




Test Monitoring Center

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

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

MEMORANDUM: 13-052
DATE: October 8, 2013
TO: Chris Prengaman, Chairman, L-37 Surveillance Panel
FROM: Scott Parke 
SUBJECT: L-37 Testing from April 1, 2013 through September 30, 2013

Please find attached a summary of reference oil testing activity this period.

SDP/sdp/mem13-052.sdp.doc

cc: Frank Farber
Jeff Clark

L-37 Surveillance Panel

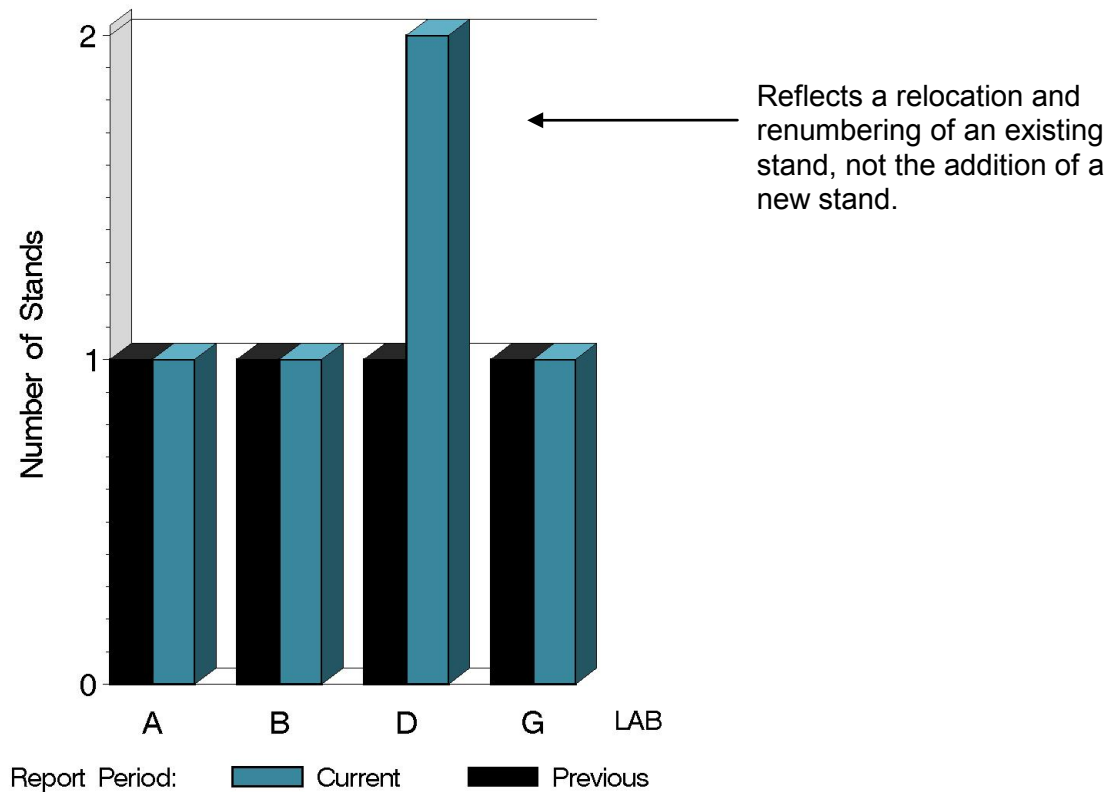
<ftp://ftp.astmtmc.cmu.edu/docs/gear/137/semiannualreports/137-10-2013.pdf>

Distribution: email

L-37 (D6121)

| | Reporting Data | Calibrated on 9-30-13 |
|------------------|----------------|-----------------------|
| Number of Labs | 4 | 3 |
| Number of Stands | 5 | 3 |

BY-LAB STAND
DISTRIBUTION



15:09:32 07OCT2013

L-37 (D6121)

Test Distribution by Oil and Validity

| | | 134 | 152-1 | 152-2 | 155 | Totals | |
|--------------------------|----|-----|-------|-------|-----|-------------|-------------|
| | | | | | | Last Period | This Period |
| Accepted for calibration | AC | 2 | 2 | 0 | 4 | 7 | 8 |
| Rejected (Mild) | OC | 0 | 0 | 0 | 0 | 0 | 0 |
| Rejected (Severe) | OC | 0 | 0 | 0 | 0 | 0 | 0 |
| Rejected (Precision) | OC | 0 | 0 | 0 | 0 | 0 | 0 |
| Invalidated calibration | LC | 0 | 0 | 0 | 0 | 0 | 0 |
| Acceptable info run | NI | 1 | 0 | 0 | 1 | 34 | 2 |
| Unacceptable info run | MI | 1 | 0 | 0 | 0 | 0 | 1 |
| Total | | 0 | 0 | 0 | 0 | 41 | 11 |

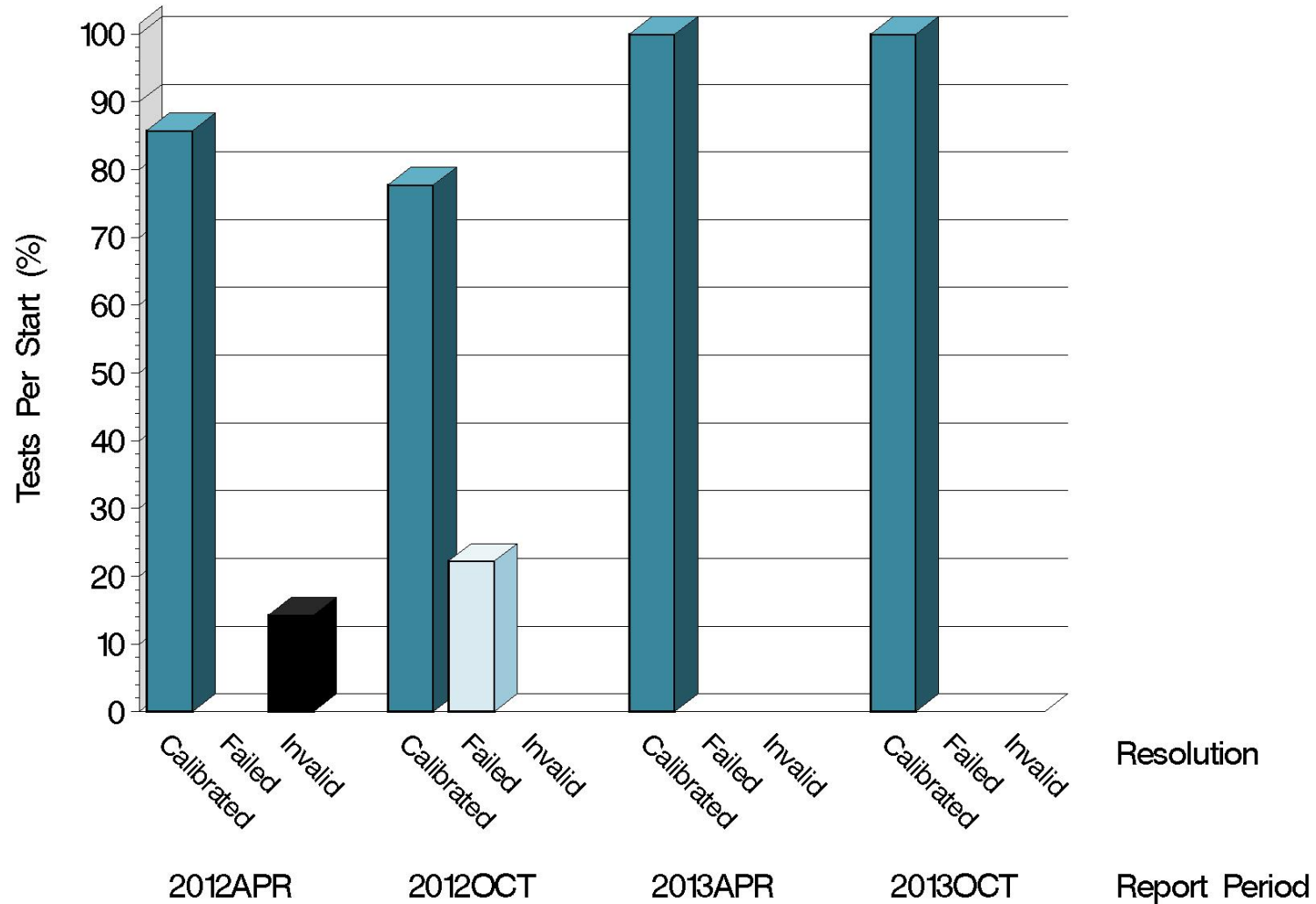
L-37 (D6121)

Calibration Attempt Detail

| | Gear Batch | Acceptable | Failed | Total |
|-------------|----------------|------------|--------|-------|
| LUBRITED | V1L500/P4T813 | 0 | 0 | 0 |
| | V1L528/P4T883A | 3 | 0 | 3 |
| | Total | 3 | 0 | 3 |
| NONLUBRITED | V1L500/P4T813 | 2 | 0 | 2 |
| | V1L528/P4T883A | 3 | 0 | 3 |
| | Total | 5 | 0 | 5 |

L-37 (D6121)

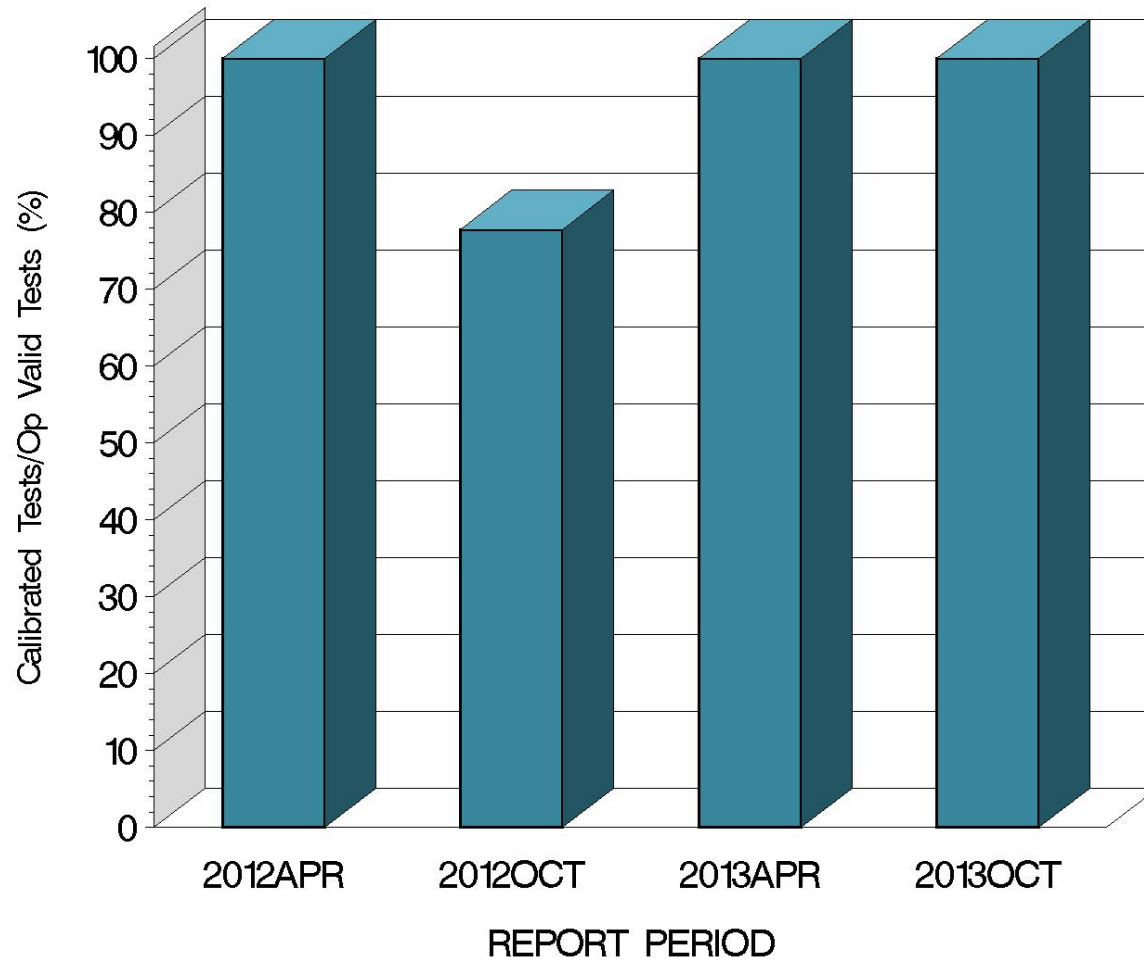
CALIBRATION ATTEMPT SUMMARY



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L-37 (D6121)

OPERATIONALLY VALID TESTS
MEETING ACCEPTANCE CRITERIA



15:09:32 07OCT2013

L-37 (D6121)

CAUSES FOR LOST TESTS

| | | Oil | | | | Validity | | | Loss Rate | | |
|-----|---------------------------------|-----|-------|-------|-----|----------|----|----|-----------|--------|----|
| Lab | Cause | 134 | 152-1 | 152-2 | 155 | RC | LC | XC | Lost | Starts | % |
| | No tests were lost this period. | | | | | | | | 0 | 11 | 0% |
| | Lost | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | |
| | Starts | 4 | 2 | 0 | 5 | 11 | 11 | 11 | | | |
| | % | 0% | 0% | 0% | 0% | 0% | 0% | 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 | 3 | -0.198 | 0.343 | -0.198 | -0.283 |
| RIPP | V1L528/P4T883A | 3 | 0.775 | 0.609 | 0.775 | 0.369 |
| SPIT | V1L528/P4T883A | 3 | 0.732 | 0.634 | 0.732 | 0.424 |
| WEAR | V1L528/P4T883A | 3 | 1.501 | 2.286 | 1.501 | 0.779 |

^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 | V1L500/P4T813 | 2 | -0.792 | 1.428 | -0.273 | -0.182 |
| | V1L528/P4T883A | 3 | 0.073 | 0.617 | | |
| RIPP | V1L500/P4T813 | 2 | -0.723 | 0.067 | 0.033 | 0.019 |
| | V1L528/P4T883A | 3 | 0.538 | 0.965 | | |
| SPIT | V1L500/P4T813 | 2 | 0.421 | 0.090 | 0.530 | 0.448 |
| | V1L528/P4T883A | 3 | 0.602 | 0.222 | | |
| WEAR | V1L500/P4T813 | 2 | 1.034 | 0.009 | 0.160 | 0.114 |
| | V1L528/P4T883A | 3 | -0.423 | 1.192 | | |

^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 | | | | | | |
|-----------------------|-----|---|--------|--------|-------|--------|
| Gear Batch | Lab | N | RIDG | RIPP | SPIT | WEAR |
| V1L528/P4T883A | A | 1 | -0.594 | 0.203 | 0.000 | 0.370 |
| | B | 1 | 0.000 | 0.707 | 1.099 | 4.132 |
| | D | 1 | 0.000 | 1.414 | 1.099 | 0.000 |
| | | | | | | |
| | | | | | | |
| NON-LUBRITED HARDWARE | | | | | | |
| Gear Batch | Lab | N | RIDG | RIPP | SPIT | WEAR |
| V1L500/P4T813 | D | 2 | -0.792 | -0.723 | 0.421 | 1.034 |
| V1L528/P4T883A | A | 1 | -0.635 | -0.434 | 0.697 | 0.499 |
| | B | 1 | 0.354 | 1.496 | 0.349 | 0.000 |
| | G | 1 | 0.499 | 0.552 | 0.760 | -1.769 |

L-37 (D6121)

SUMMARY OF SEVERITY & PRECISION

Severity

Testing on both lubrited and non-lubrited hardware remained within control chart limits this period.

Precision

With the exception of WEAR on lubrited hardware, precision performance remained within control chart limits. See LTMS Deviations following the industry control charts.

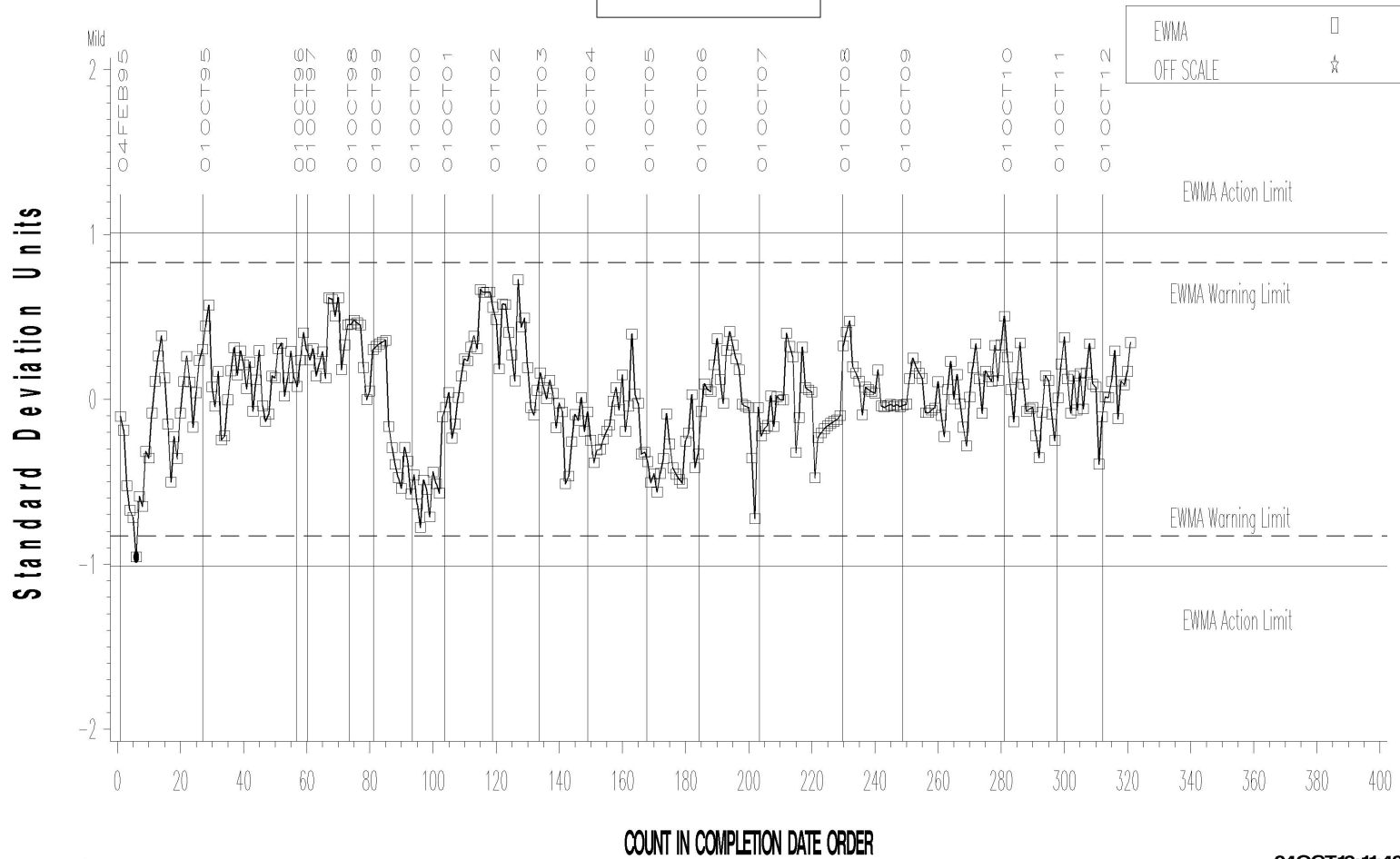
Industry control charts follow.

L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

LTMS Severity Analysis



Severe

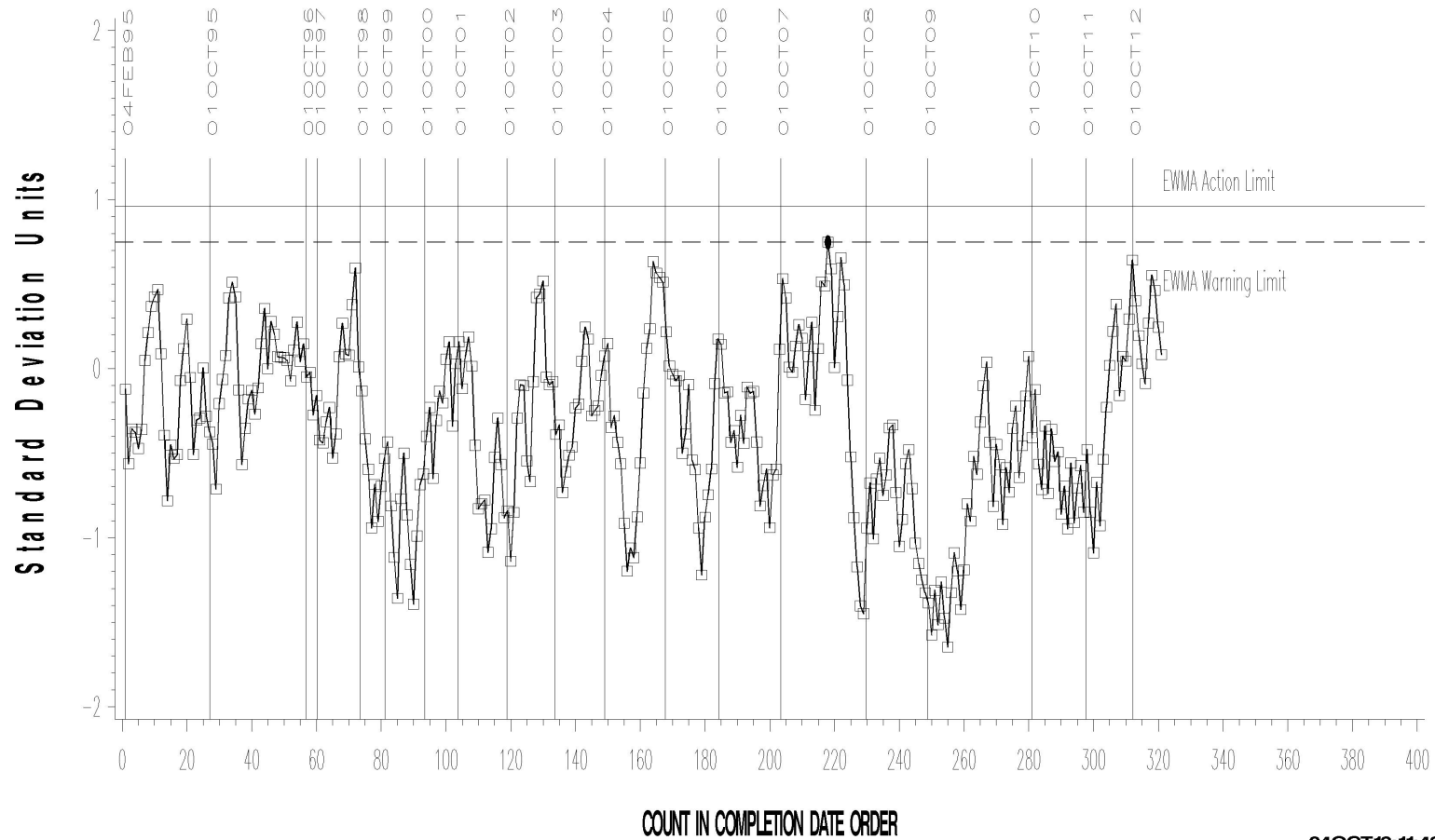
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L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

LTMS Precision Analysis



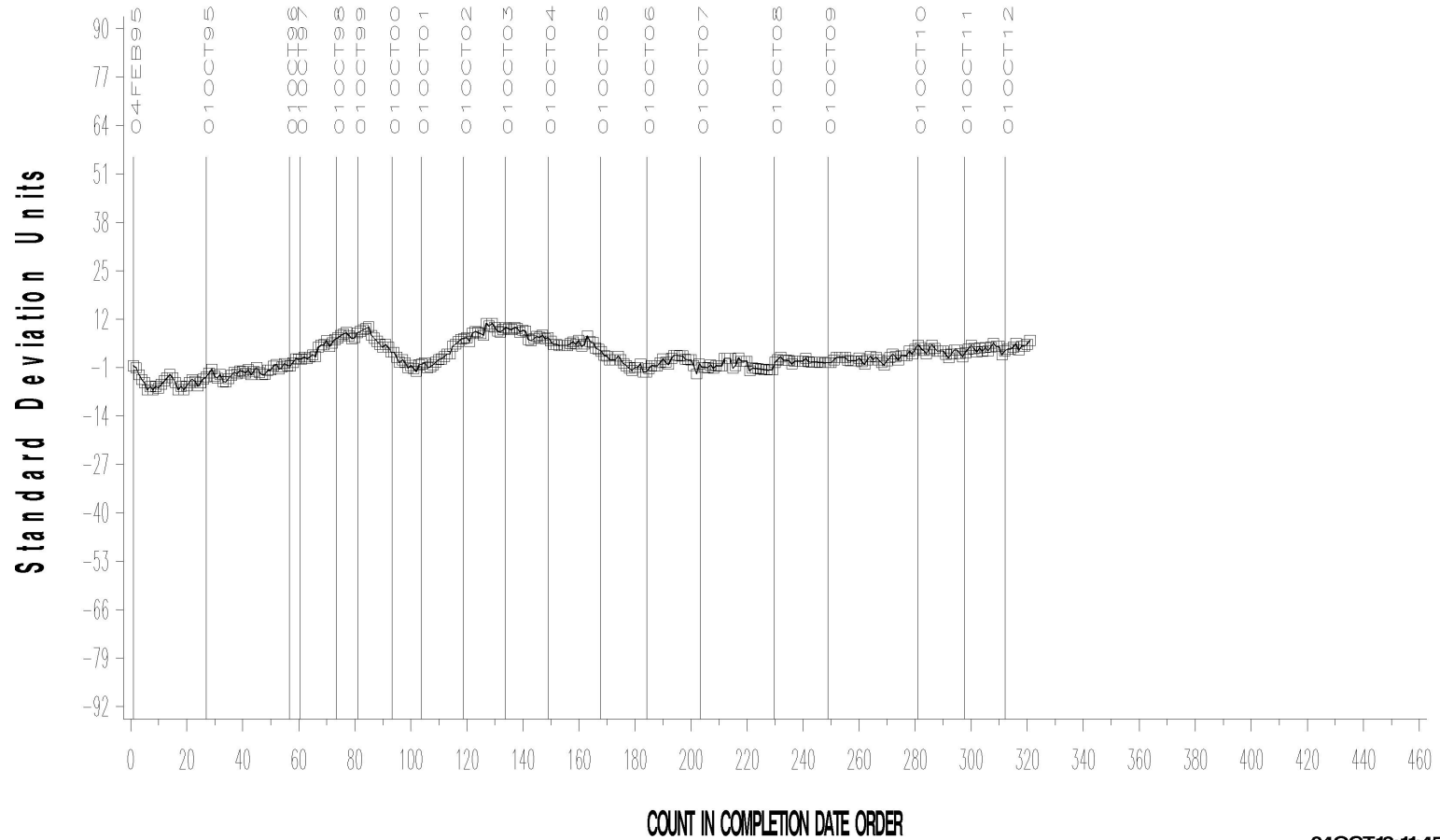
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L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

CUSUM Severity Analysis



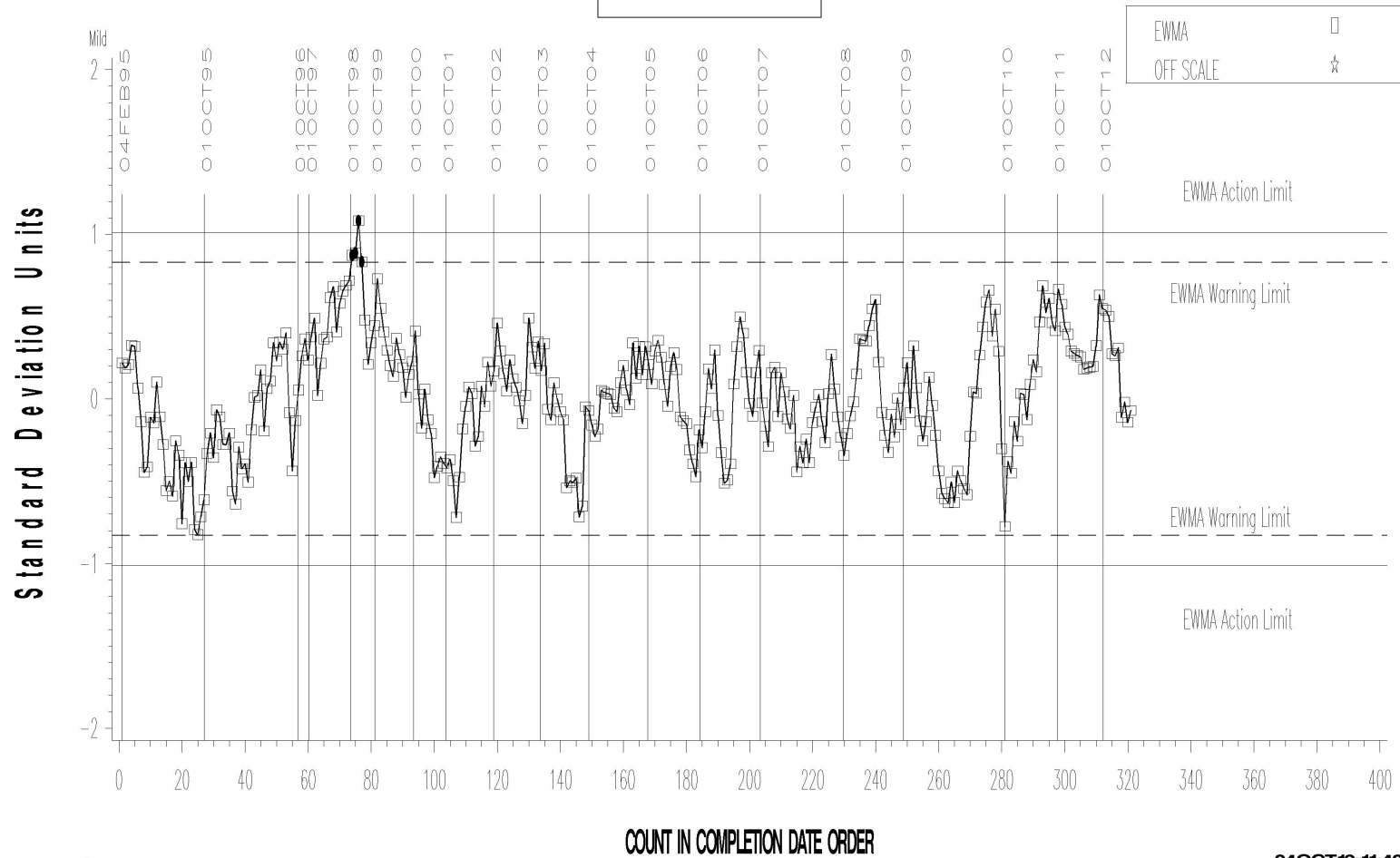
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L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING

LTMS Severity Analysis



Severp

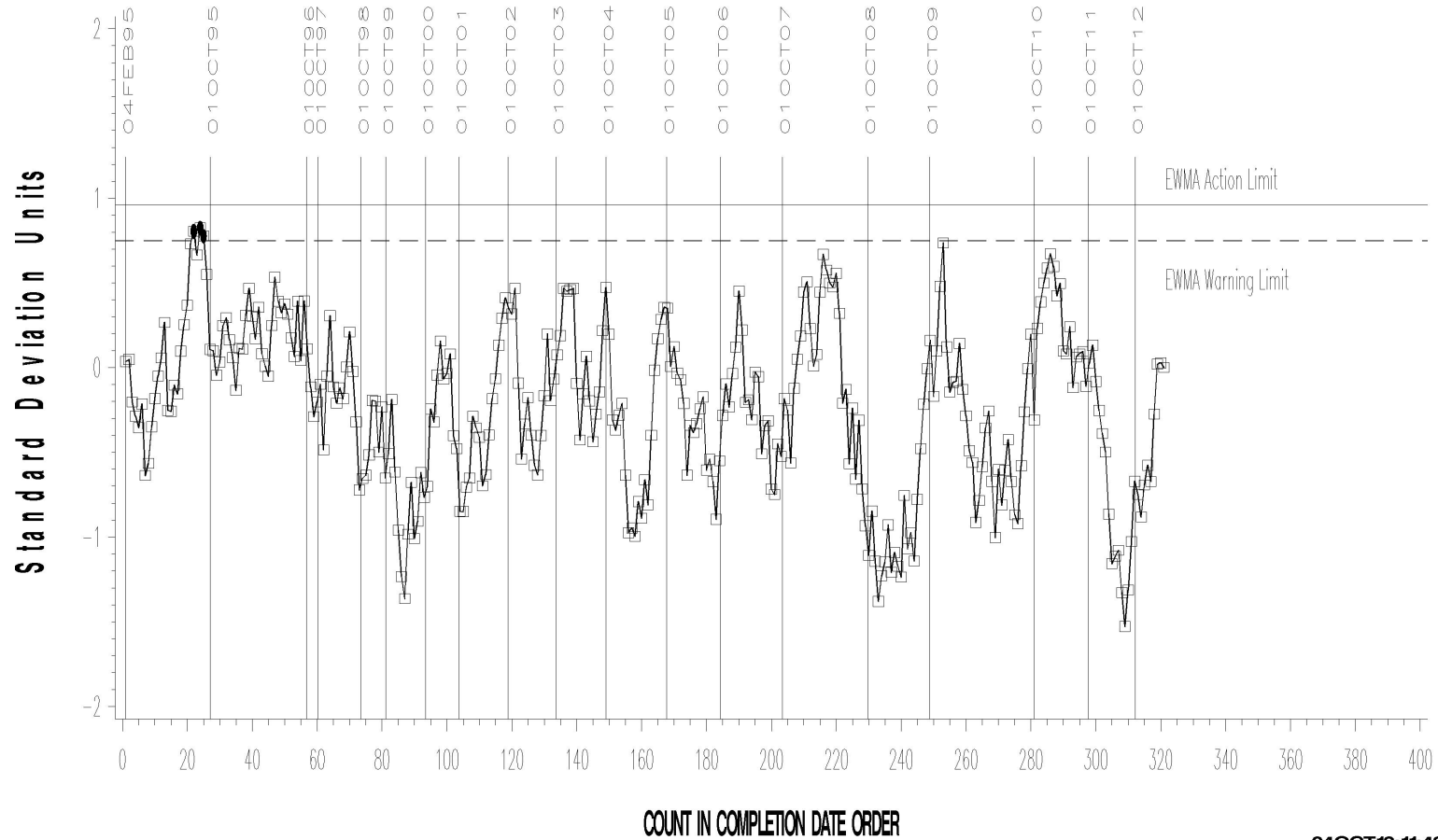
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L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING

LTMS Precision Analysis



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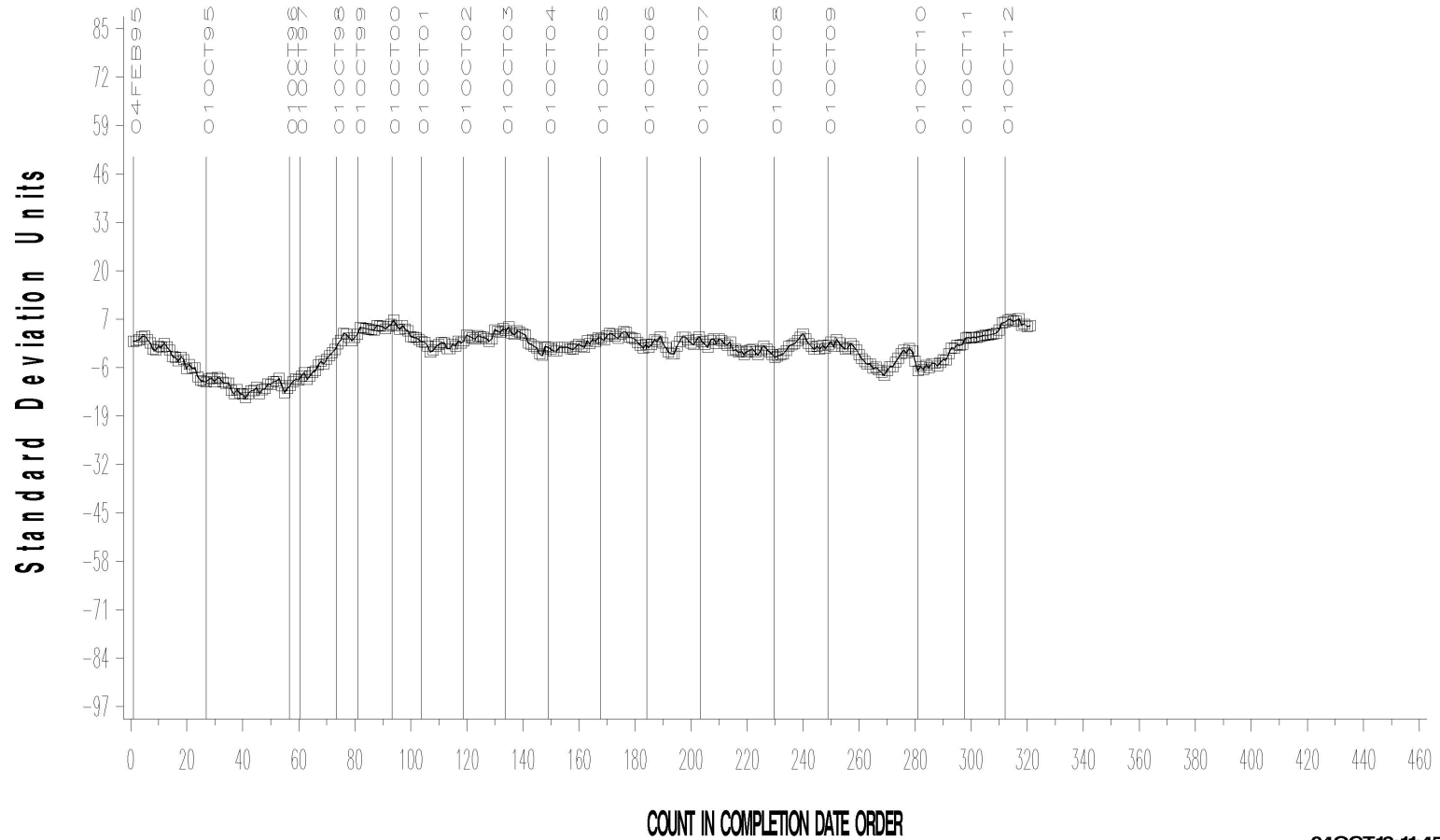
A Program of ASTM International

L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING

CUSUM Severity Analysis



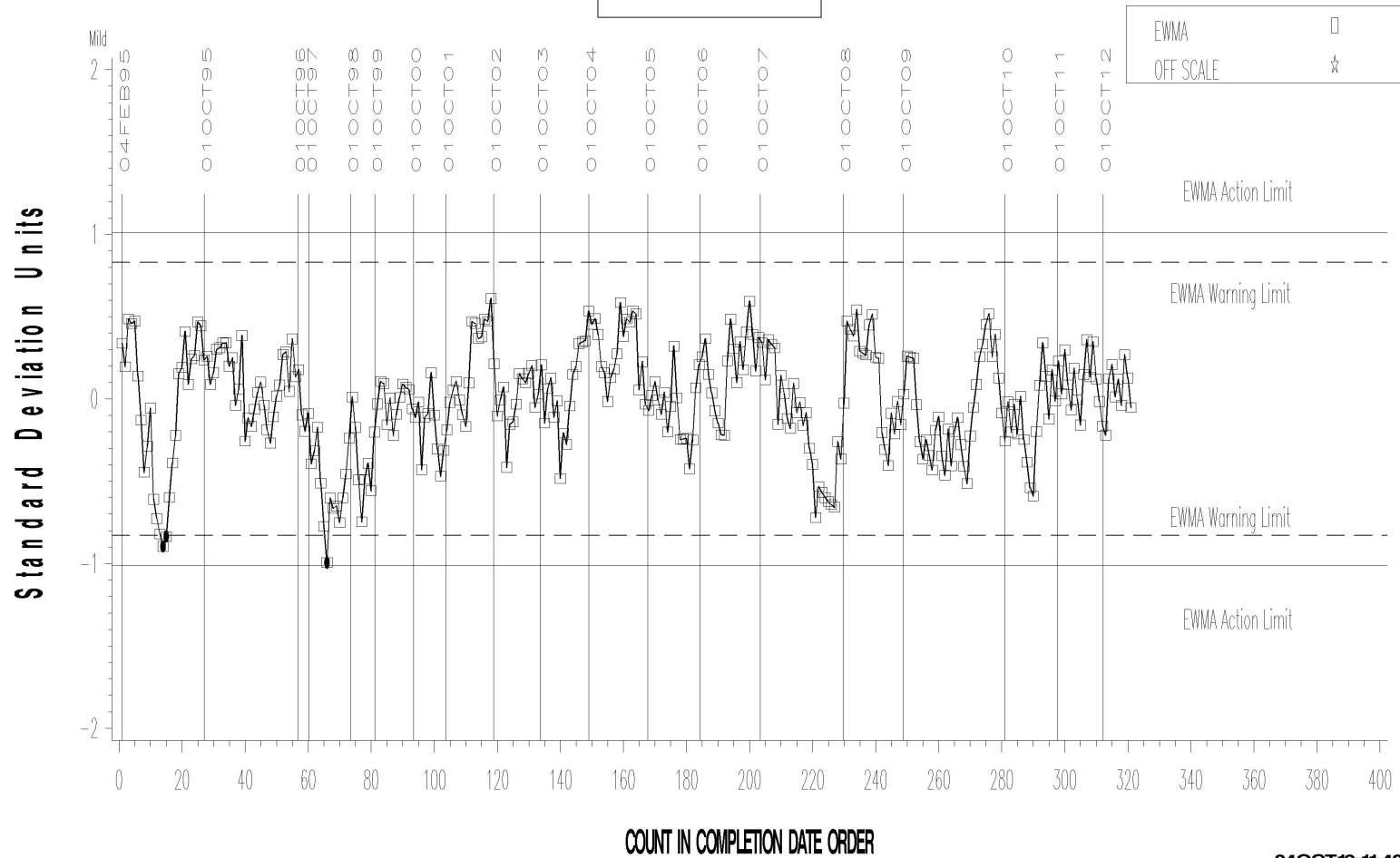
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L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIPPLING

LTMS Severity Analysis



Severe

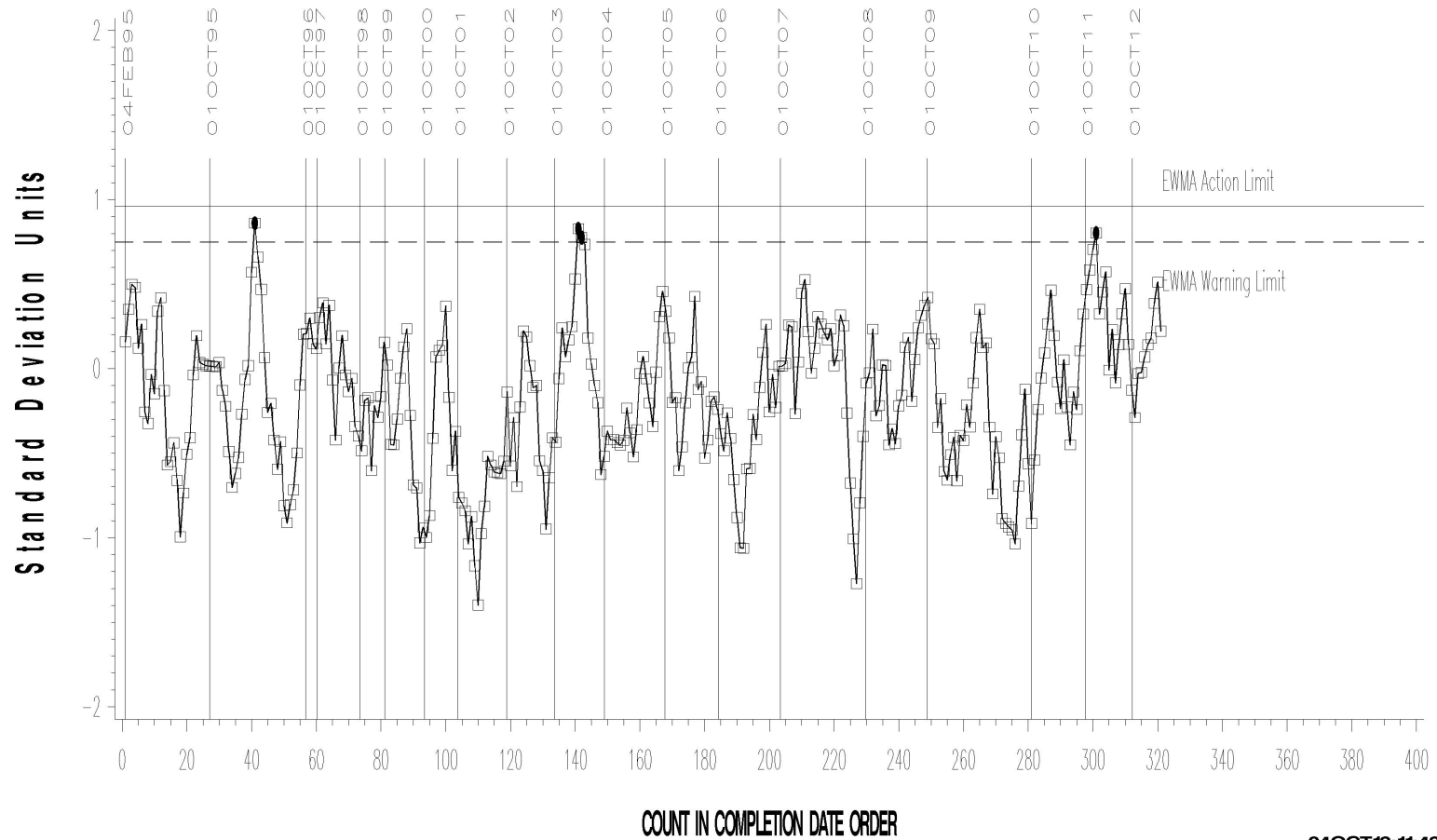
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L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIPPLING

LTMS Precision Analysis



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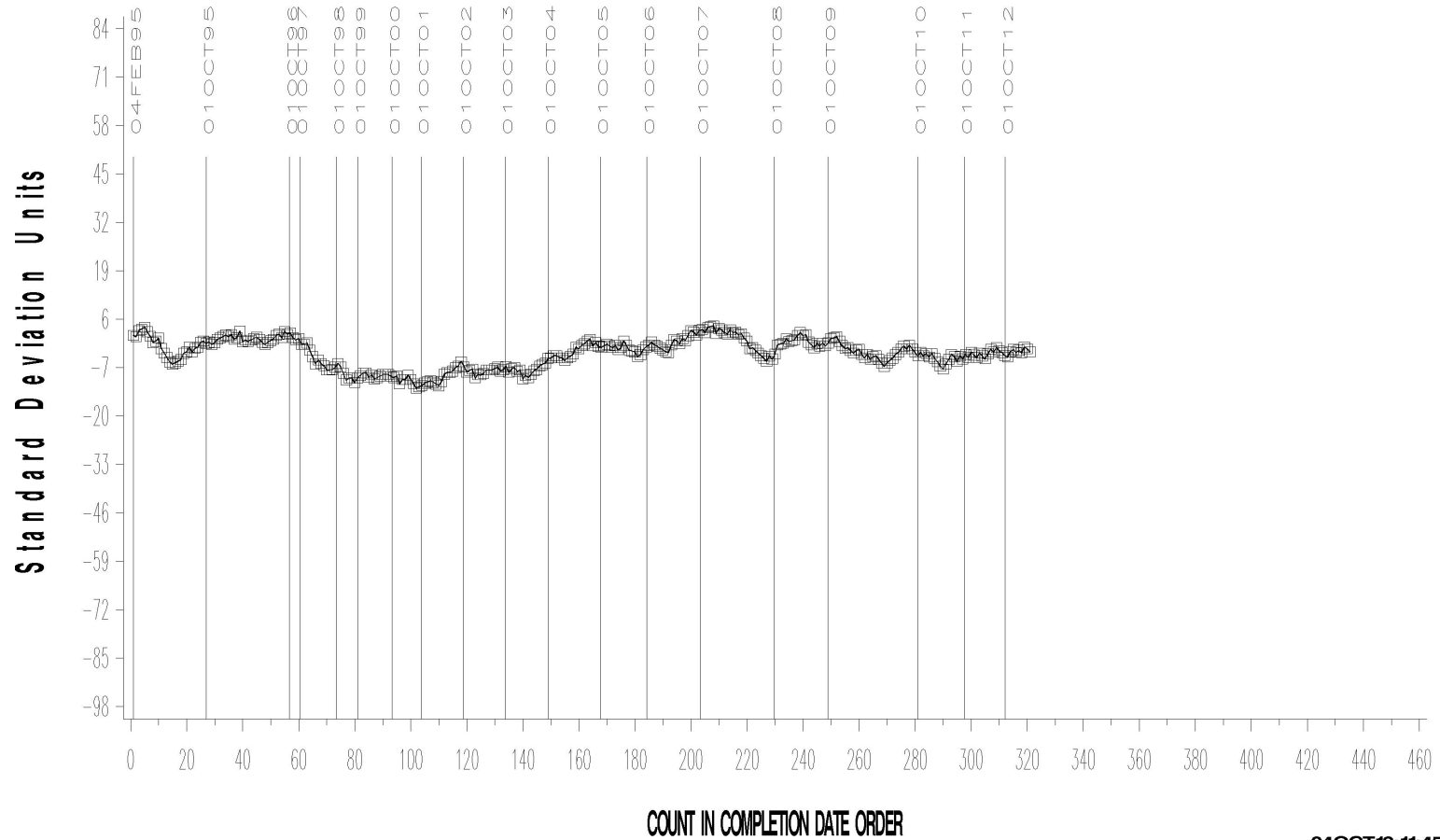
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L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIBBLING

CUSUM Severity Analysis



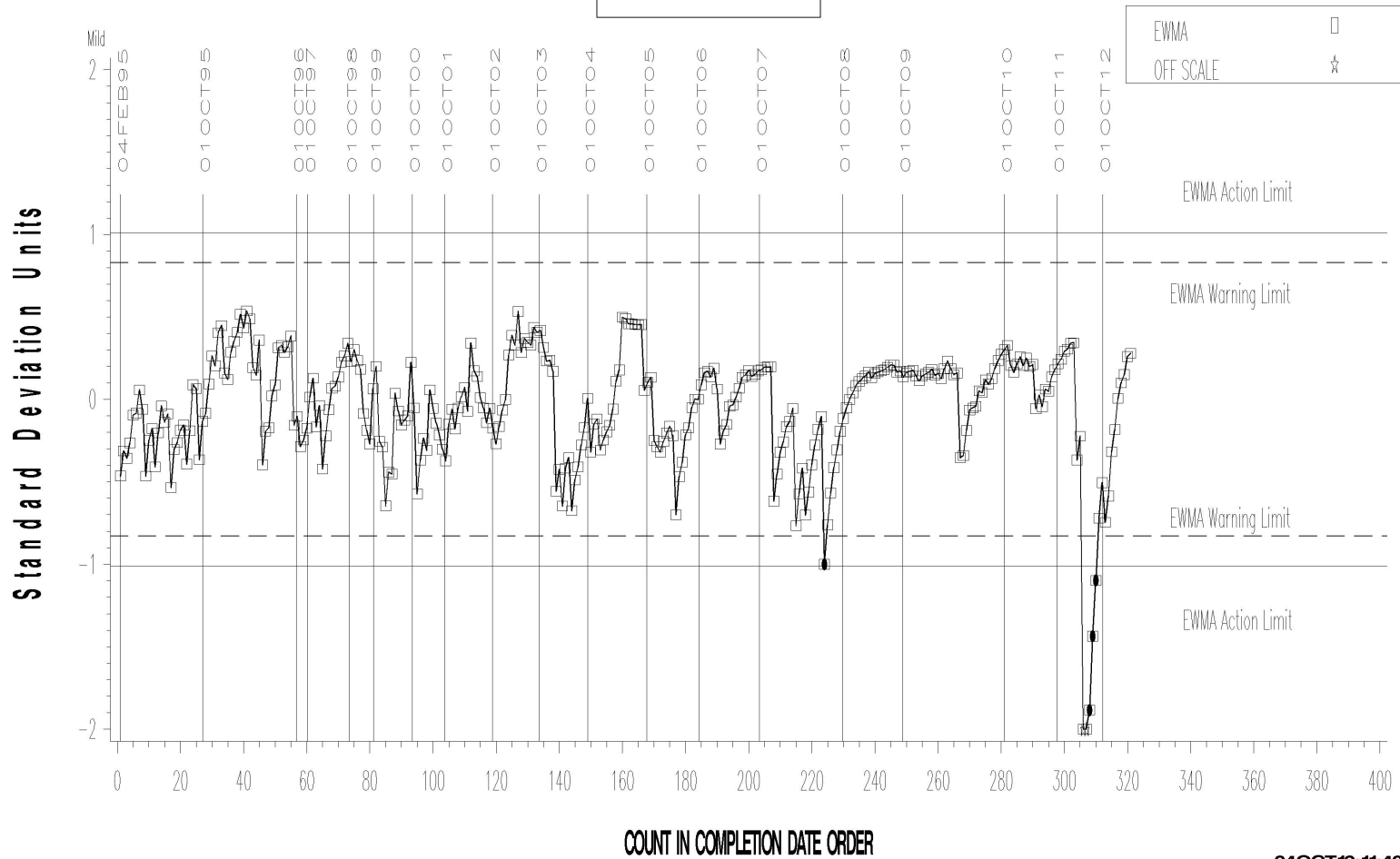
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L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR PITTING/SPALLING

LTMS Severity Analysis



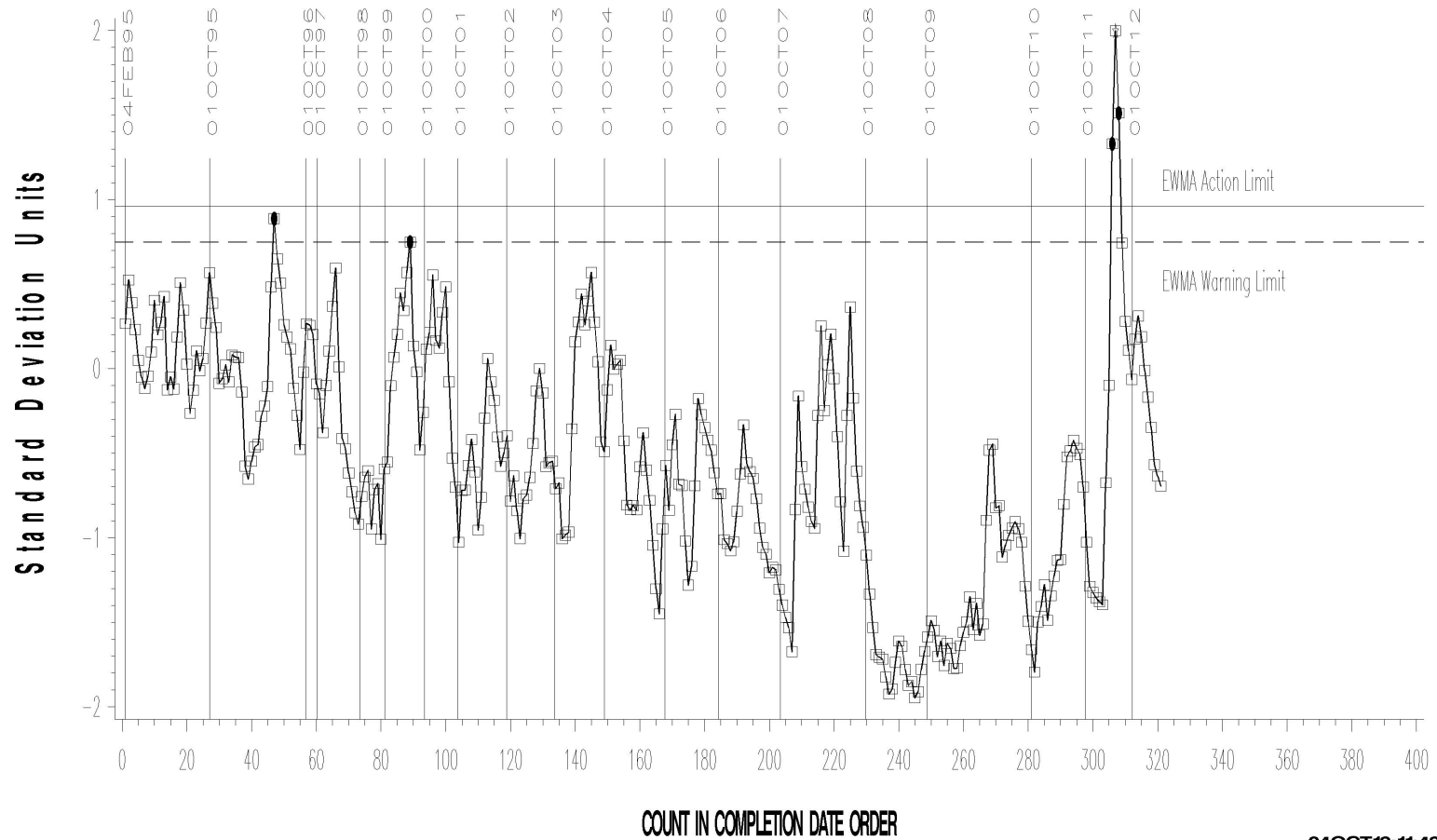
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L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR PITTING/SPALLING

LTMS Precision Analysis



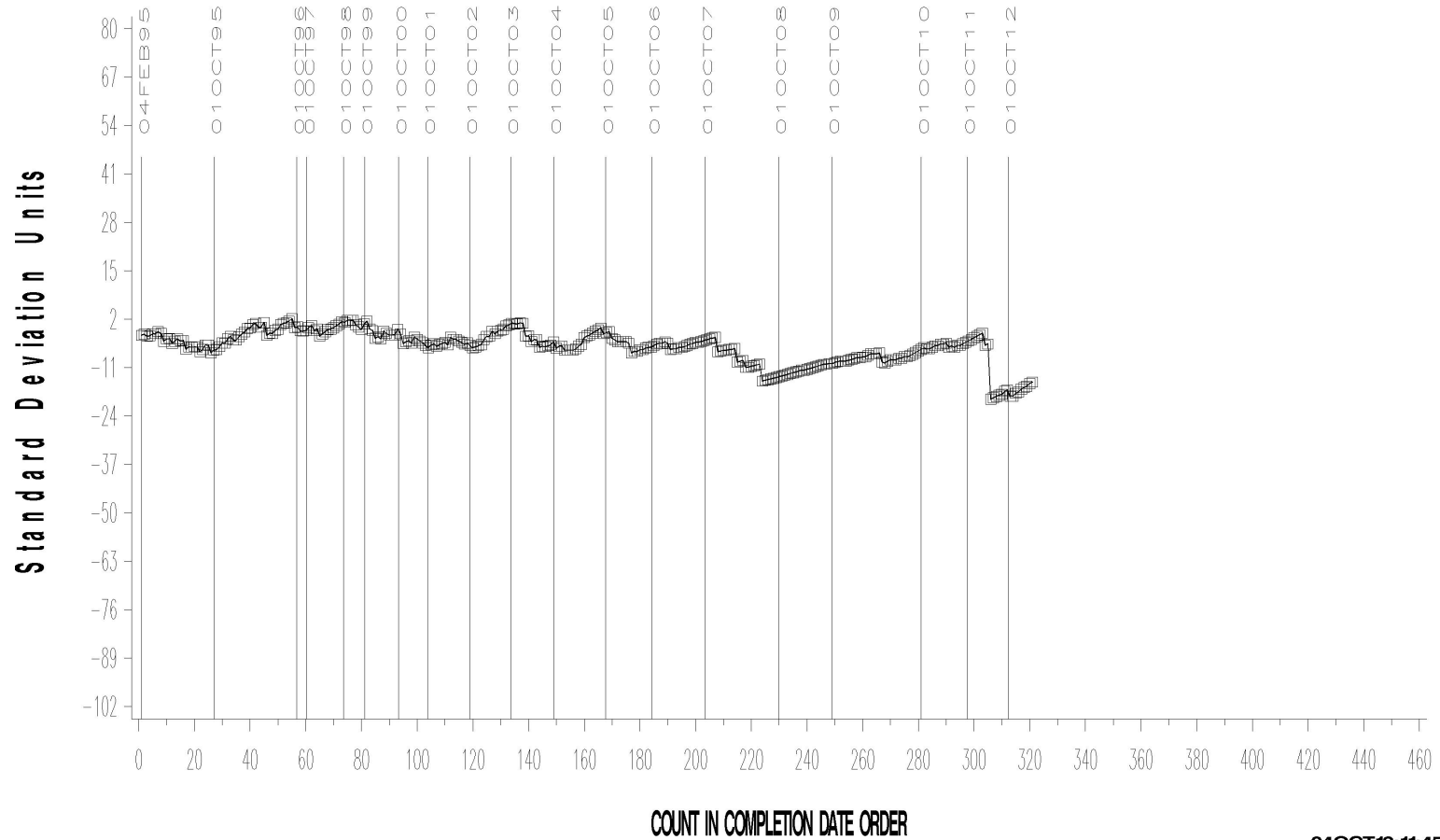
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L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR PITTING/SPALLING

CUSUM Severity Analysis



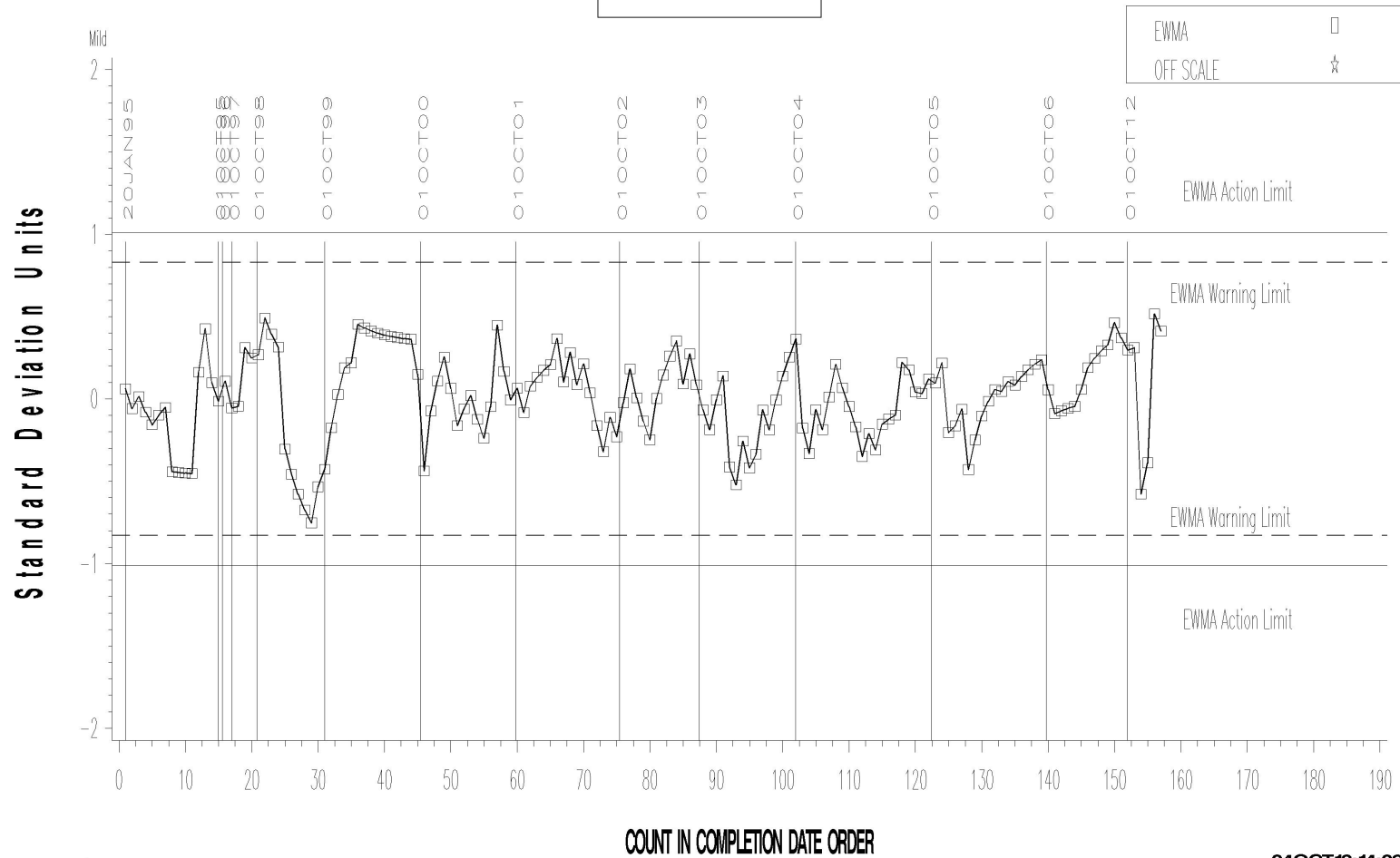
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L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

LTMS Severity Analysis



Severp

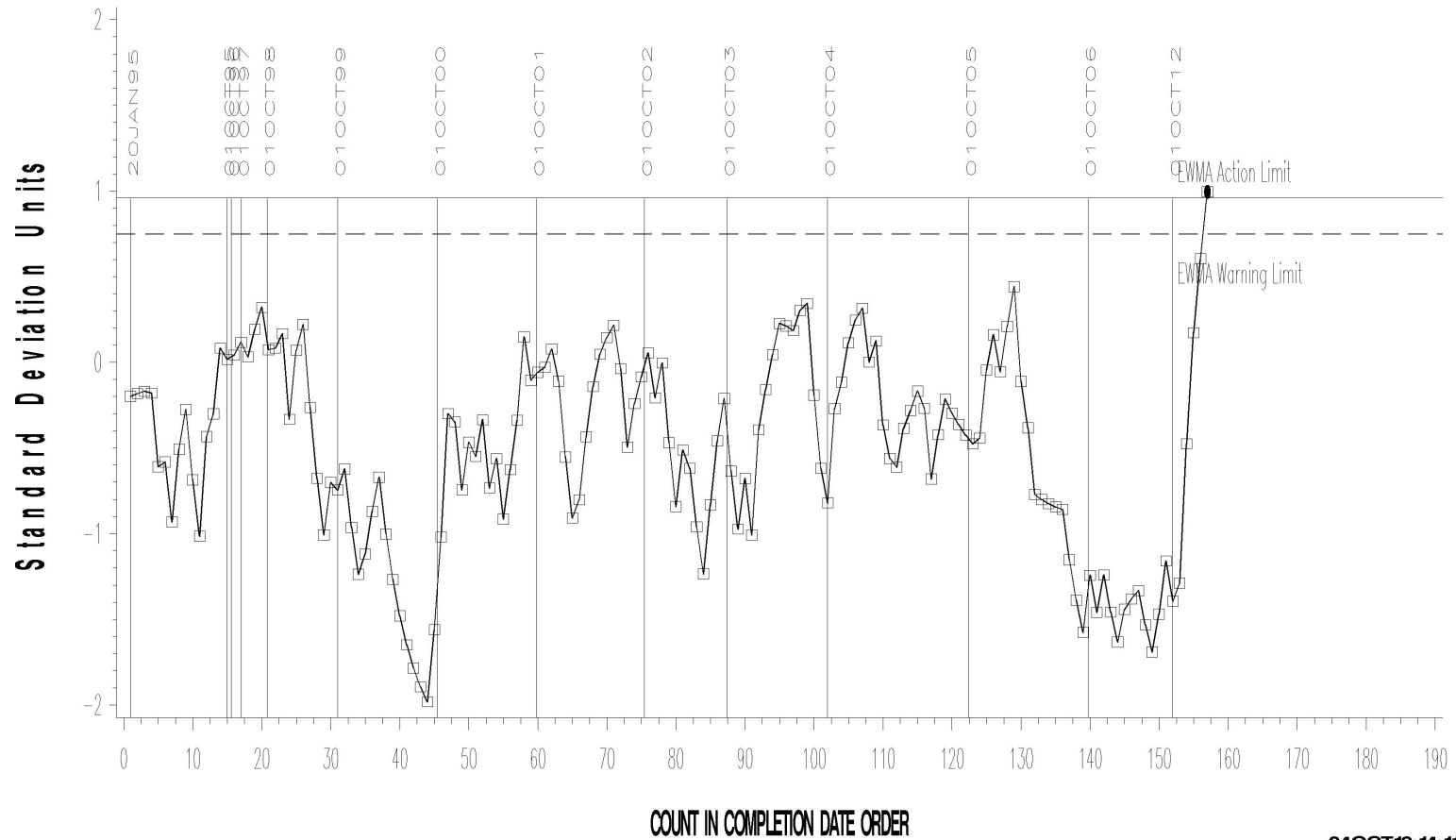
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L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

LTMS Precision Analysis



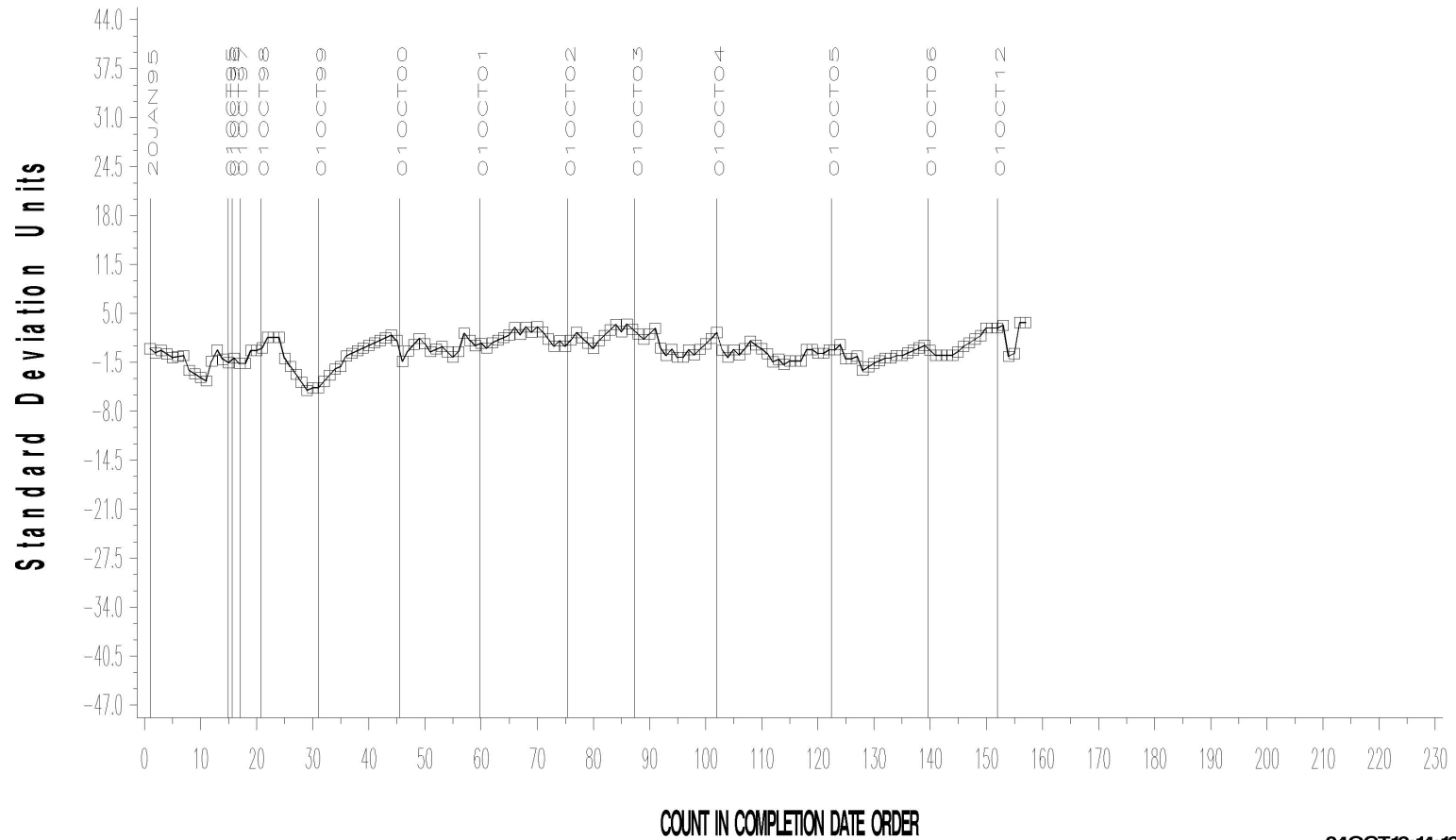
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L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

CUSUM Severity Analysis



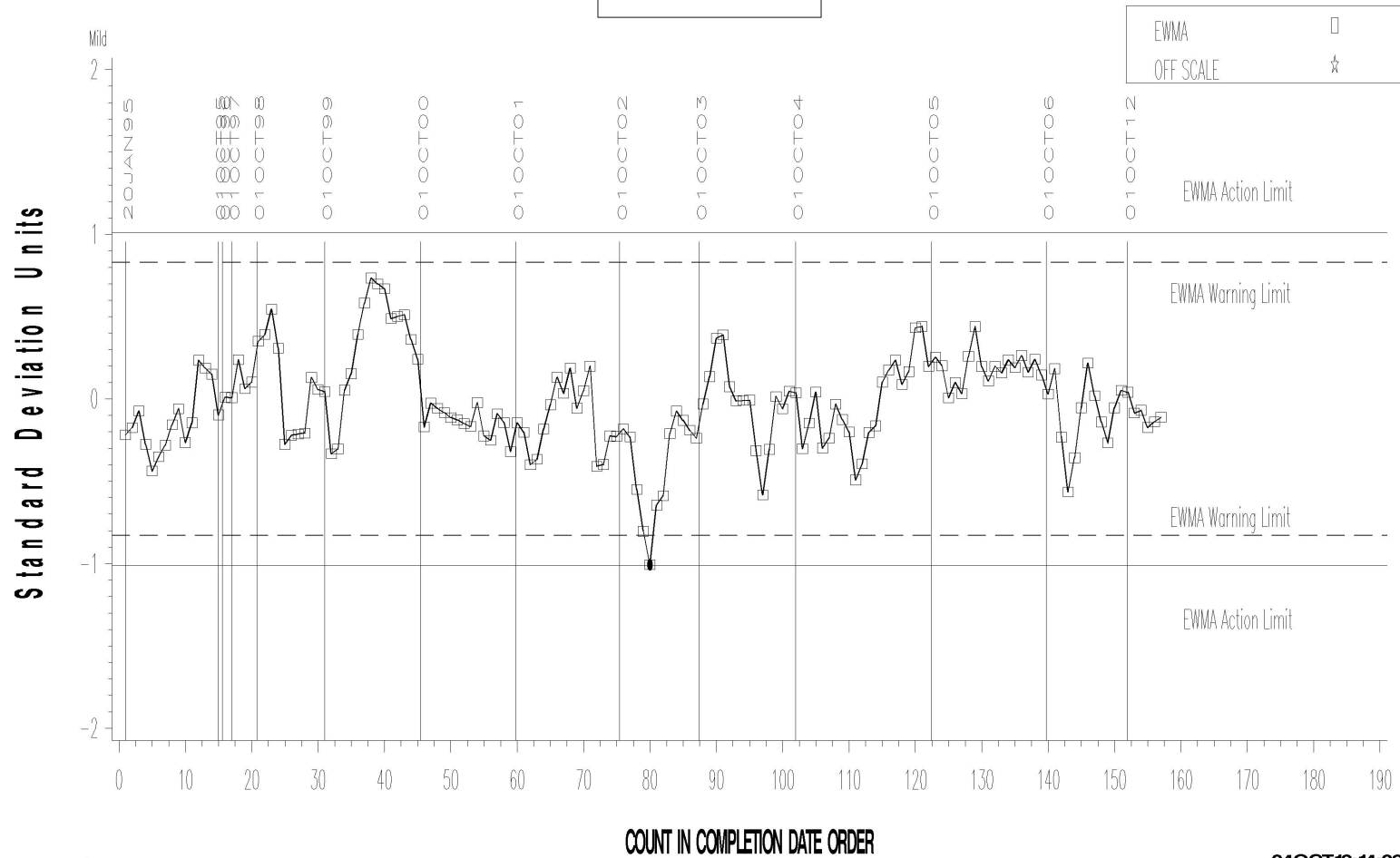
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L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING

LTMS Severity Analysis



Severp

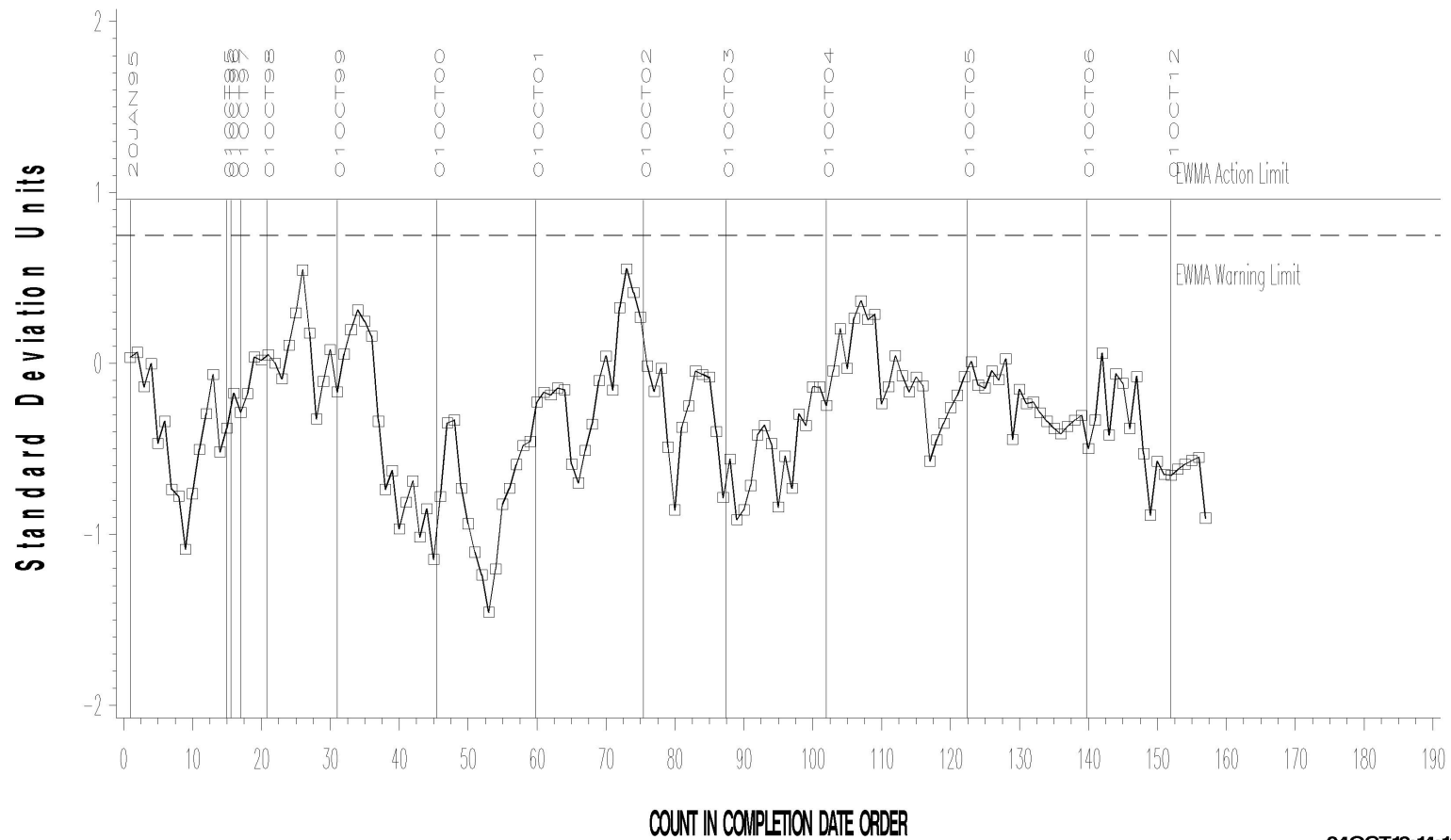
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L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING

LTMS Precision Analysis



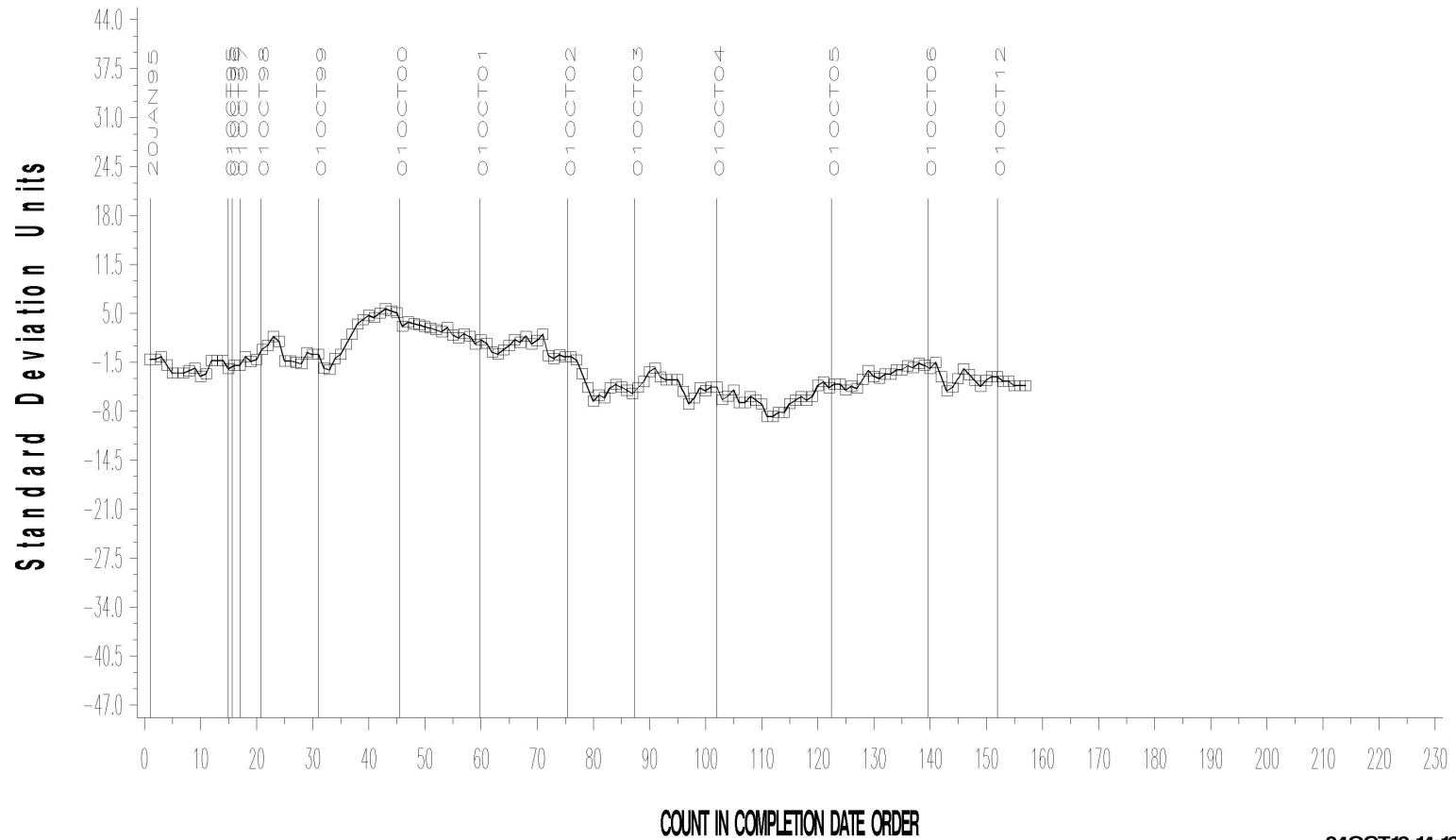
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L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING

CUSUM Severity Analysis



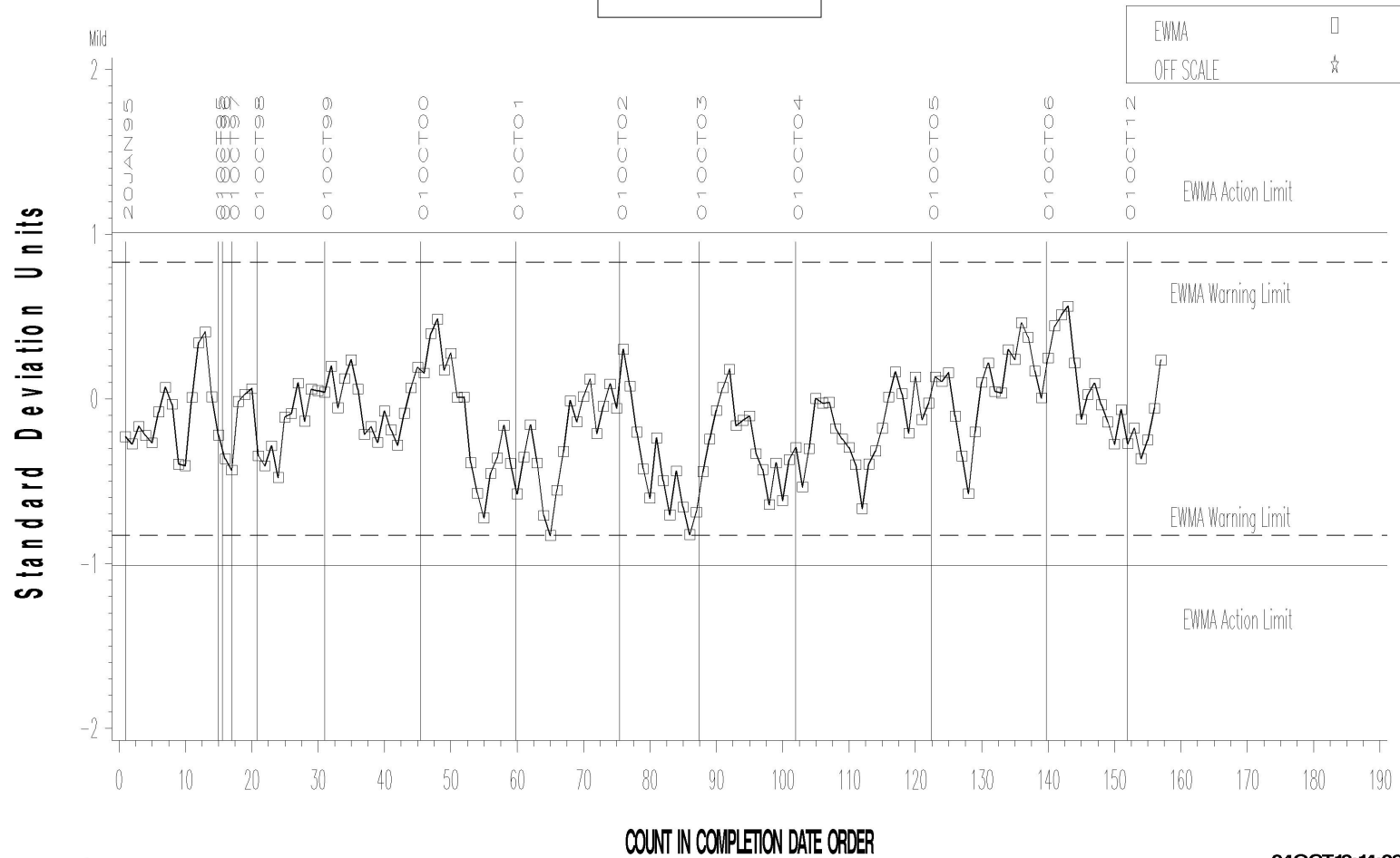
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L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIPPLING

LTMS Severity Analysis



Severe

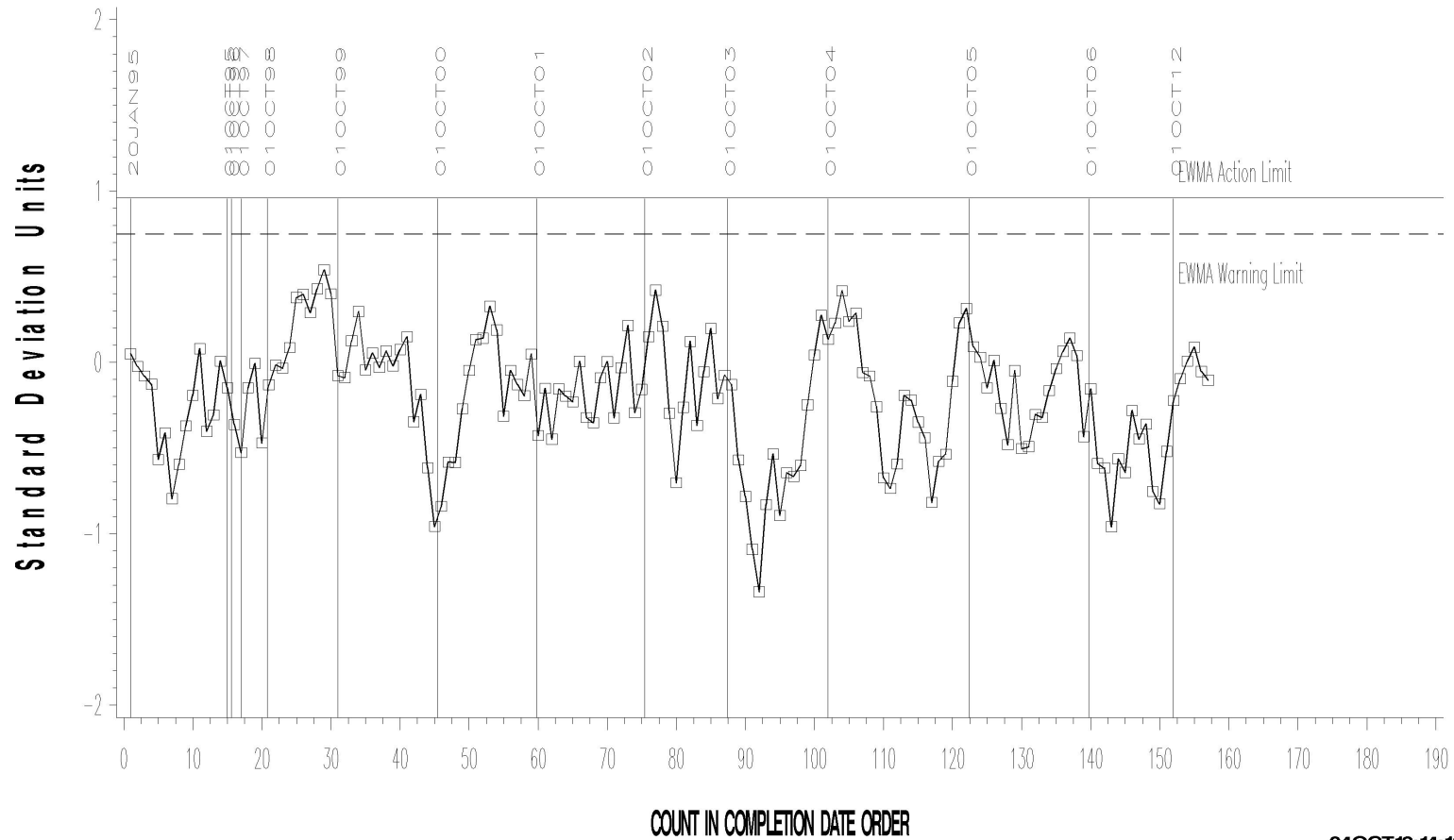
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L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIPPLING

LTMS Precision Analysis



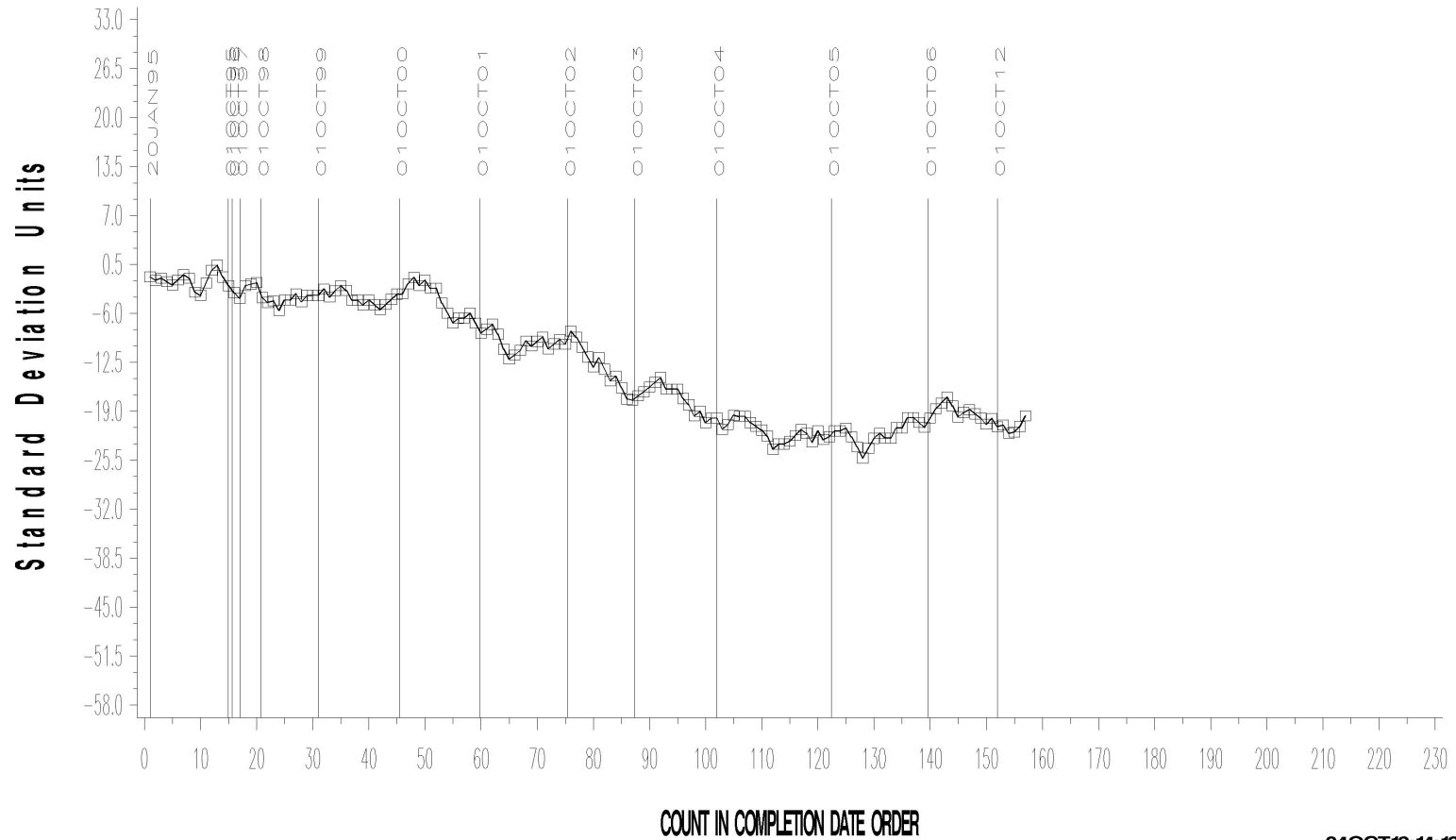
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L-37 (D6121)

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FINAL PINION GEAR RIPPLING

CUSUM Severity Analysis



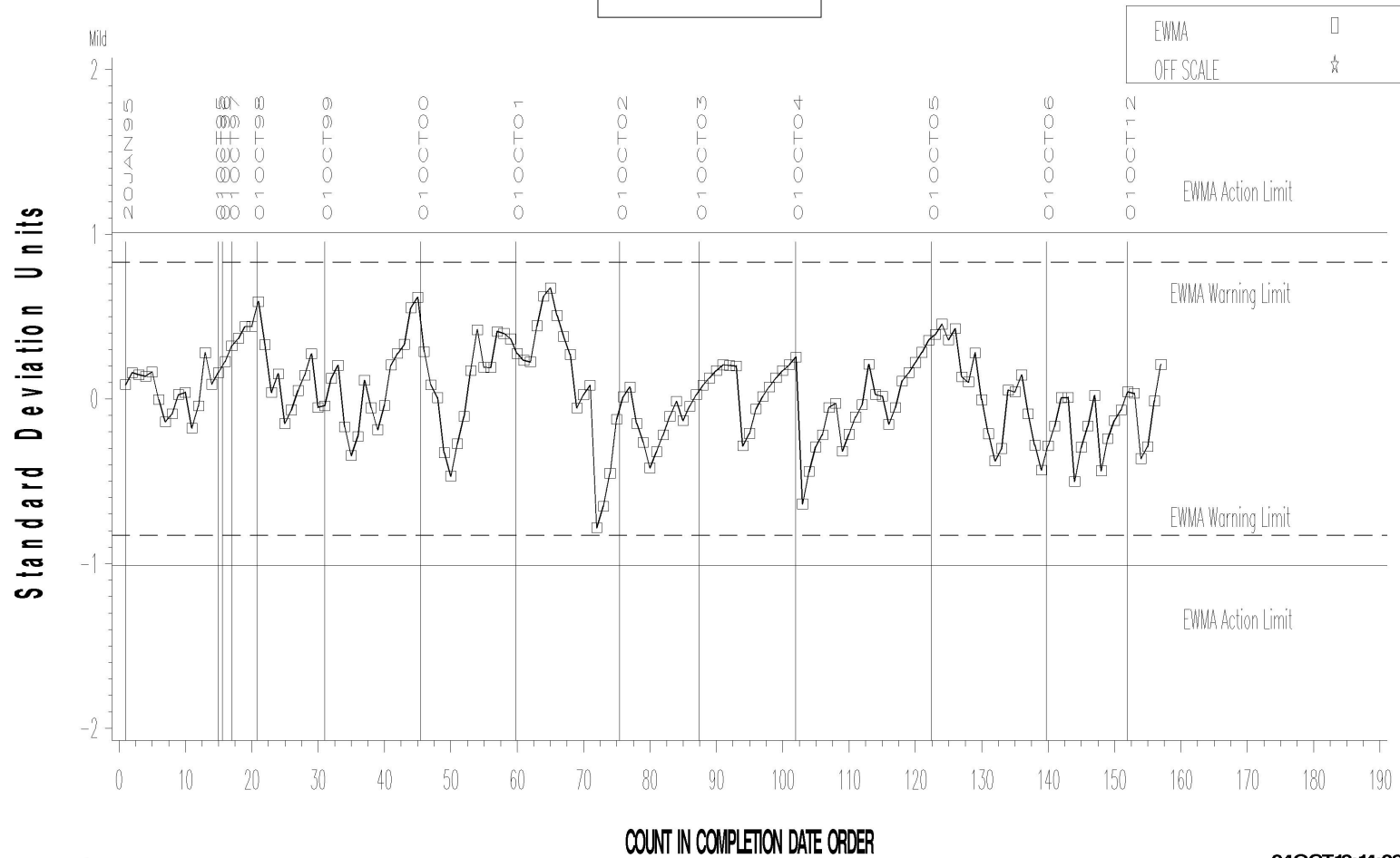
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L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR PITTING/SPALLING

LTMS Severity Analysis



Severp

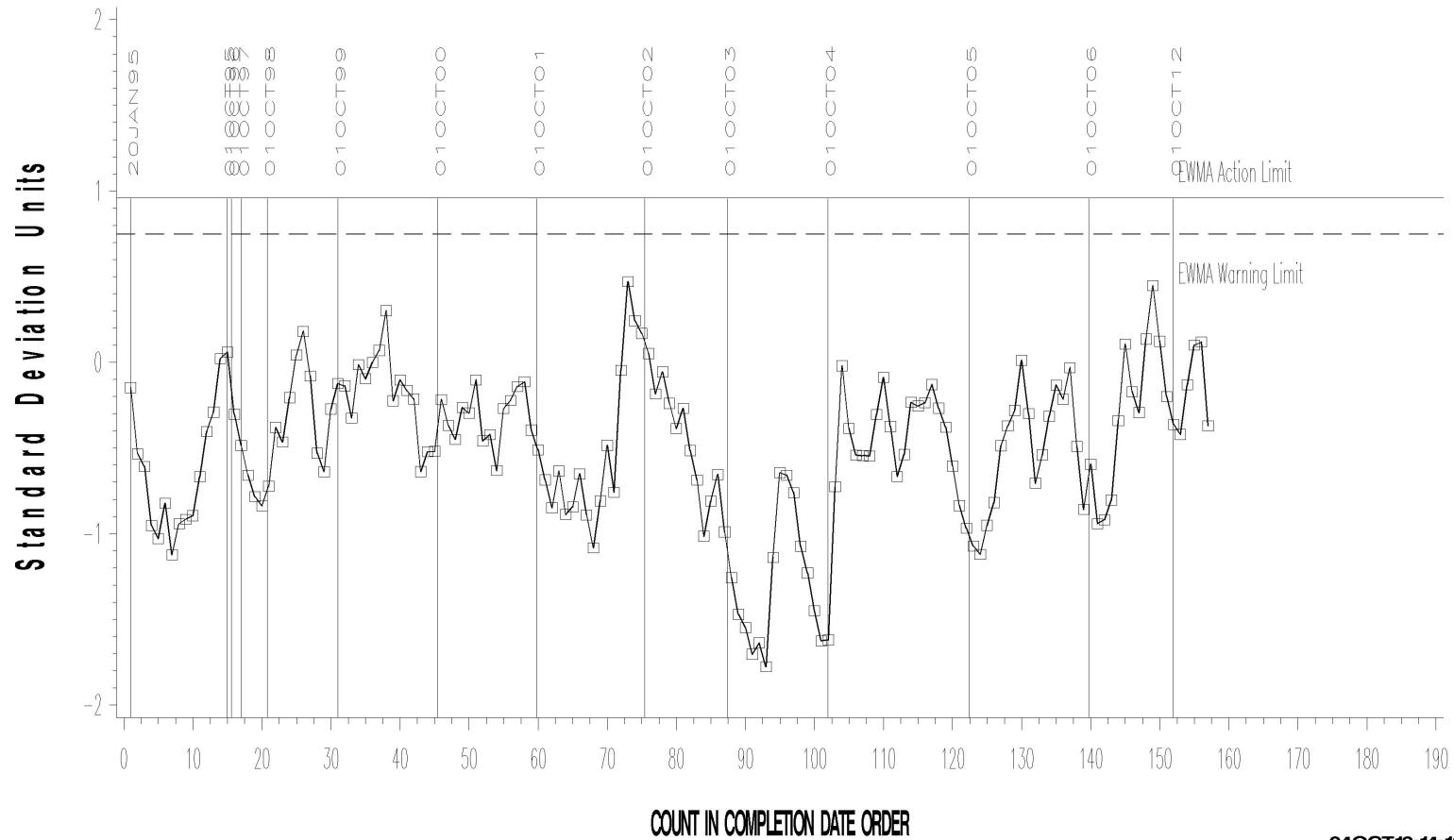
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L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR PITTING/SPALLING

LTMS Precision Analysis



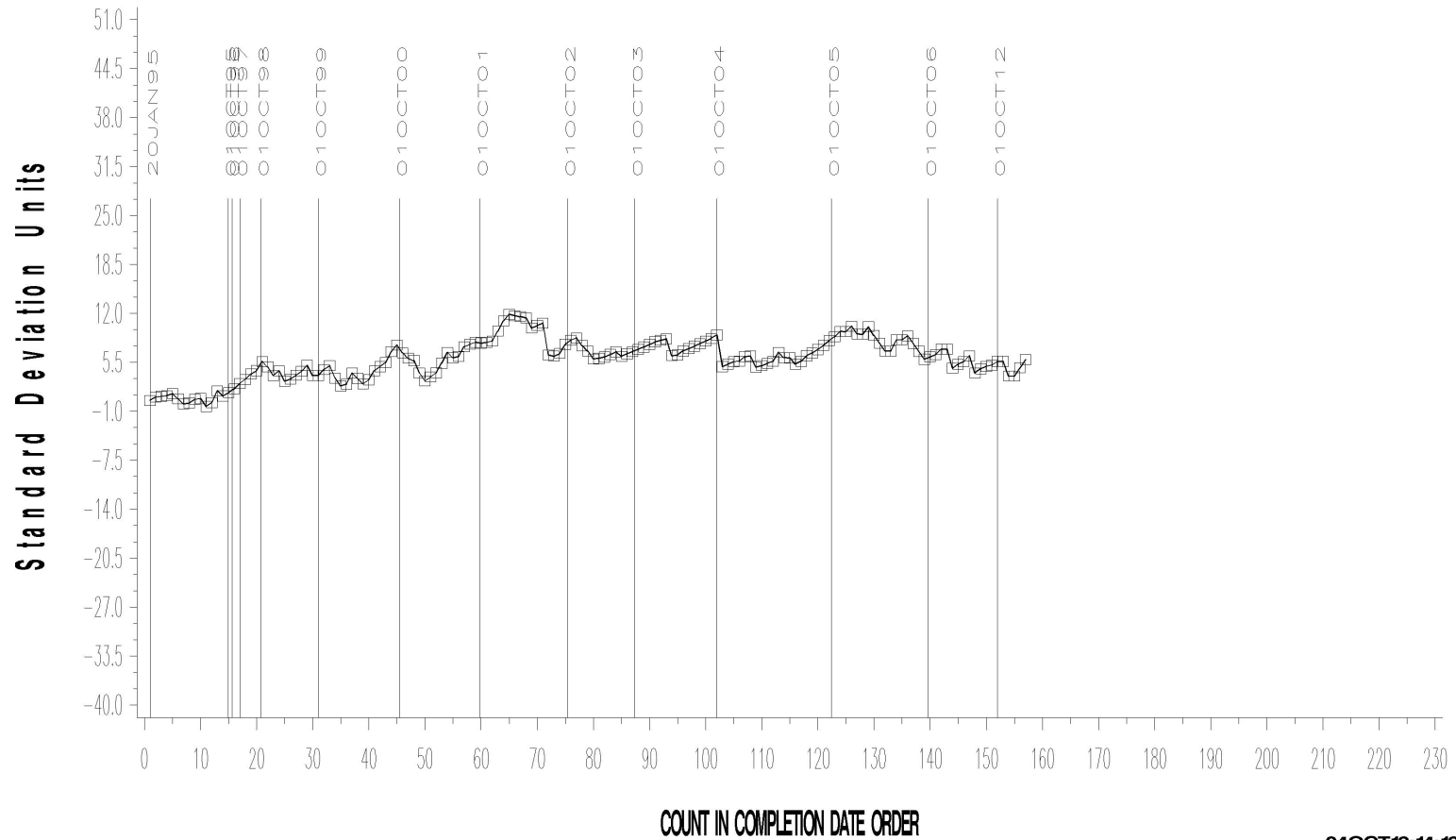
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L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR PITTING/SPALLING

CUSUM Severity Analysis



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L-37 (D6121)

TIMELINE ADDITIONS

| Effective Date | Information Letter | Event |
|----------------|--------------------|--|
| 20121107 | 13-3 | Presence of an inspection port in the axle cover is optional. |
| 20130513 | 13-4 | <ol style="list-style-type: none">1. Revision to correction factor for use with non-lubrited V1L528 hardware under Canadian test conditions2. Editorial Revision - Changing Spitting Terminology to Pitting/Spalling. |

L-37 (D6121)

LAB VISITS

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

INFORMATION LETTERS

Information Letter 13-3 was issued April 24, 2013 to make the presence of an inspection port in the axle cover optional.

Information Letter 13-4 was issued May 28, 2013 to revise the correction factor used with non-lubricated V1L528 hardware under Canadian test conditions and to change “spitting” to “pitting/spalling”.

L-37 (D6121)

LTMS DEVIATIONS

One LTMS deviation was written this period to calibrate a test stand generating a precision alarm on WEAR using lubrified hardware.

For test acceptance, the L-37 surveillance panel has approved the use of acceptance bands that are not derived from calculations using the target mean, standard deviation, and k-value. This can produce widely divergent Shewhart severity values on successive tests and thereby result in precision alarms.

If this approach results in recurring alarms, it may be necessary for the surveillance panel to readdress how precision is evaluated for this test.

L-37 (D6121)

STATUS OF REFERENCE OIL SUPPLY

| Oil | Cans @ Labs | @ TMC | |
|--------------|-------------|------------|--------------|
| | | Cans | Gallons |
| 127 | 2 | 1 | 1.0 |
| 134 | 9 | 78 | 78.4 |
| 151-2 | 4 | 2 | 2.4 |
| 151-3 | 3 | 0 | 0.0 |
| 152-1 | 1 | 0 | 0.0 |
| 152-2 | 16 | 242 | 242.0 |
| 152-3 | 0 | 54 | 54.8 |
| 153-1 | 39 | 57 | 58.0 |
| 155 | 14 | 23 | 23.4 |
| 155-1 | 16 | 395 | 395.8 |
| Total | 104 | 852 | 855.7 |

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 and HTCT).