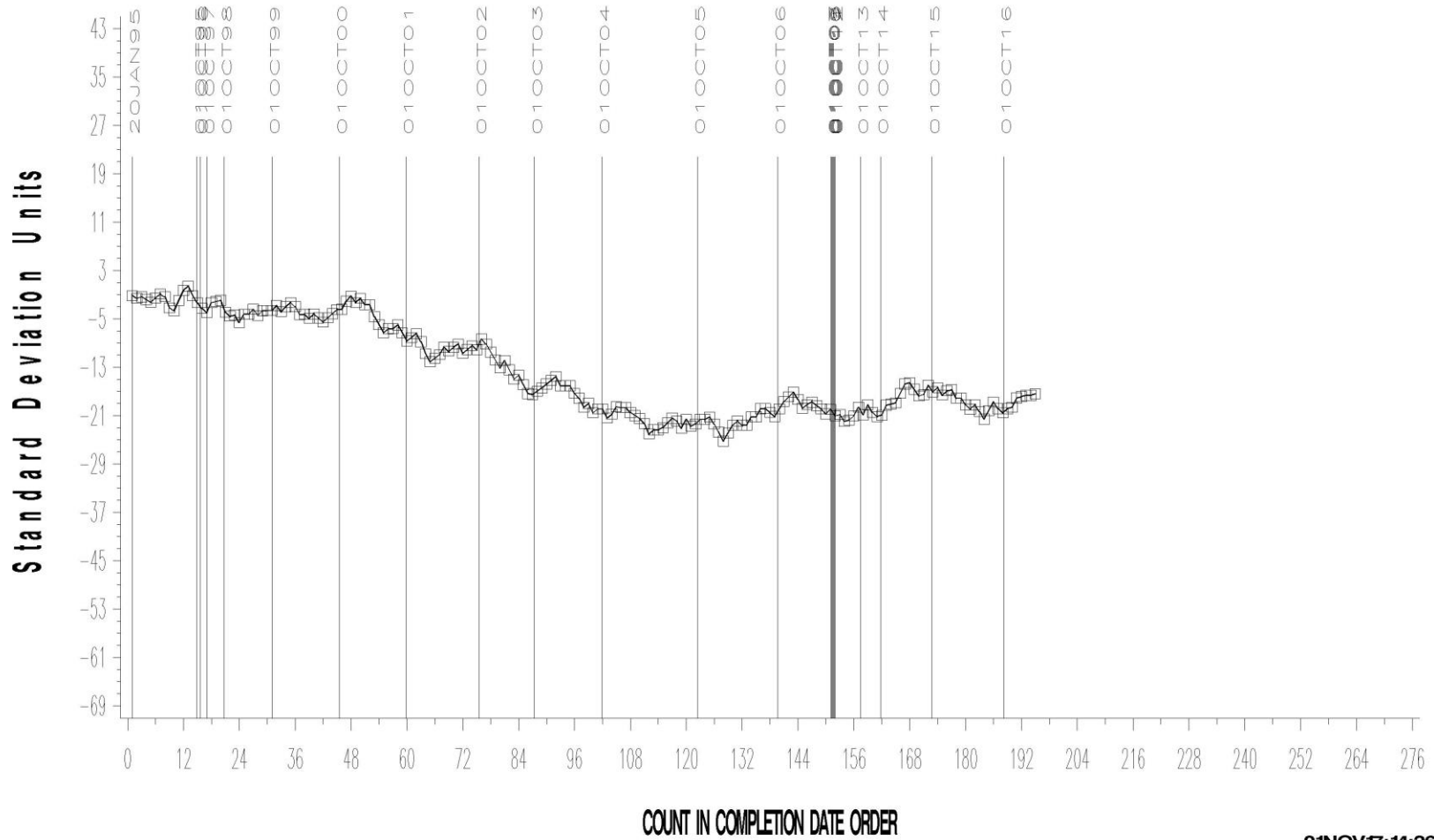


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L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIPPLING

CUSUM Severity Analysis



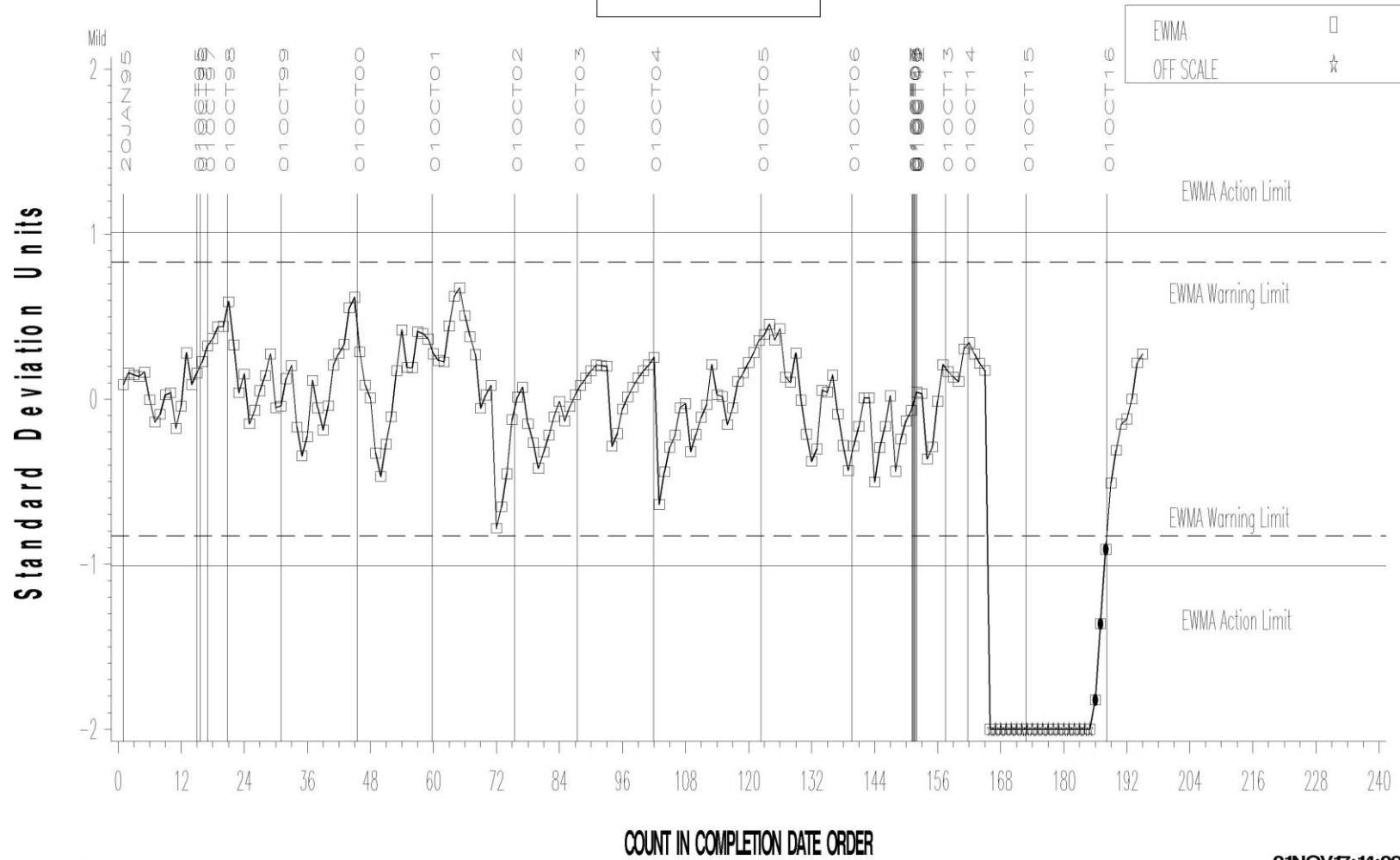
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# L-37 (D6121)

## L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

### FINAL PINION GEAR PITTING/SPALLING

LTMS Severity Analysis



Severe

COUNT IN COMPLETION DATE ORDER

01NOV17:14:09

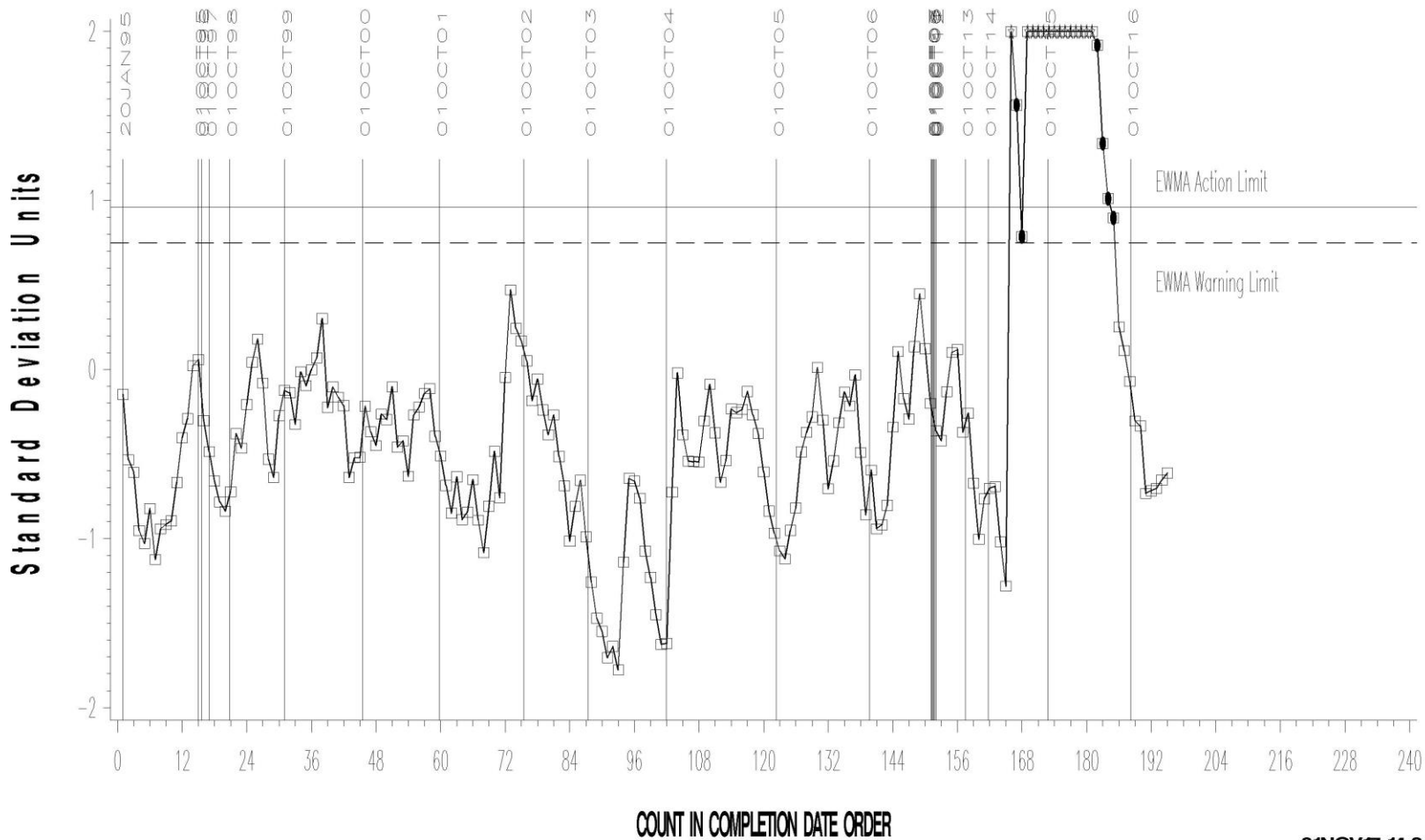
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L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA



## FINAL PINION GEAR PITTING/SPALLING

LTMS Precision Analysis



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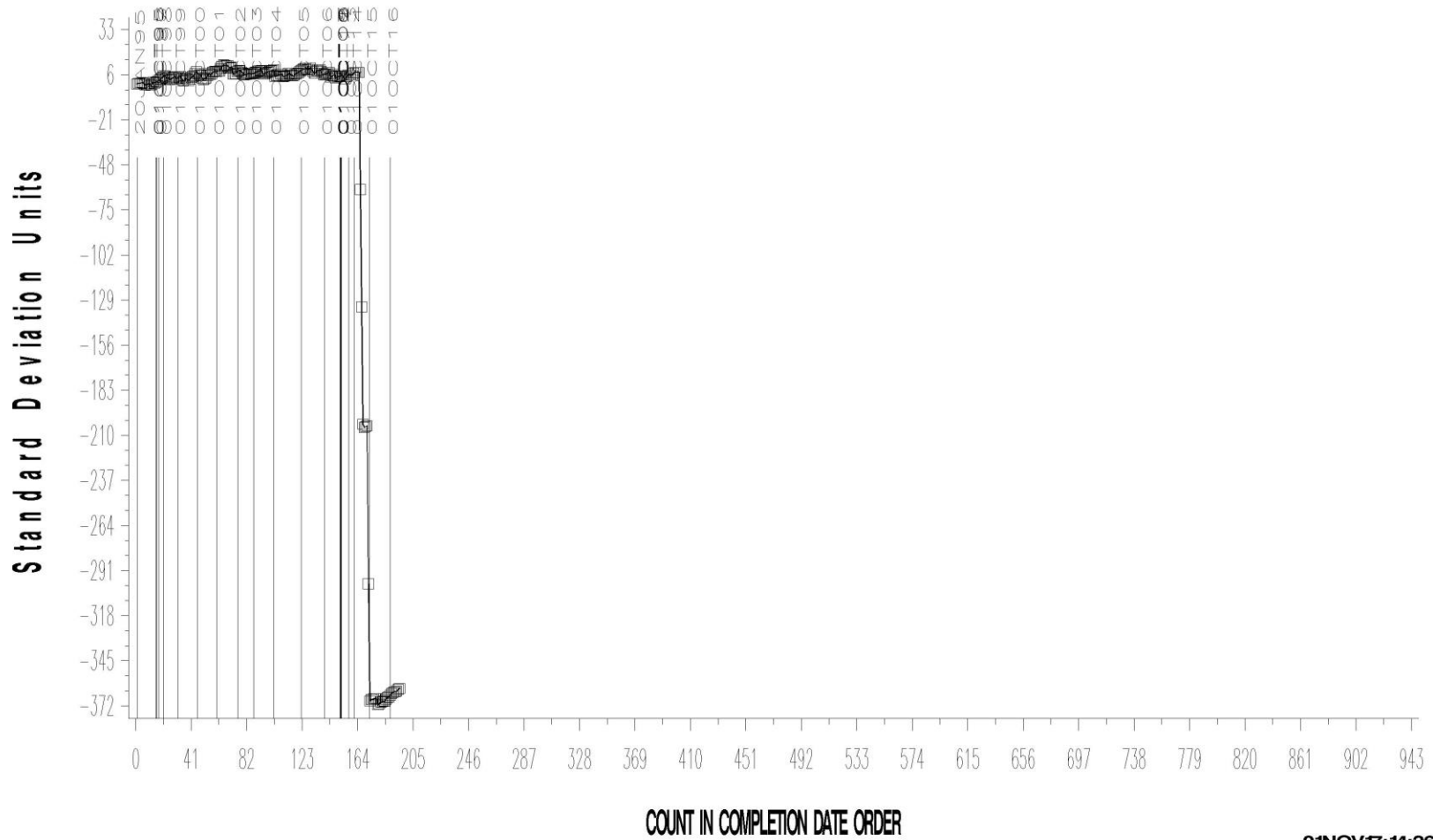
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# L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR PITTING/SPALLING

CUSUM Severity Analysis



01NOV17:14:26

# L-37 (D6121)

## TIMELINE ADDITIONS

Effective Date	Information Letter	Event
		None this period

# L-37 (D6121)

## LAB VISITS

No L-37 lab visits were conducted this report period.

## 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	389	389.5
134	2	0	0.0
134-1	10	204	204.0
152-2	12	144	144.9
153-1	35	0	0.0
155	6	15	15.0
155-1	8	182	182.7
<b>Total</b>	<b>73</b>	<b>934</b>	<b>936.0</b>

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.