



Test Monitoring Center

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

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

MEMORANDUM: 20-039
DATE: October 7, 2020
TO: Robert Slocum, Chairman, L-37-1 Surveillance Panel
FROM: Dylan Beck *Dylan Beck*
SUBJECT: L-37-1 Testing from April 1, 2020 through September 30, 2020

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

DJB/djb/mem20-039.djb.doc

cc: Frank Farber
Jeff Clark

L-37 Surveillance Panel

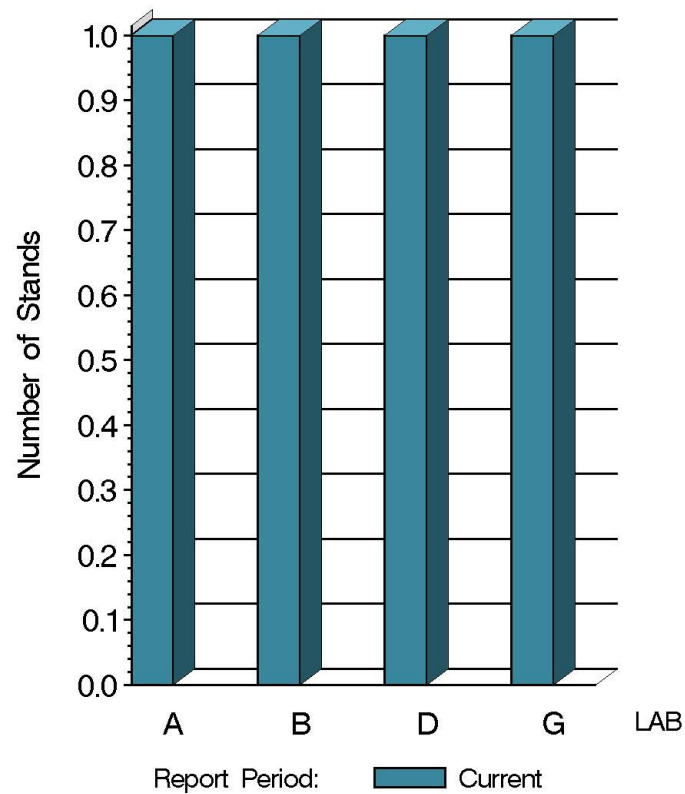
<http://www.astmtmc.cmu.edu/ftp/docs/gear/1371/semiannualreports/1371-10-2020.pdf>

Distribution: email

L-37-1 (D8165)

	Reporting Data	Calibrated on 9-30-20
Number of Labs	4	4
Number of Stands	4	4

BY-LAB STAND
DISTRIBUTION



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L-37-1 (D8165)

Test Distribution by Oil and Validity

					Totals	
					Last Period	This Period
		134/ 134-1	152-2	155-1		
Accepted for calibration	AC	3	2	3	7	8
Rejected (Mild)	OC	0	0	1	3	1
Rejected (Severe)	OC	0	1	0	2	1
Rejected (Precision)	OC	0	0	0	0	0
Aborted run	XC	0	0	1	3	1
Acceptable info run	NI	4	8	3	7	15
Total		7	11	8	22	26

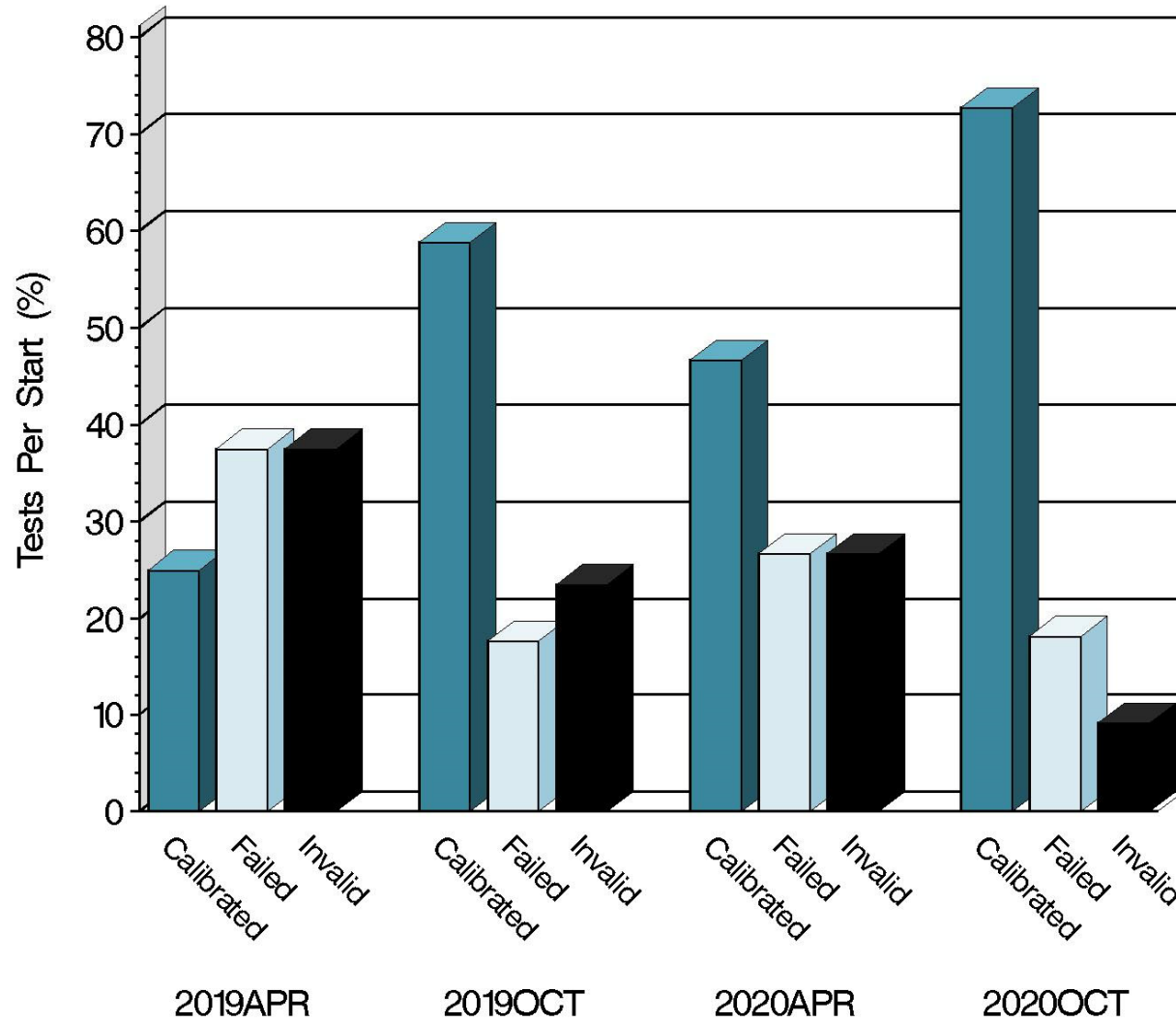
L-37-1 (D8165)

Calibration Attempt Detail

	Gear Batch	Acceptable	Aborted	Failed	Total
LUBRITED	04-2014	3	0	0	3
NONLUBRITED	06-2018	3	1	1	5
	12-2019	2	0	0	2
	01-2020	1	0	0	1
	Total	9	1	1	11

L-37-1 (D8165)

CALIBRATION ATTEMPT SUMMARY



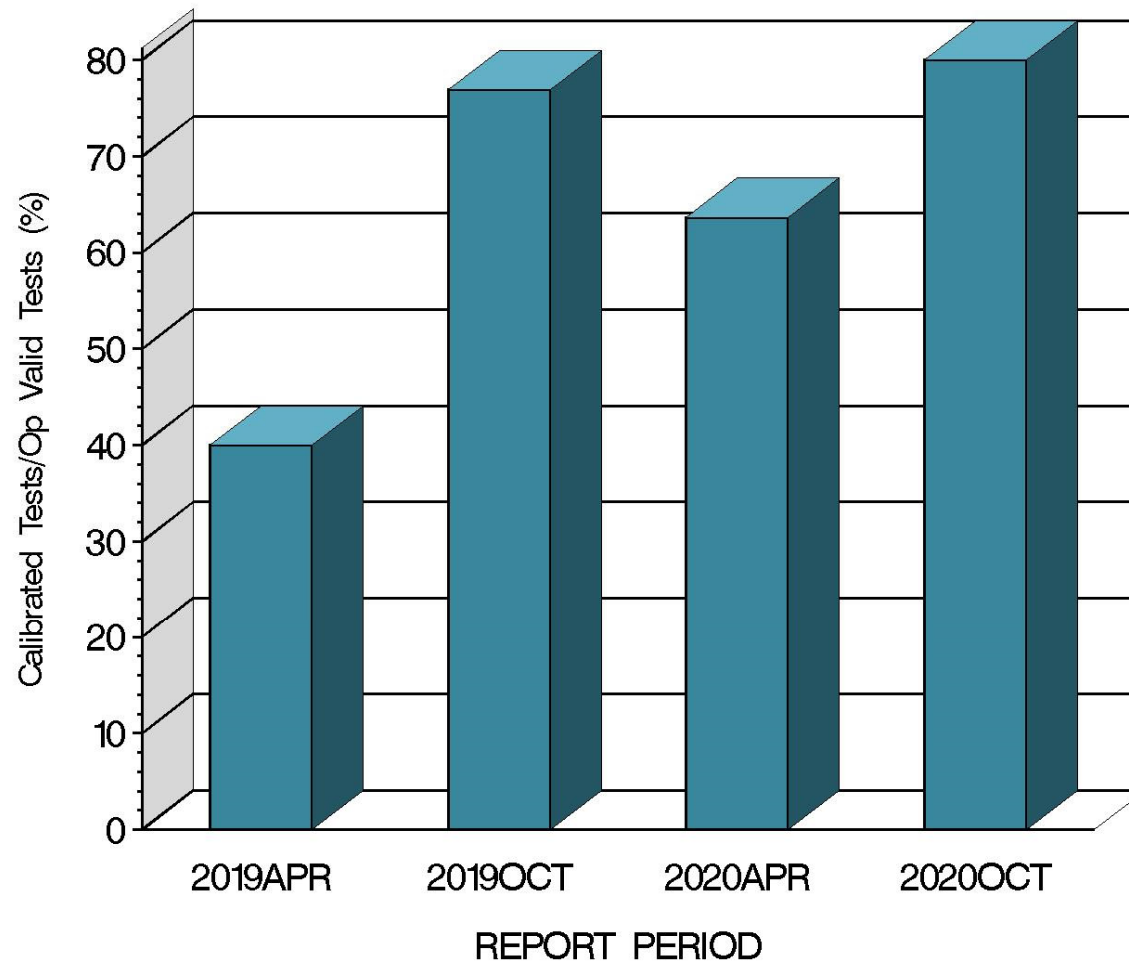
Resolution

Report Period

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L-37-1 (D8165)

OPERATIONALLY VALID TESTS
MEETING ACCEPTANCE CRITERIA



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L-37-1 (D8165)

CAUSES FOR LOST TESTS

Lab	Cause	Oil				Validity			Loss Rate		
		134	134-1	152-2	155-1	XC	LC	XI	Lost	Starts	%
D	Pinion Bearing Failure				●	●			1	8	13%
	Lost	0	0	0	1	1	0	0			
	Starts	0	7	11	8	26	26	26			
	%	0%	0%	0%	13%	4%	0%	0%			

L-37-1 (D8165)

GEAR BATCH SEVERITY

LUBRITED HARDWARE						
Parameter	Gear Batch	N	Δ/s	s^A	Overall Δ/s	Overall Shift (in Merits) ^B
RIDG	04-2014	3	-0.772	0.544	-0.772	-1.104
RIPP	04-2014	3	-0.575	0.938	-0.575	-0.274
SPIT	04-2014	3	-0.222	0.694	-0.222	-0.129
WEAR	04-2014	3	-0.317	0.556	-0.317	-0.165

L-37-1 (D8165)

NON-LUBRITED HARDWARE						
Parameter	Gear Batch	N	Δ/s	s^A	Overall Δ/s	Overall Shift (in Merits) ^B
WEAR	04-2014	3	-0.772	0.544	-0.772	-1.104
RIDG	04-2014	3	-0.575	0.938	-0.575	-0.274
RIPP	04-2014	3	-0.222	0.694	-0.222	-0.129
SPIT	04-2014	3	-0.317	0.556	-0.317	-0.165
WEAR	06-2018	4	0.714	.	0.315	0.225
RIDG	06-2018	4	-0.583	3.279	0.635	-0.423
RIPP	06-2018	4	0.105	0.433	-0.044	-0.019
SPIT	06-2018	4	0.000	0.000	0.250	0.212
WEAR	12-2019	2	0.318	1.055	0.315	0.225
RIDG	12-2019	2	-0.556	0.629	-0.635	-0.423
RIPP	12-2019	2	0.396	0.046	-0.035	-0.019
SPIT	12-2019	2	0.750	.	0.250	0.212
WEAR	01-2020	1	-0.714	.	0.315	0.225
RIDG	01-2020	1	1.000	.	-0.635	-0.423
RIPP	01-2020	1	-1.455	.	-0.035	-0.019
SPIT	01-2020	1	0.750	.	0.250	0.212

^A As computed using SA standard deviation published in the LTMS document.

L-37-1 (D8165)

LAB SEVERITY

LUBRITED HARDWARE AVERAGE Δ/s						
Gear Batch	Lab	N	RIDG	RIPP	SPIT	WEAR
04-2014	D	2	-0.929	-0.113	0.167	-0.032
	G	1	-0.458	-1.500	-1.000	-0.889

NON-LUBRITED HARDWARE AVERAGE Δ/s						
Gear Batch	Lab	N	RIDG	RIPP	SPIT	WEAR
01-2020	A	1	-1.000	-1.455	.	-0.714
06-2018	B	4	-0.583	0.105	0.000	0.714
12-2019	B	1	-0.111	0.429	0.750	0.778
	D	1	-1.000	0.364	.	-0.714

L-37-1 (D8165)

SUMMARY OF SEVERITY & PRECISION

Severity

Nonlubrited – RIDG ended the last reporting period by exceeding the action limit, but has since returned within the limits. SPIT, WEAR, and RIPP remained within the limits this period.

Lubrited – All parameters remained within the limits this period.

L-37-1 (D8165)

SUMMARY OF SEVERITY & PRECISION (cont.)

Precision

Nonlubrited - WEAR, SPIT, and RIPP remained within the precision limit this period. RIDG exceeded the action limit this period and remains outside of the limits.

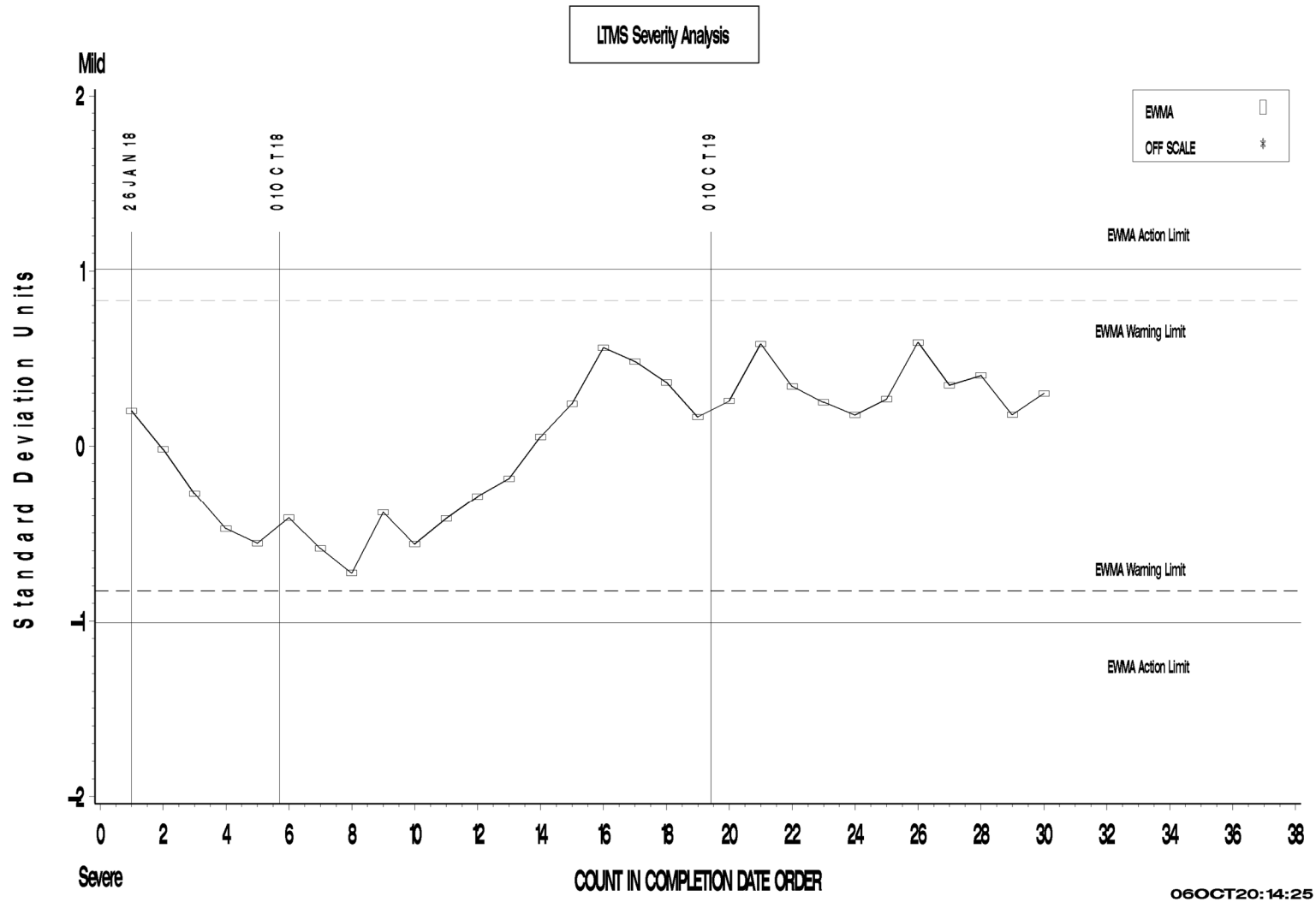
Lubrited – All parameters remained within the precision limit this period.

Industry control charts follow.

L-37-1 (D8165)

L-37-1 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

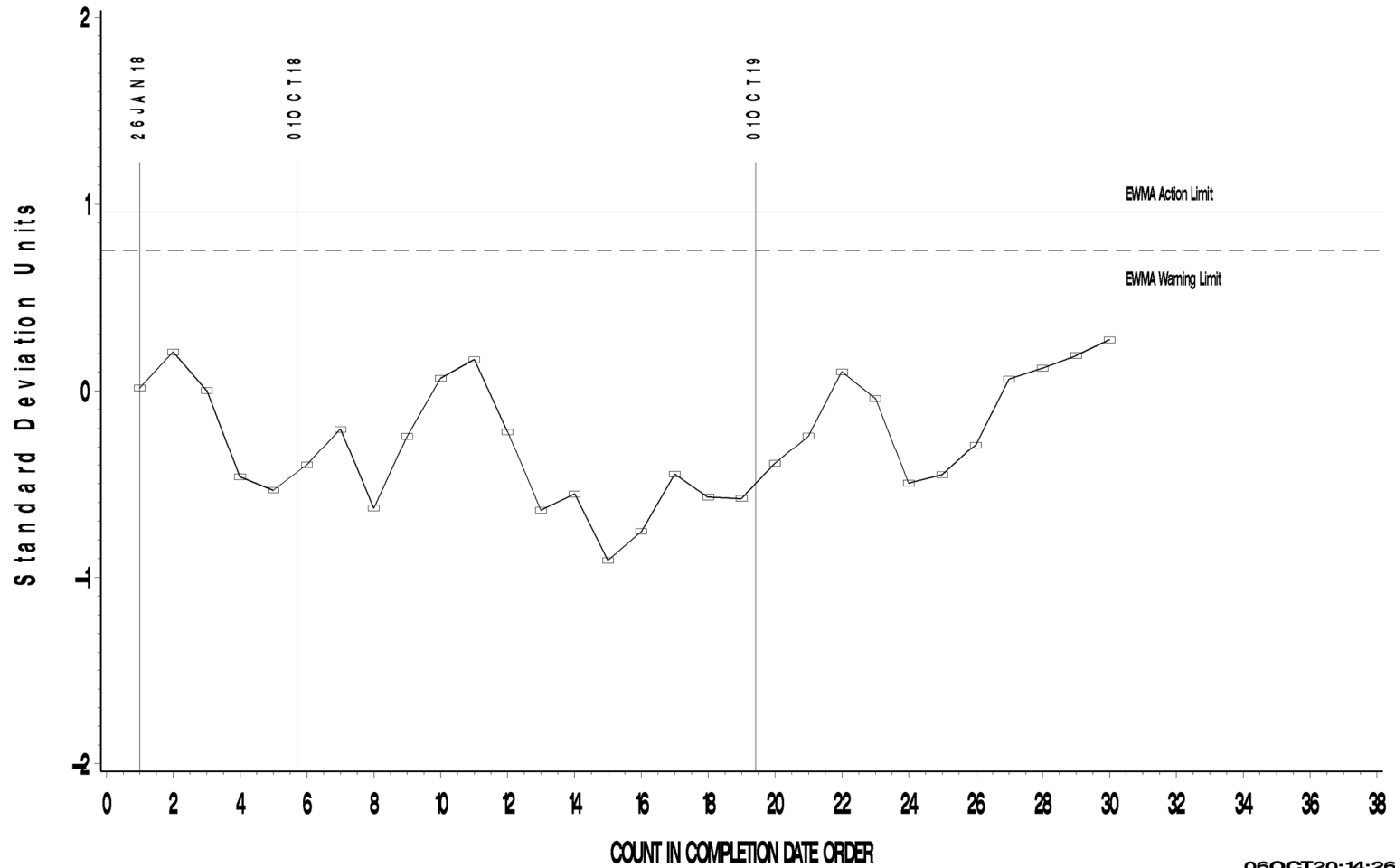


L-37-1 (D8165)

L-37-1 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

LTMS Precision Analysis



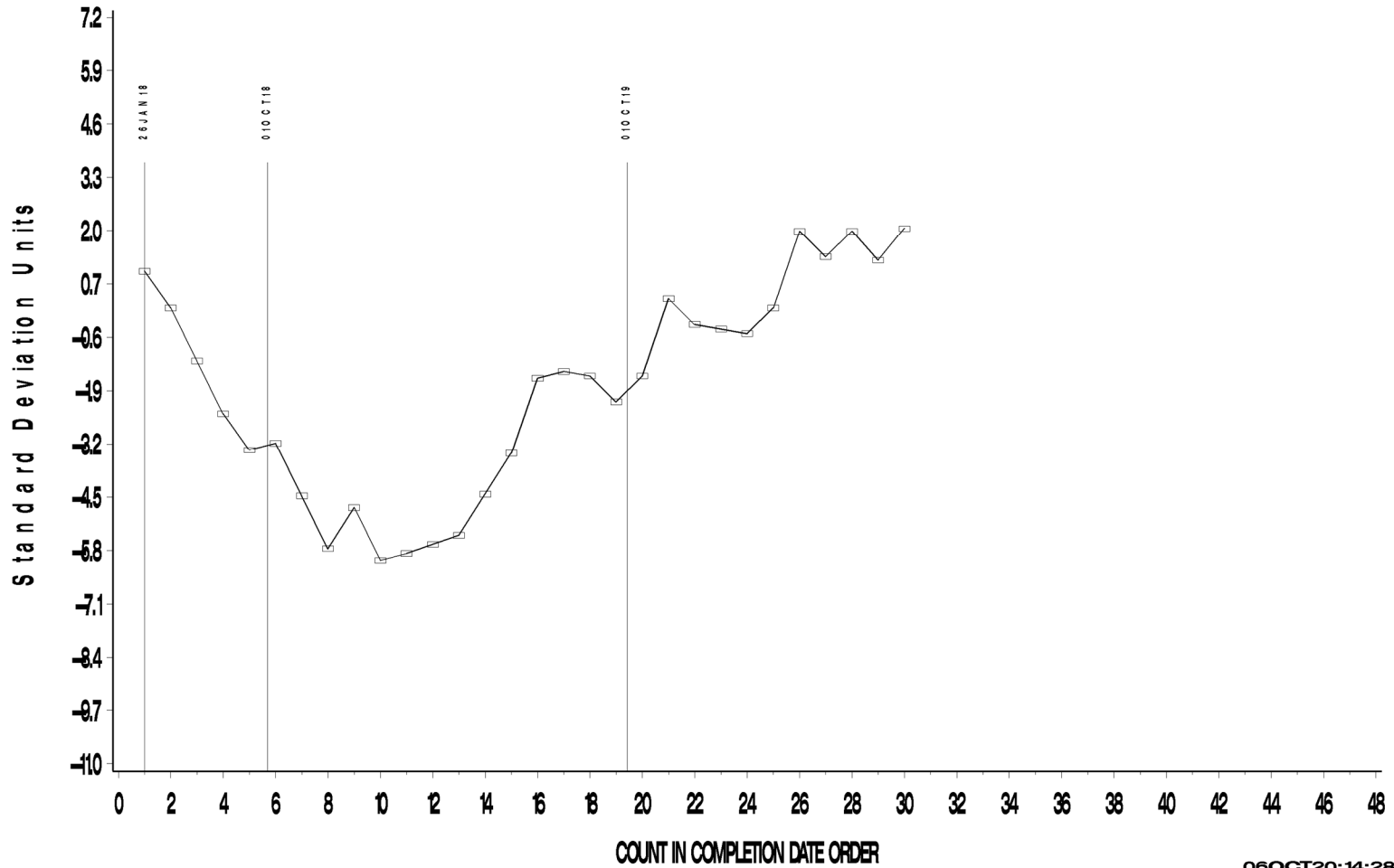
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L-37-1 (D8165)

L-37-1 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

CUSUM Severity Analysis

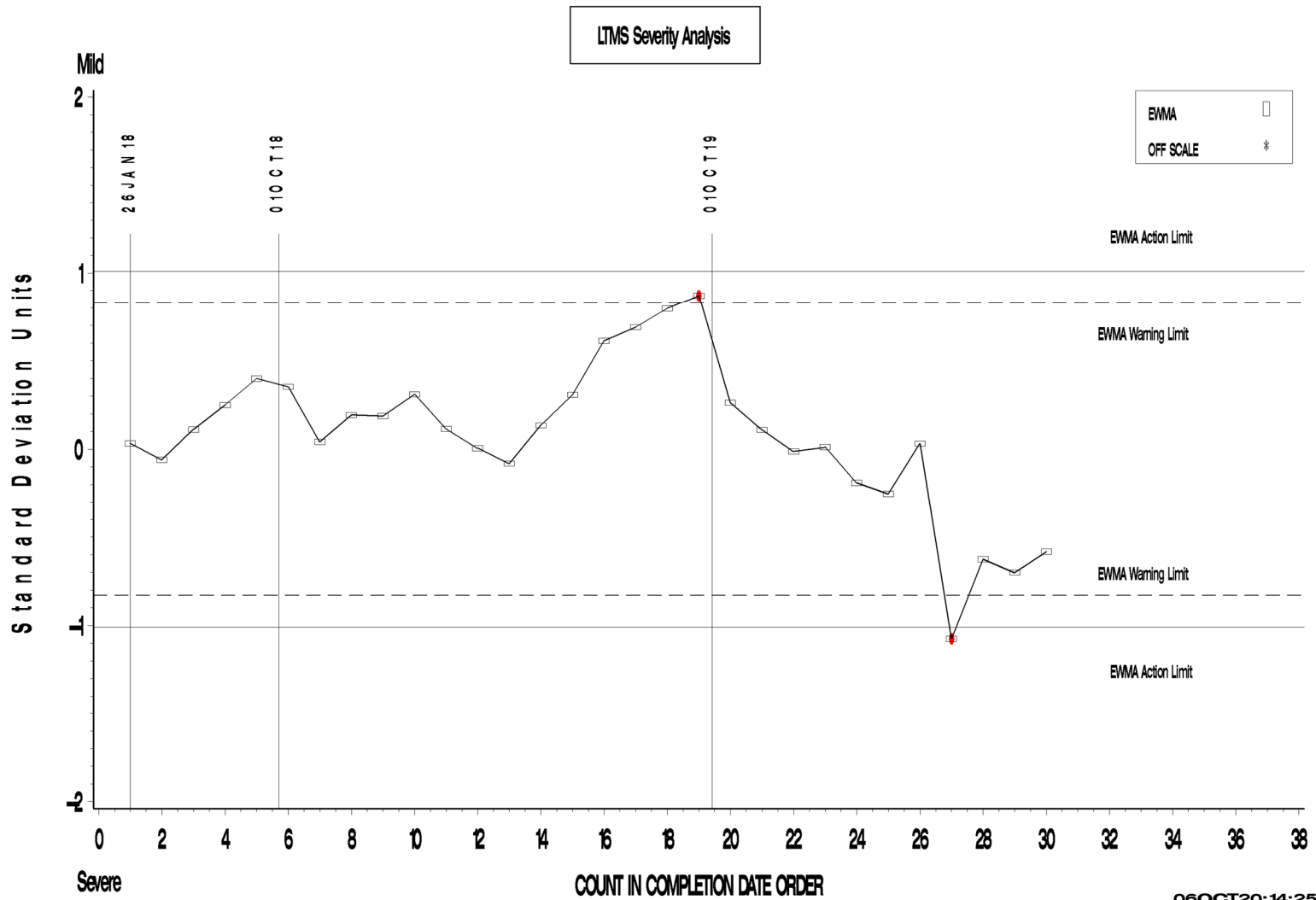


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L-37-1 (D8165)

L-37-1 NONLUBRICATED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING

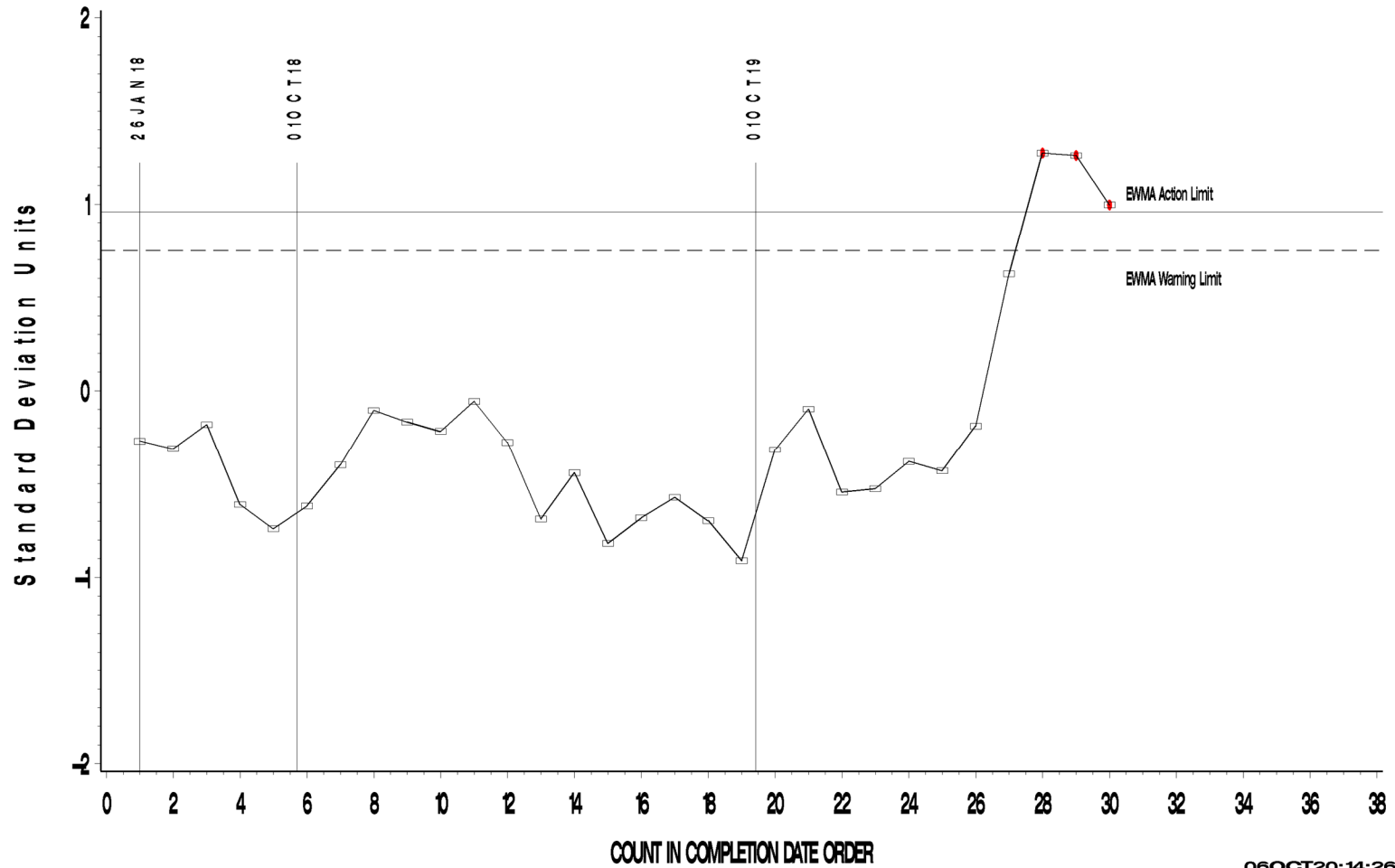


L-37-1 (D8165)

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LTMS Precision Analysis



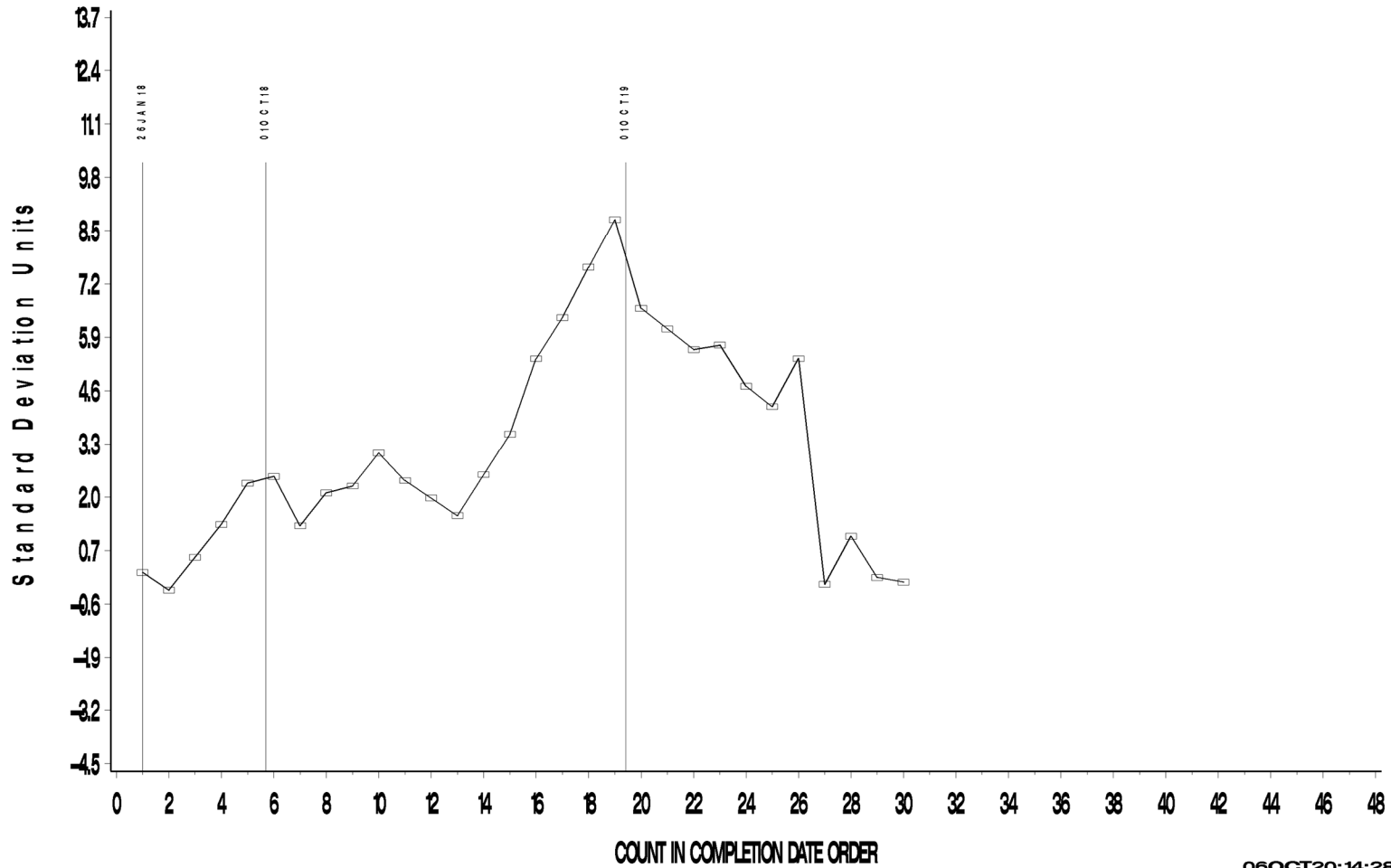
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L-37-1 (D8165)

L-37-1 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING

CUSUM Severity Analysis

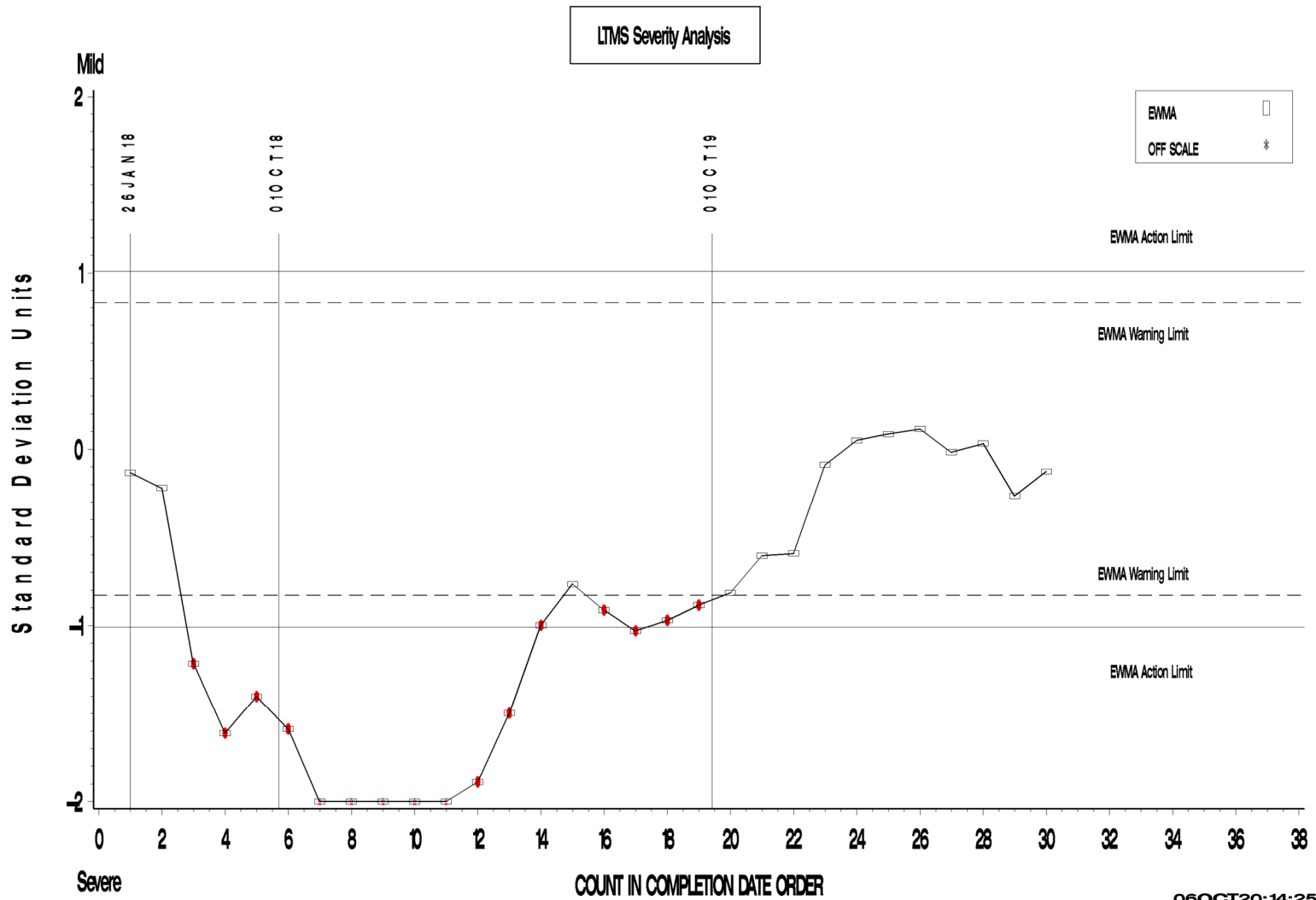


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L-37-1 (D8165)

L-37-1 NONLUBRICATED INDUSTRY OPERATIONALLY VALID DA

FINAL PINION GEAR RIPPLING



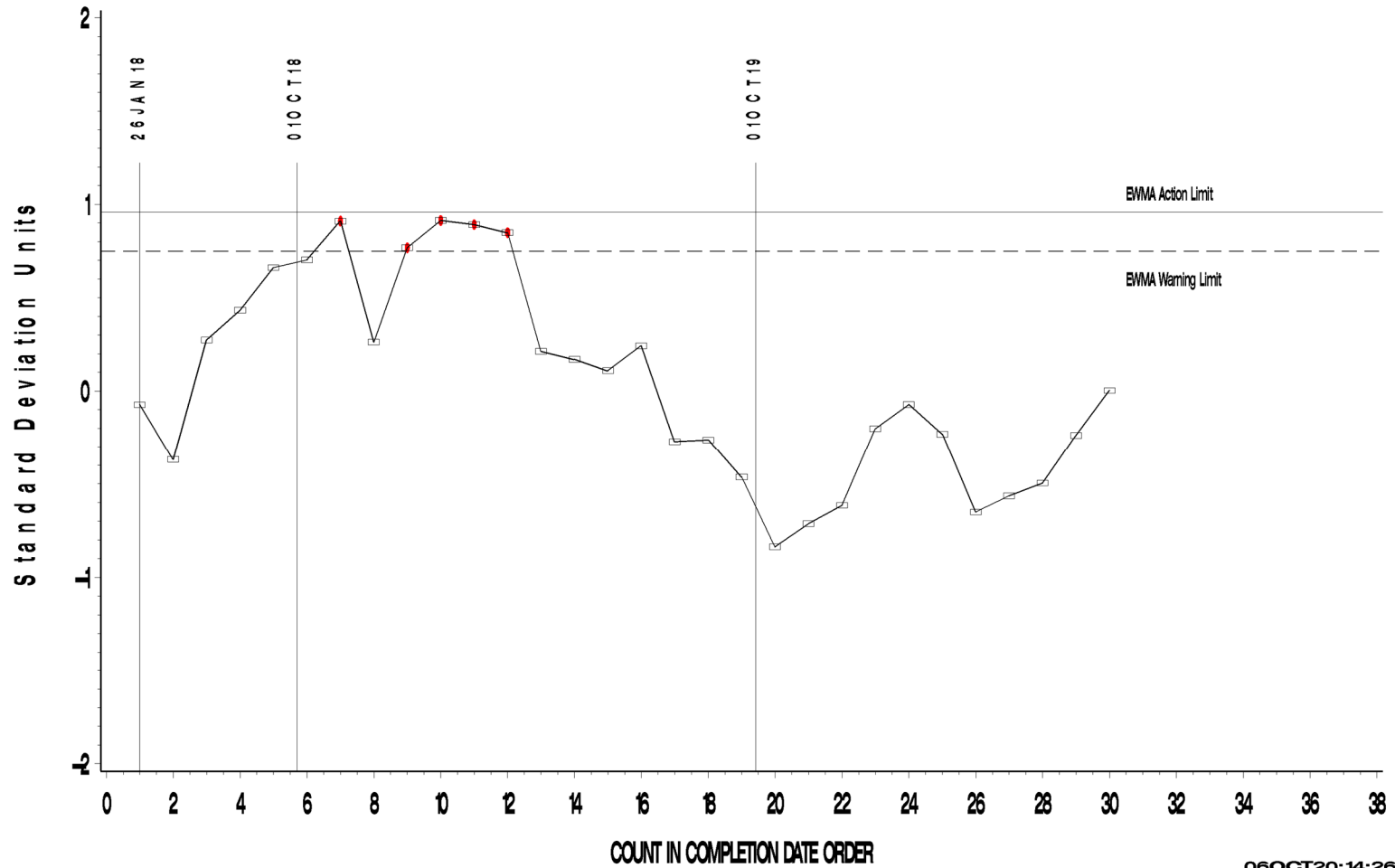
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L-37-1 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIBBLING

LTMS Precision Analysis



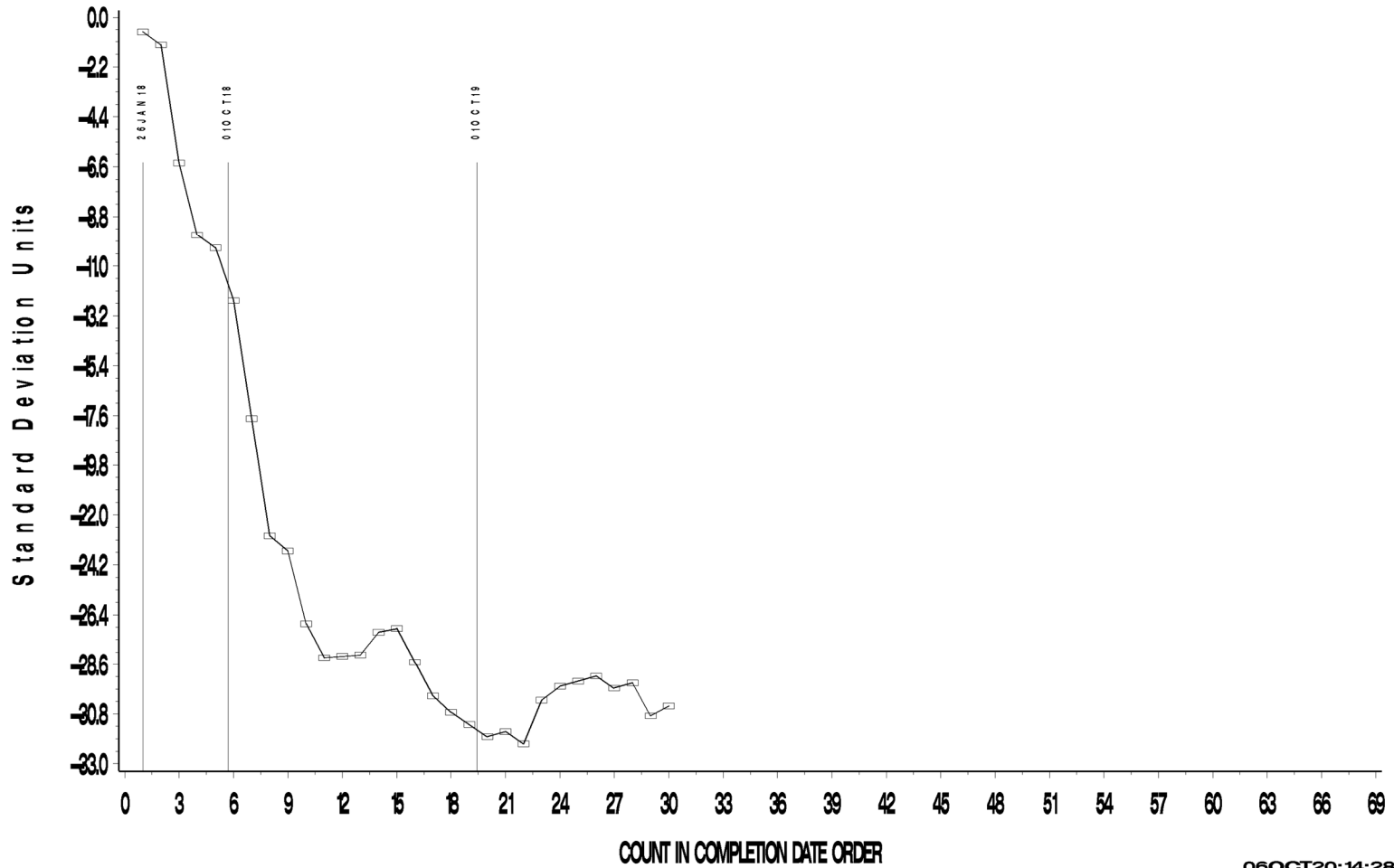
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L-37-1 (D8165)

L-37-1 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIPPLING

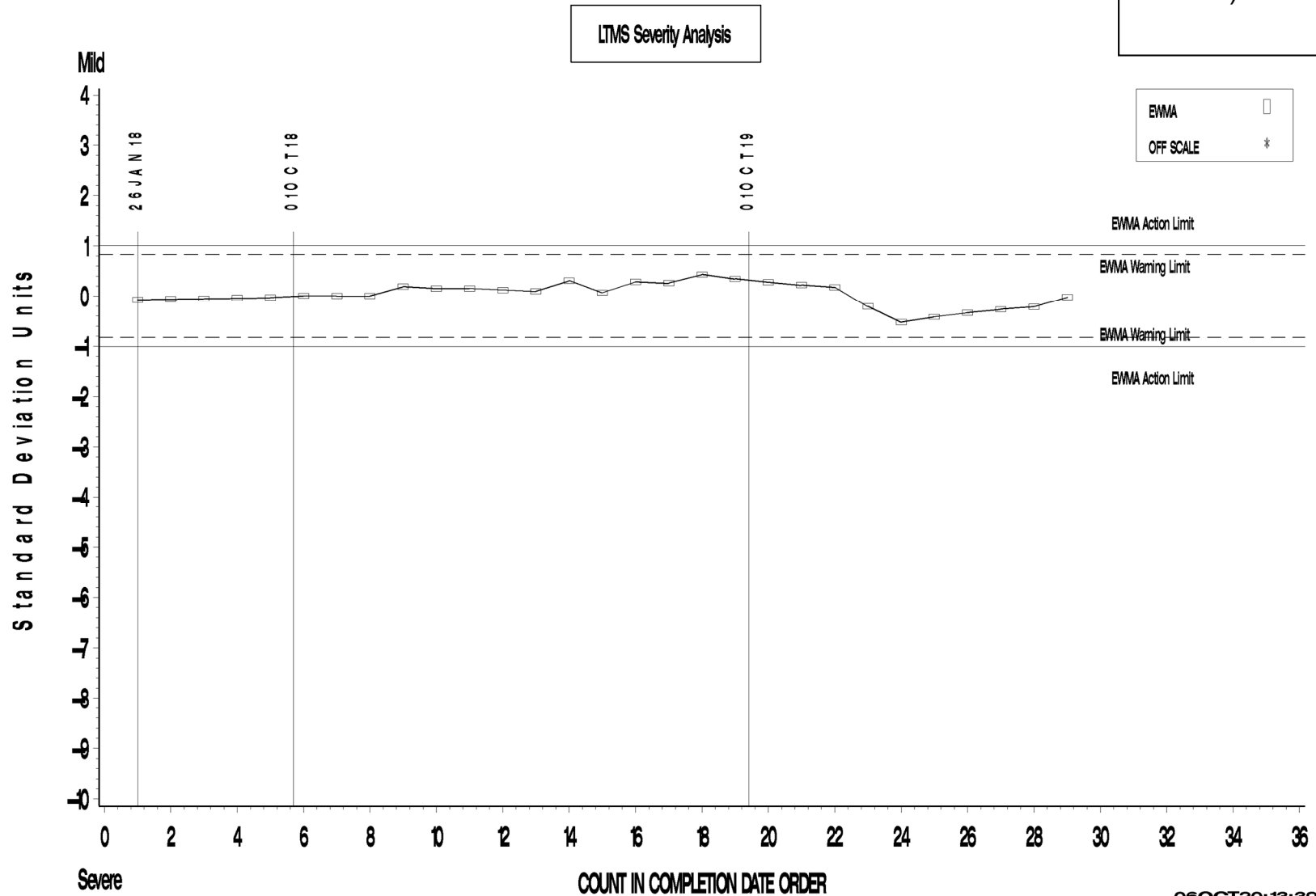
CUSUM Severity Analysis



L-37-1 (D8165)

L-37-1 NONLUBRICATED INDUSTRY OPERATIONALLY VALID DATA
FINAL PINION GEAR PITTING/SPALLING

Results for 155-1 reference oil were not included in this SPIT charts based on the current targets for the oil leading to undefined calculations. Two 152-2 results (129856, and 138440) were also omitted.



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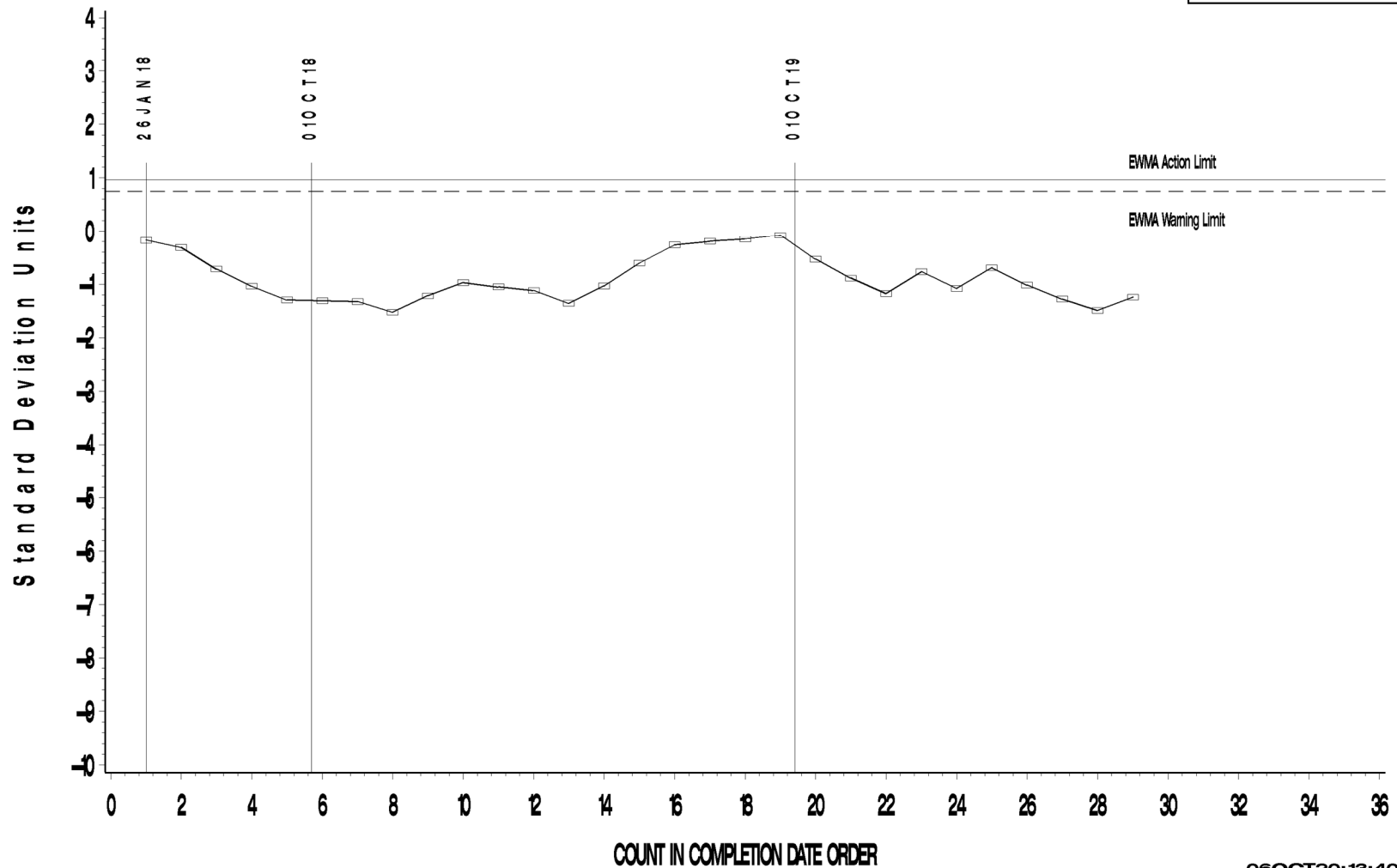
L-37-1 (D8165)

L-37-1 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR PITTING/SPALLING

LTMS Precision Analysis

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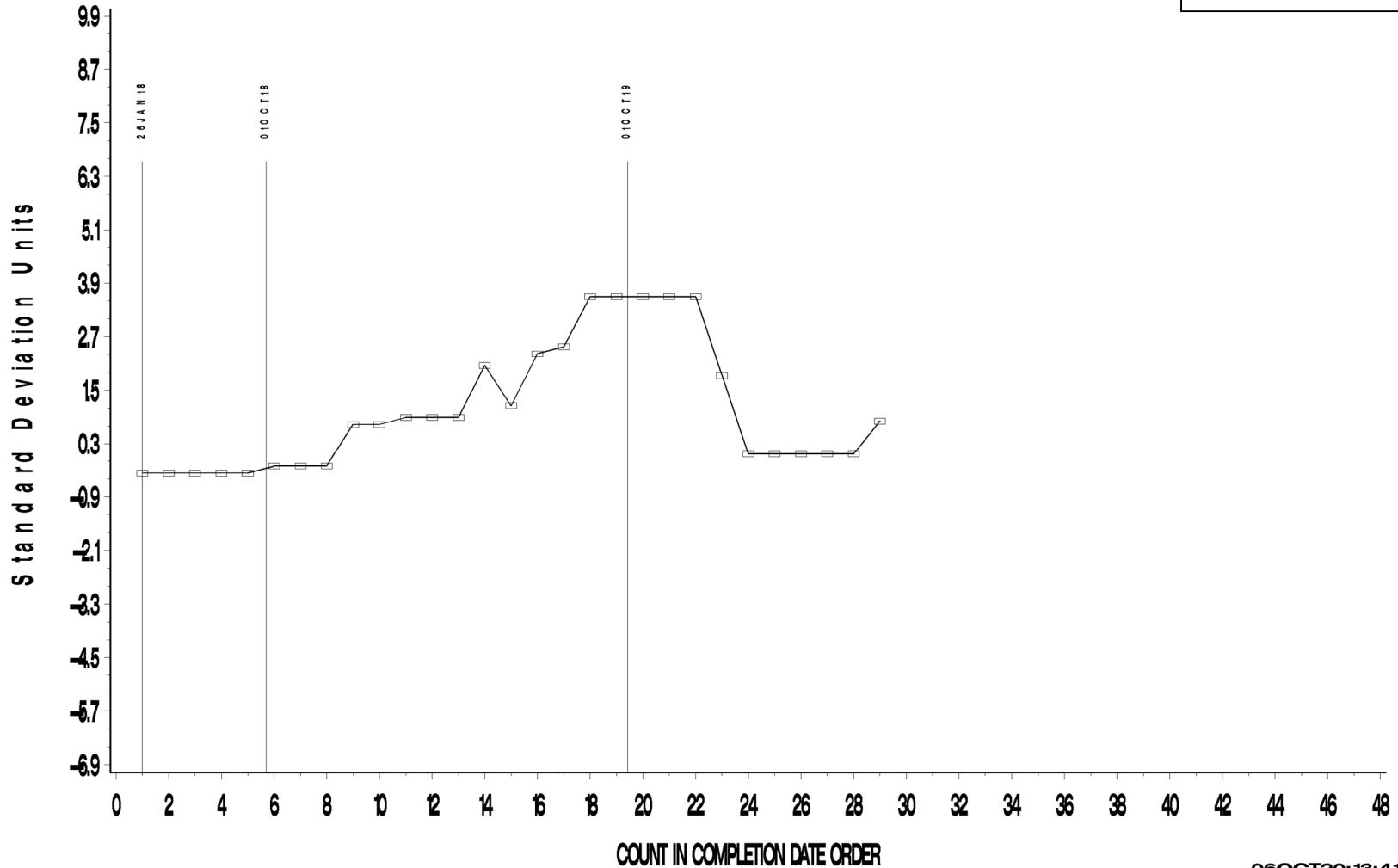


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L-37-1 (D8165)

L-37-1 NONLUBRICATED INDUSTRY OPERATIONALLY VALID DATA
FINAL PINION GEAR PITTING/SPALLING

CUSUM Severity Analysis



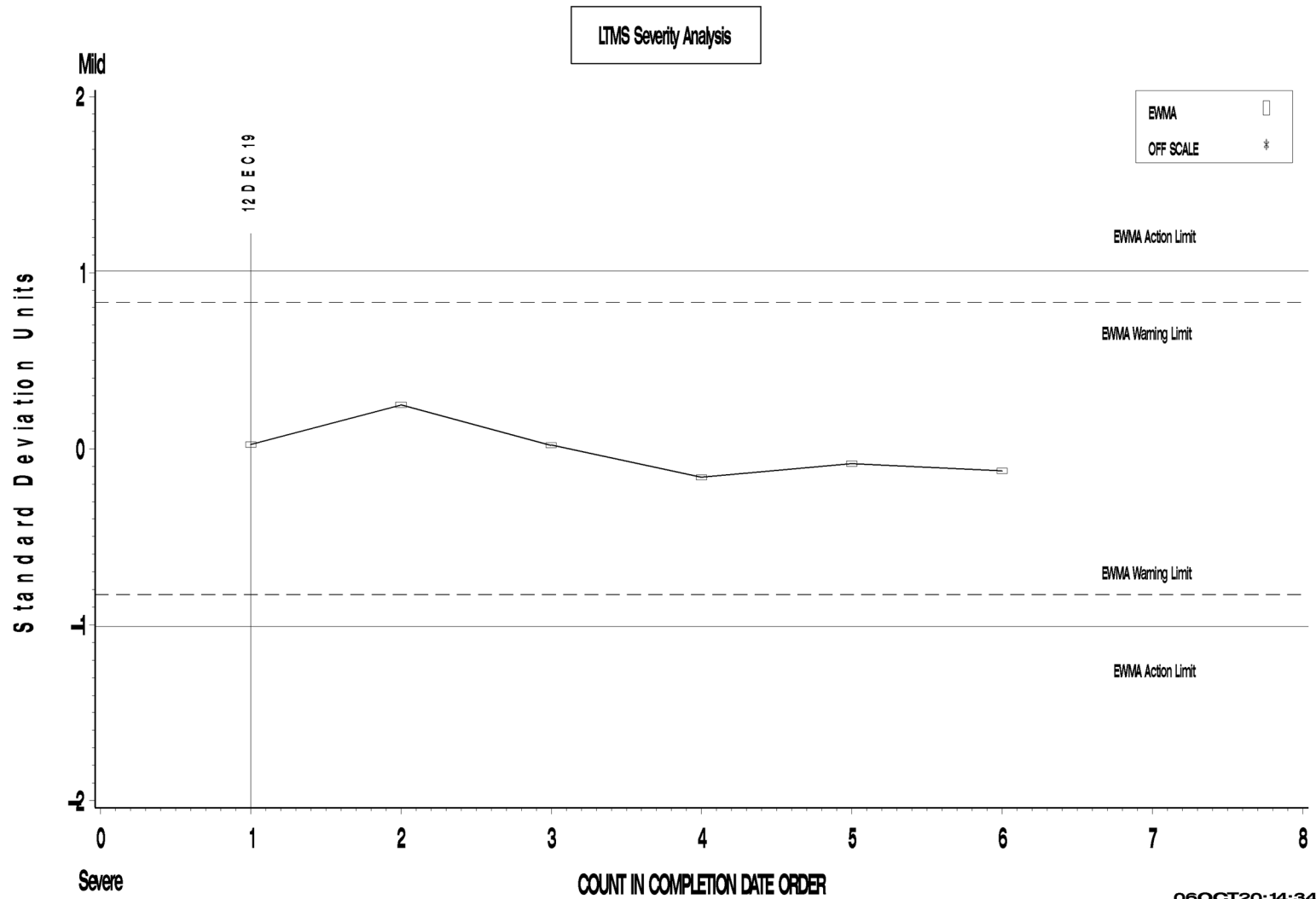
Results for 155-1 reference oil were not included in this SPIT charts based on the current targets for the oil leading to undefined calculations. Two 152-2 results (129856, and 138440) were also omitted.

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L-37-1 (D8165)

L-37-1 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

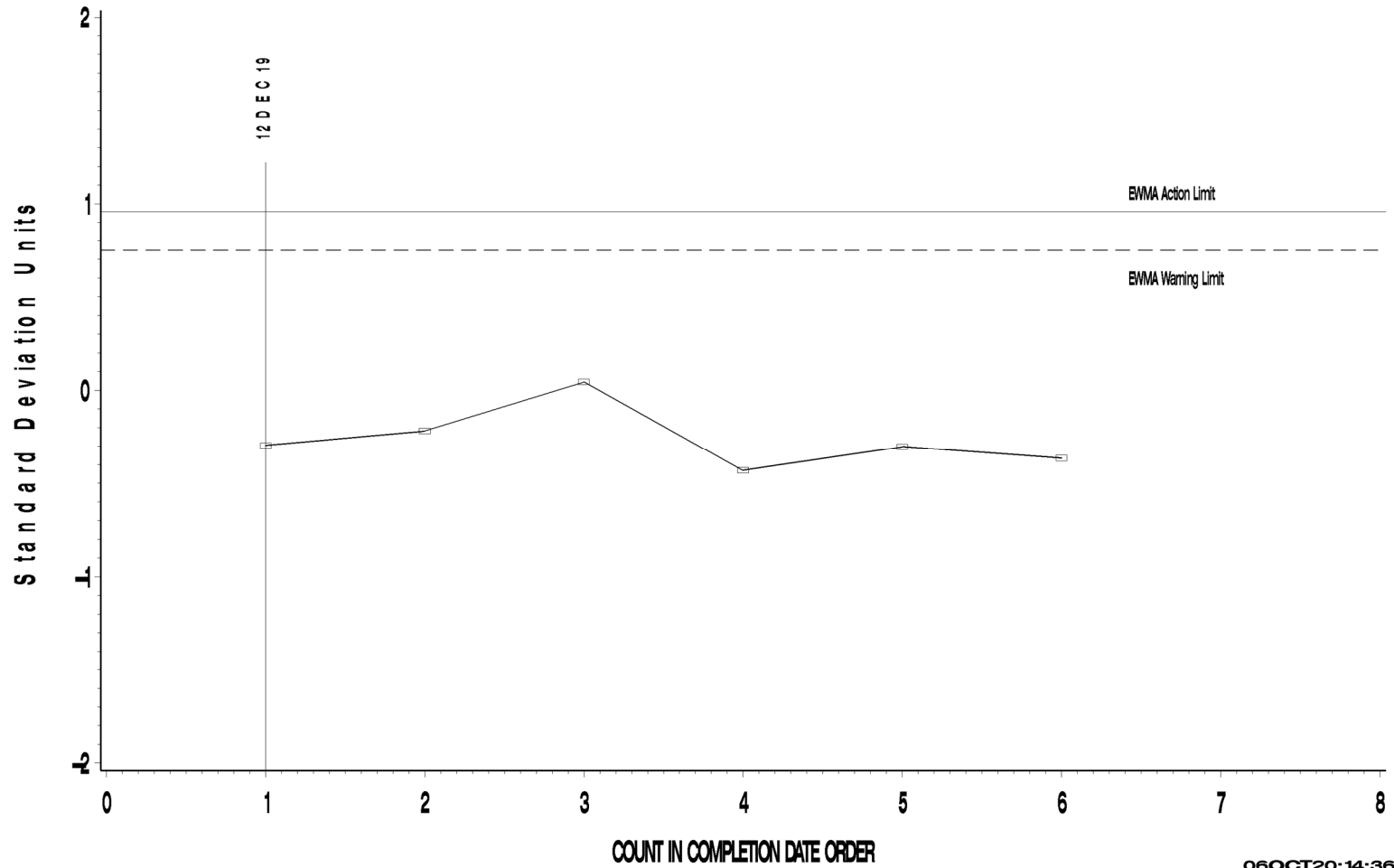


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L-37-1 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

LTMS Precision Analysis

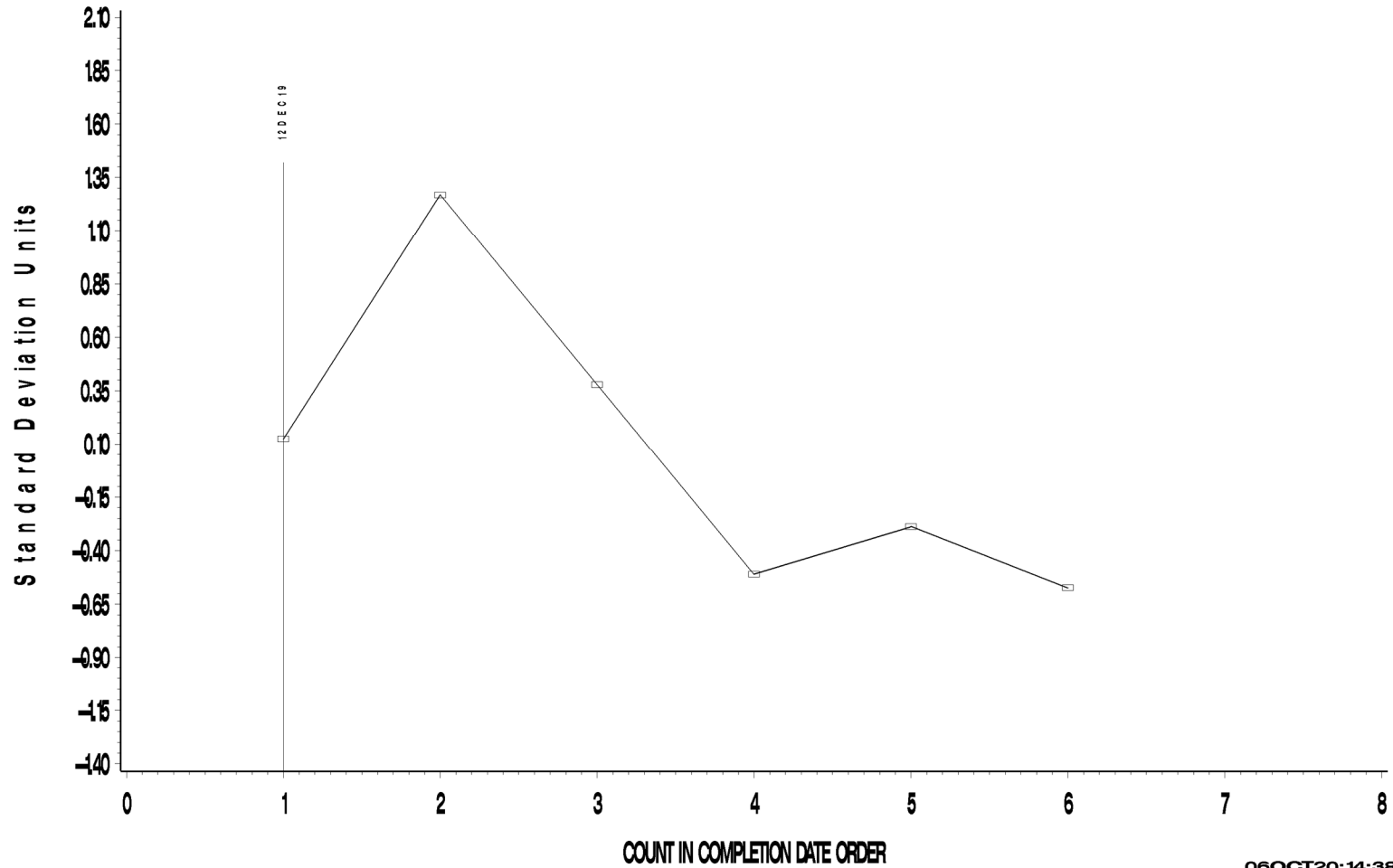


L-37-1 (D8165)

L-37-1 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

CUSUM Severity Analysis



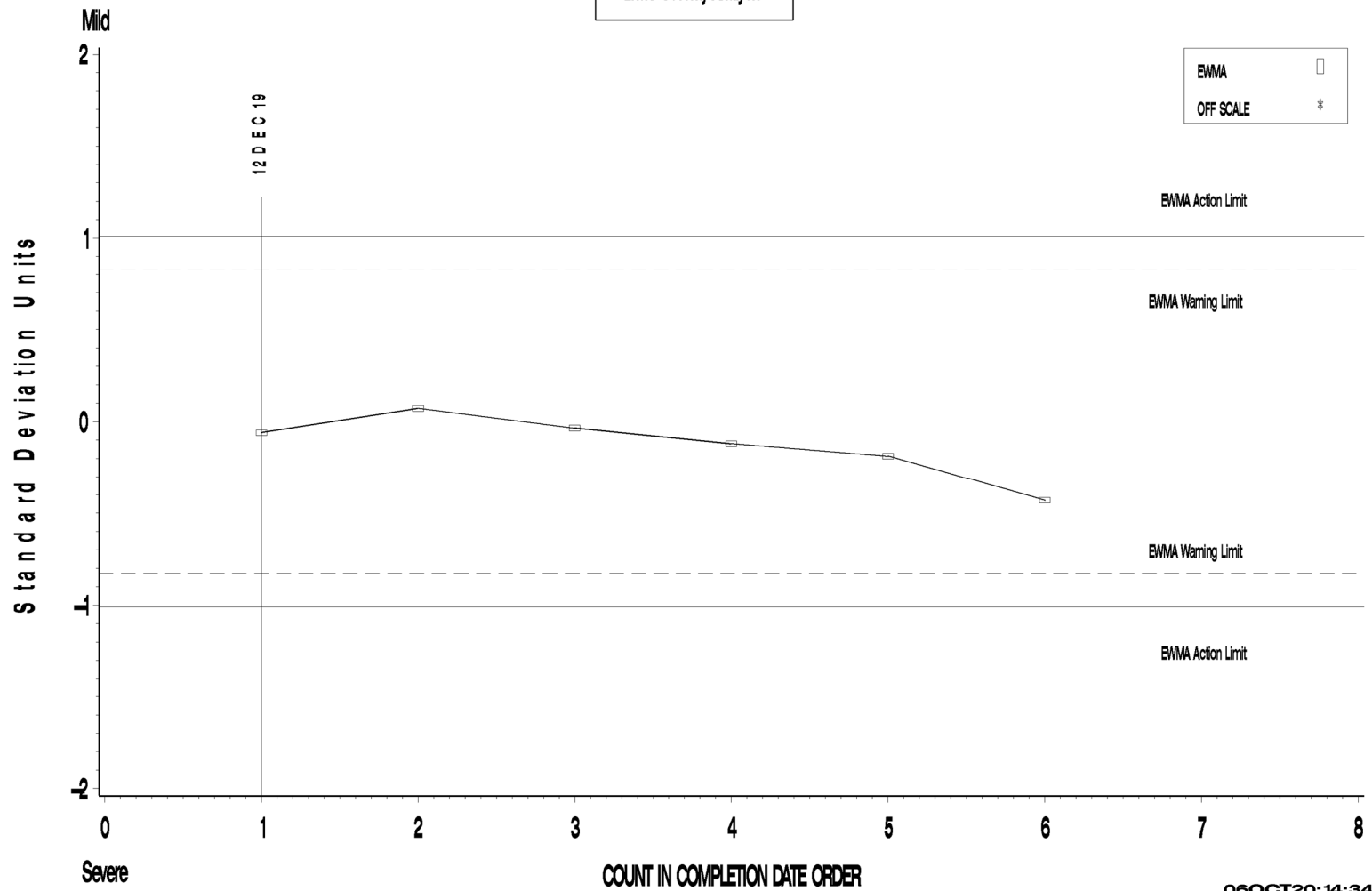
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L-37-1 (D8165)

L-37-1 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING

LTMS Severity Analysis

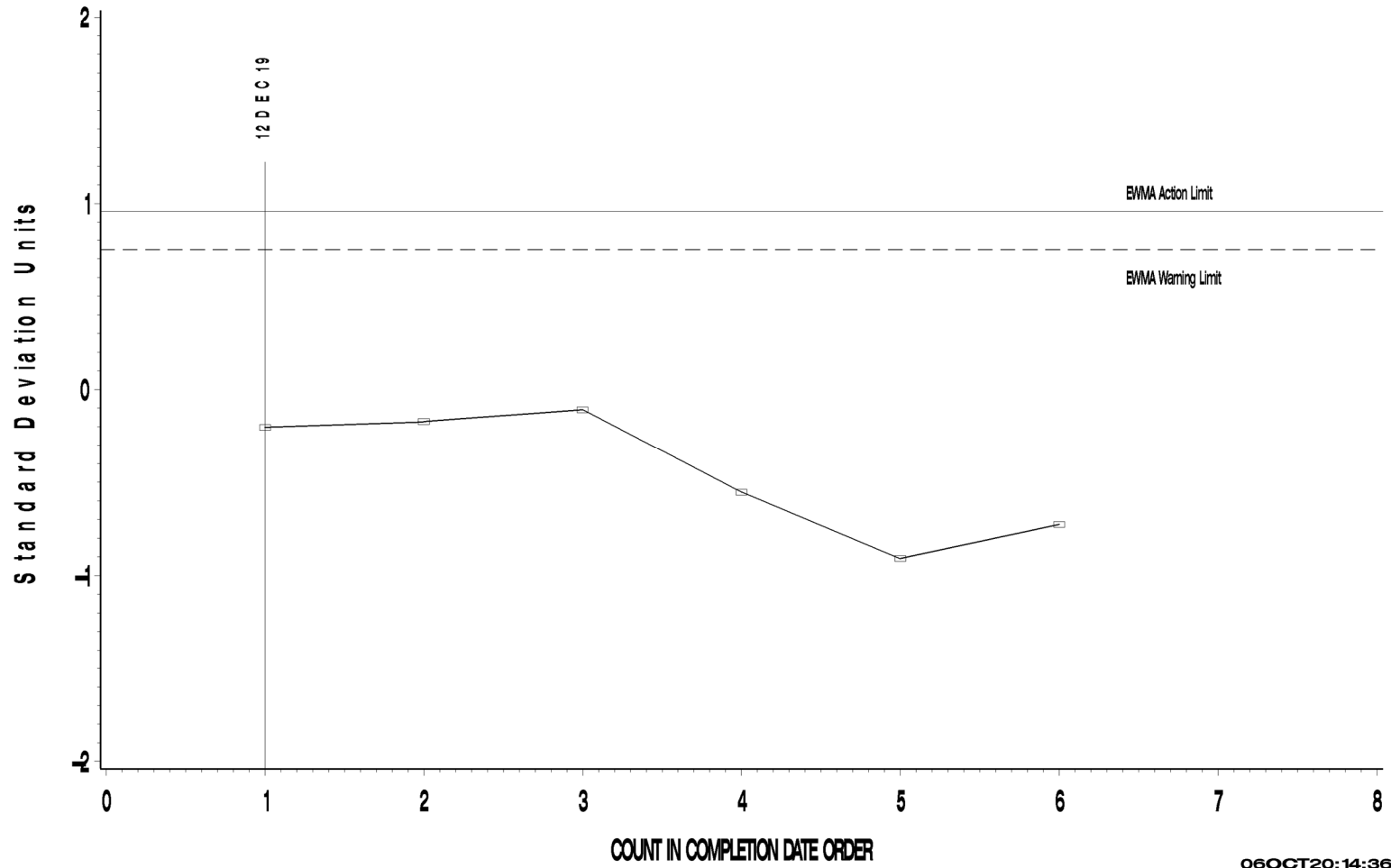


L-37-1 (D8165)

L-37-1 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING

LTMS Precision Analysis

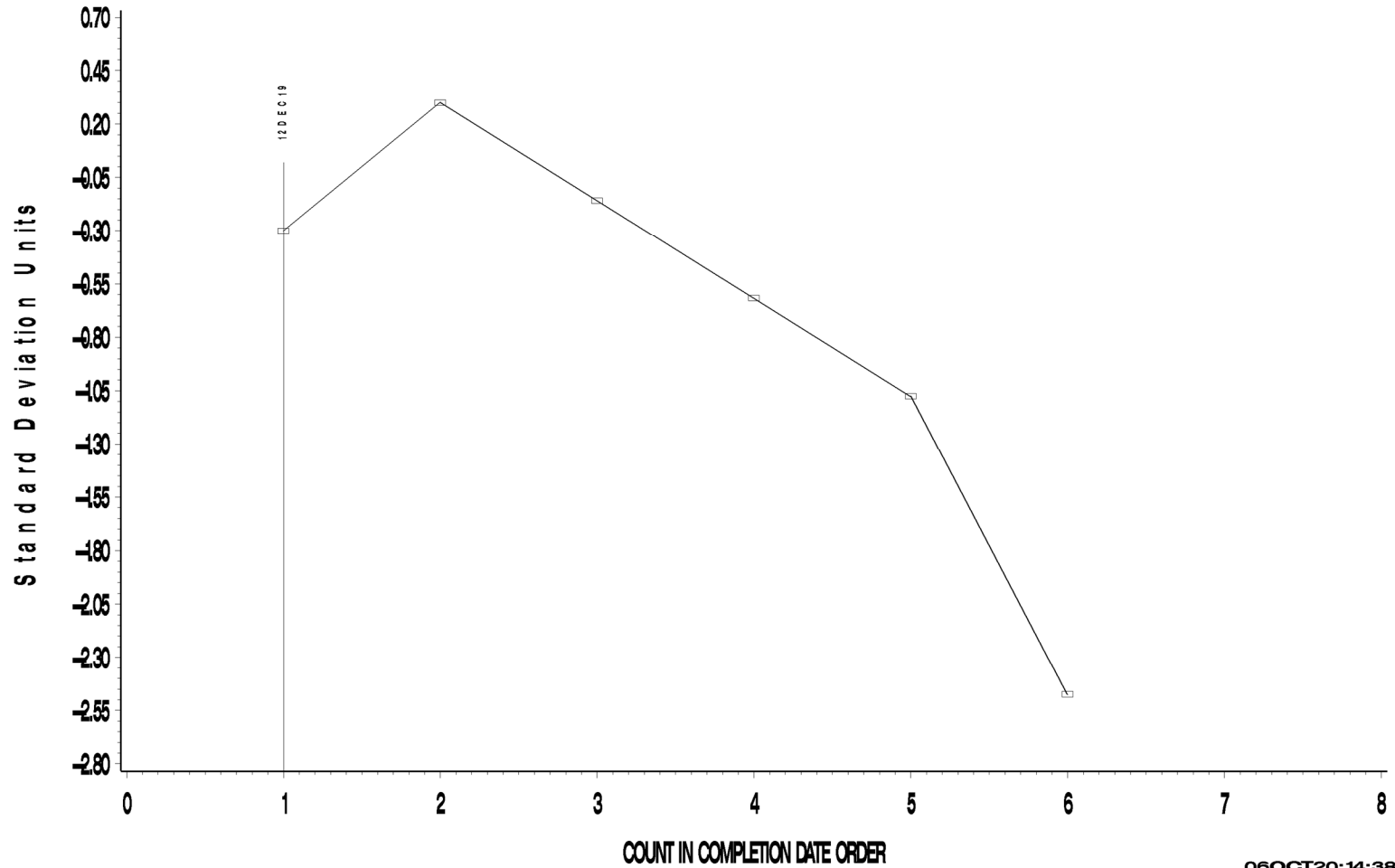


L-37-1 (D8165)

L-37-1 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING

CUSUM Severity Analysis



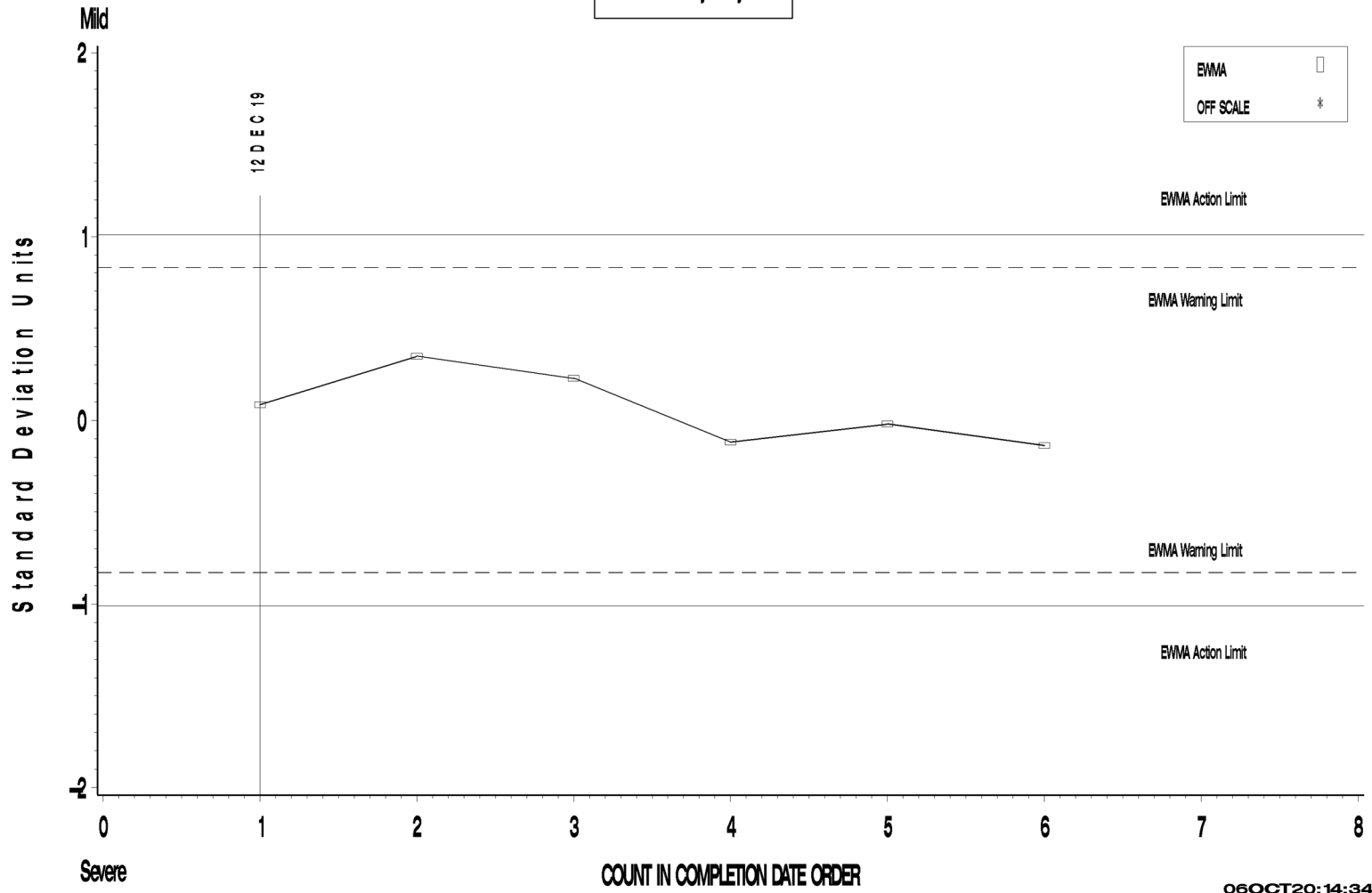
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L-37-1 (D8165)

L-37-1 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIBBLING

LTMS Severity Analysis

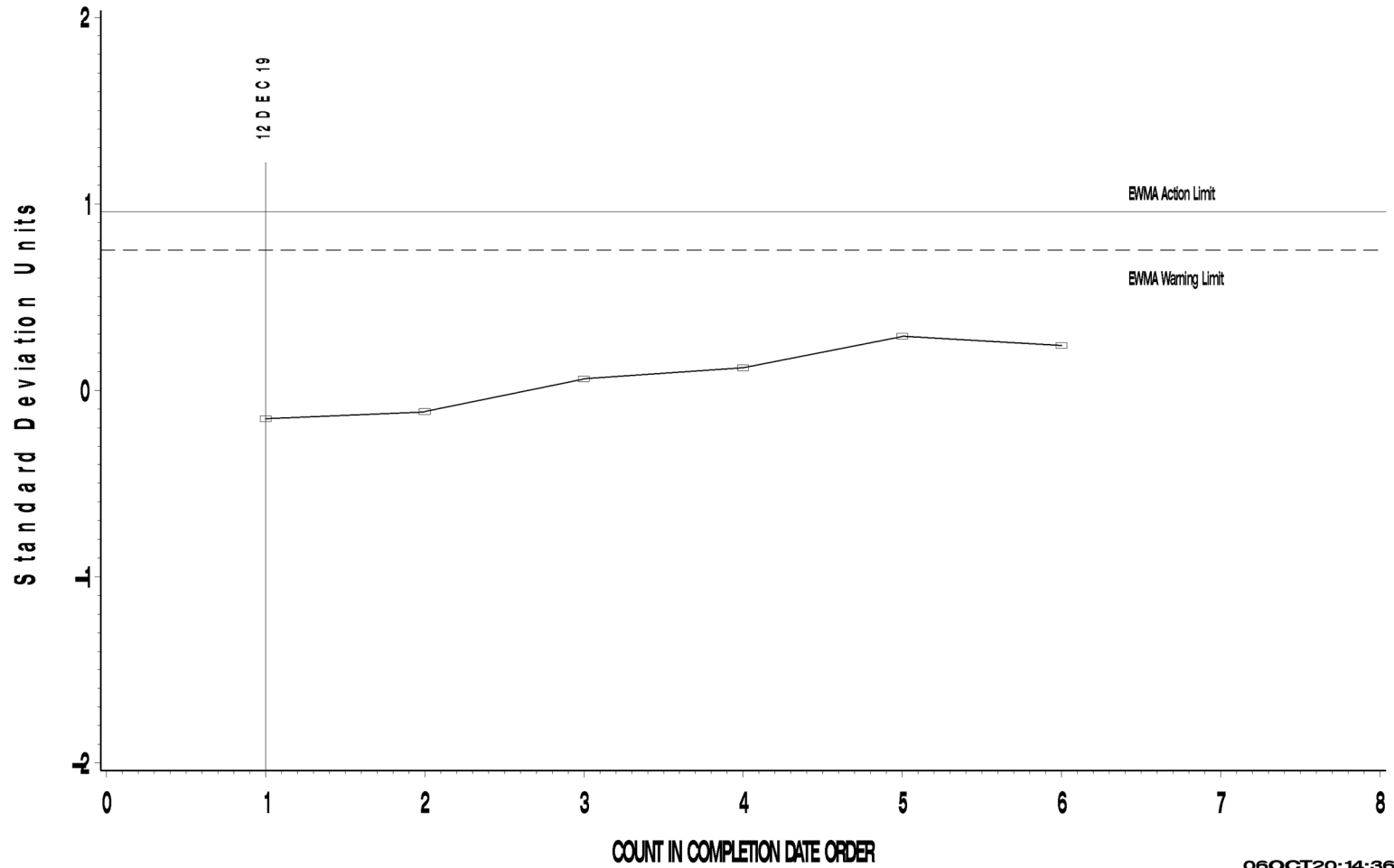


L-37-1 (D8165)

L-37-1 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIBBLING

LTMS Precision Analysis

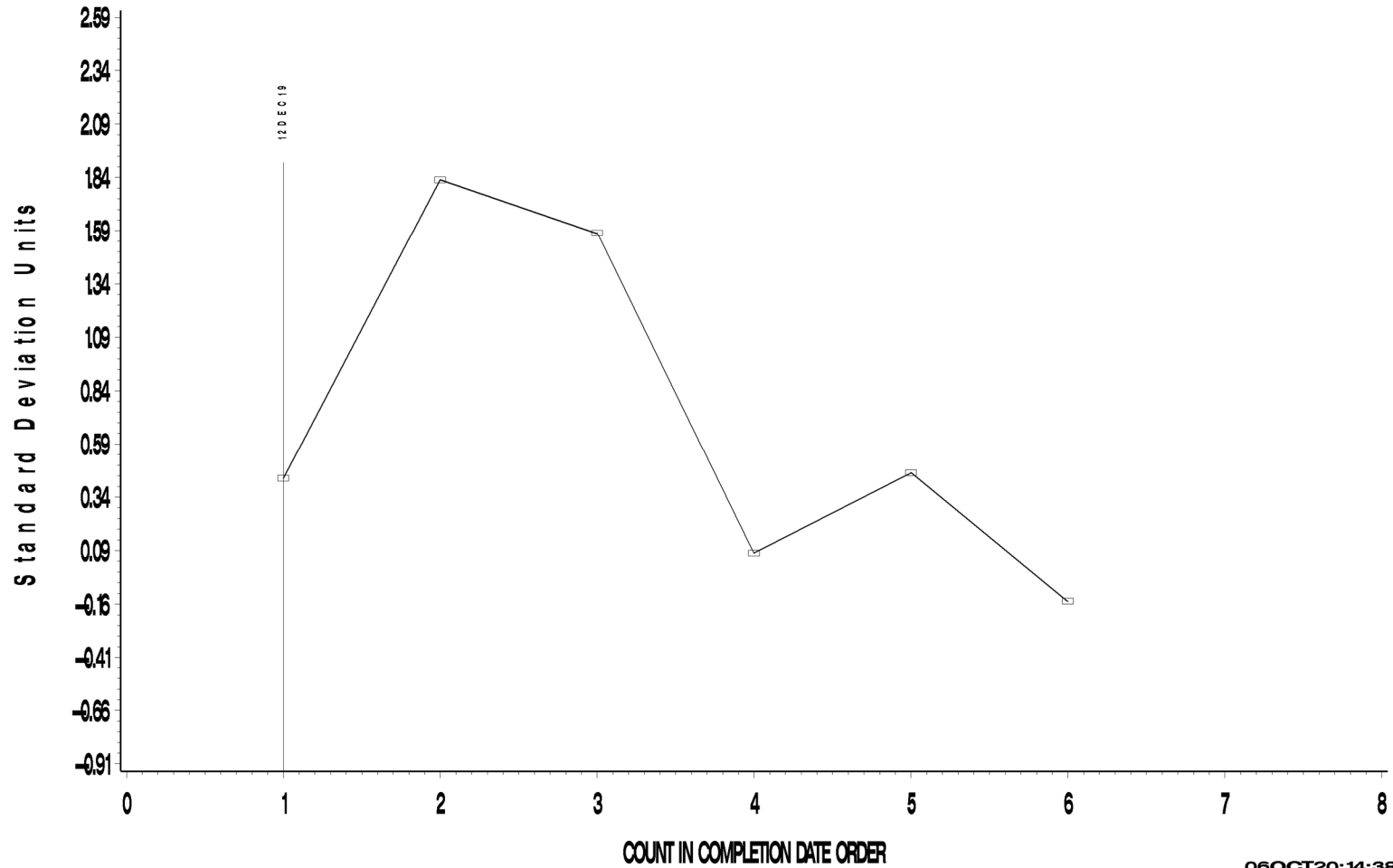


L-37-1 (D8165)

L-37-1 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIPPLING

CUSUM Severity Analysis



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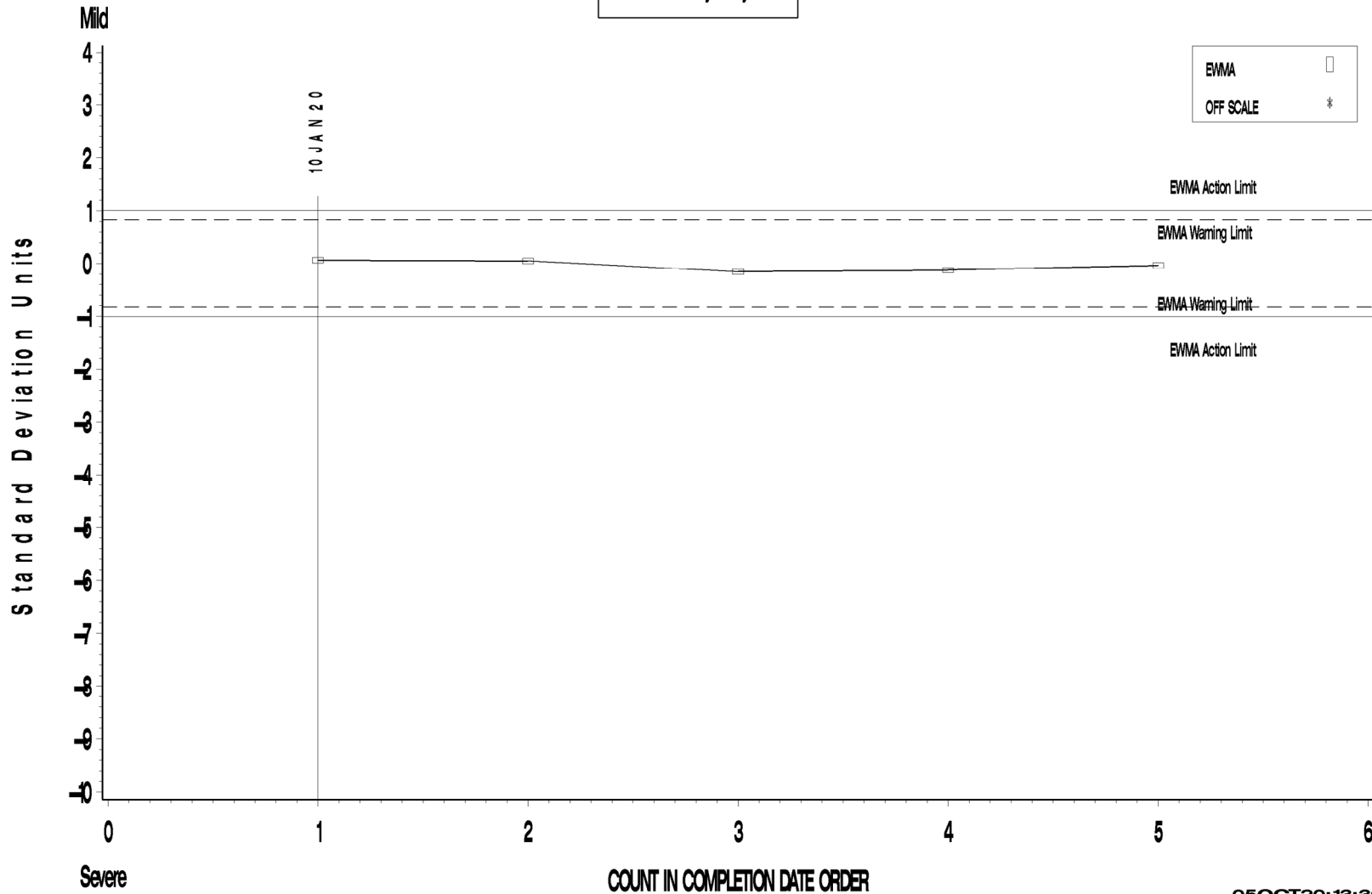
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L-37-1 (D8165)

L-37-1 LUBRITED INDUSTRY OPERATIONALLY VALID DATA
FINAL PINION GEAR PITTING/SPALLING

Results for 155-1 reference oil were not included in this SPIT charts based on the current targets for the oil leading to undefined calculations

LTMS Severity Analysis



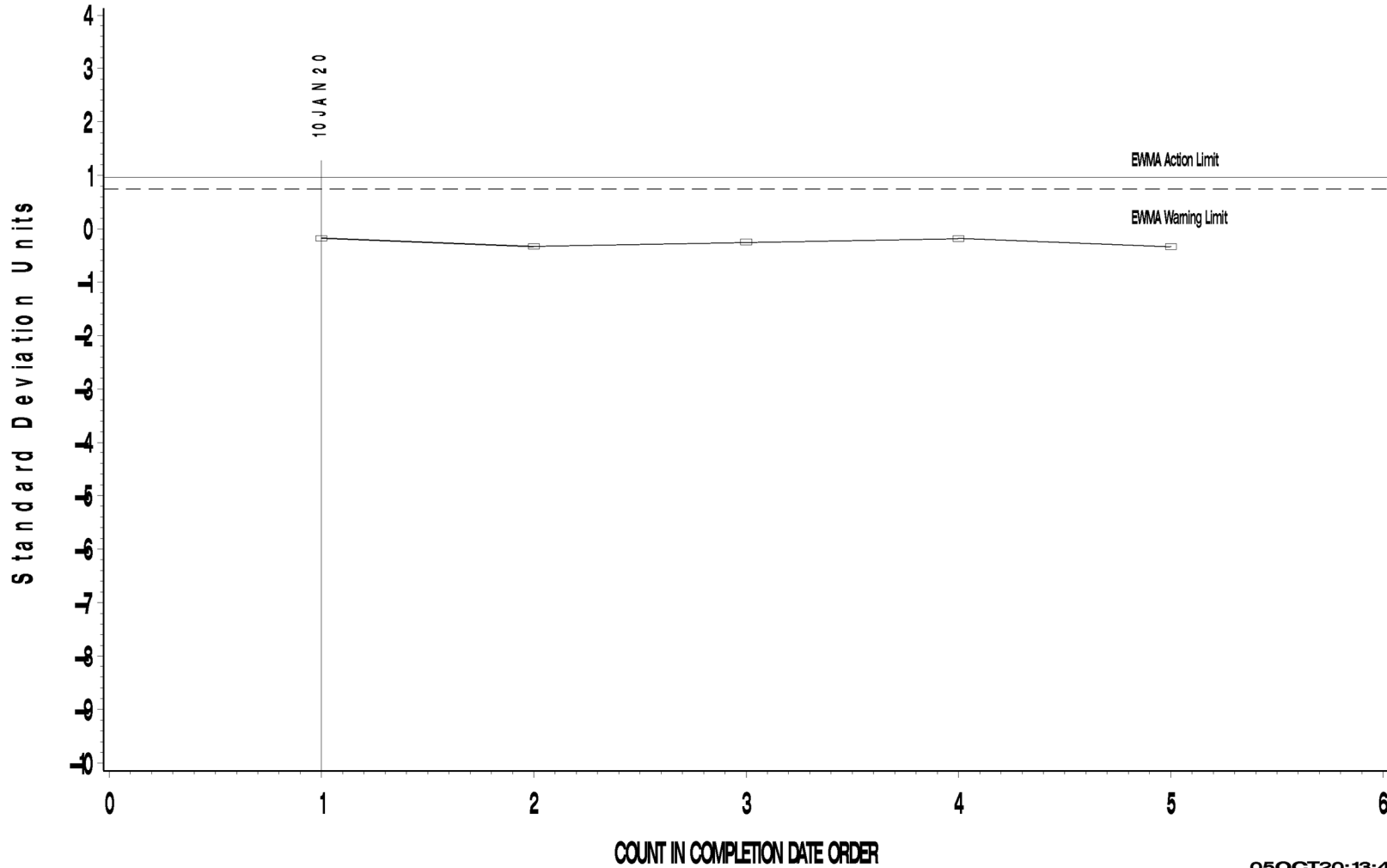
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L-37-1 (D8165)

L-37-1 LUBRICATED INDUSTRY OPERATIONALLY VALID DATA
FINAL PINION GEAR PITTING/SPALLING

LTMS Precision Analysis

Results for 155-1 reference oil were not included in this SPIT charts based on the current targets for the oil leading to undefined calculations



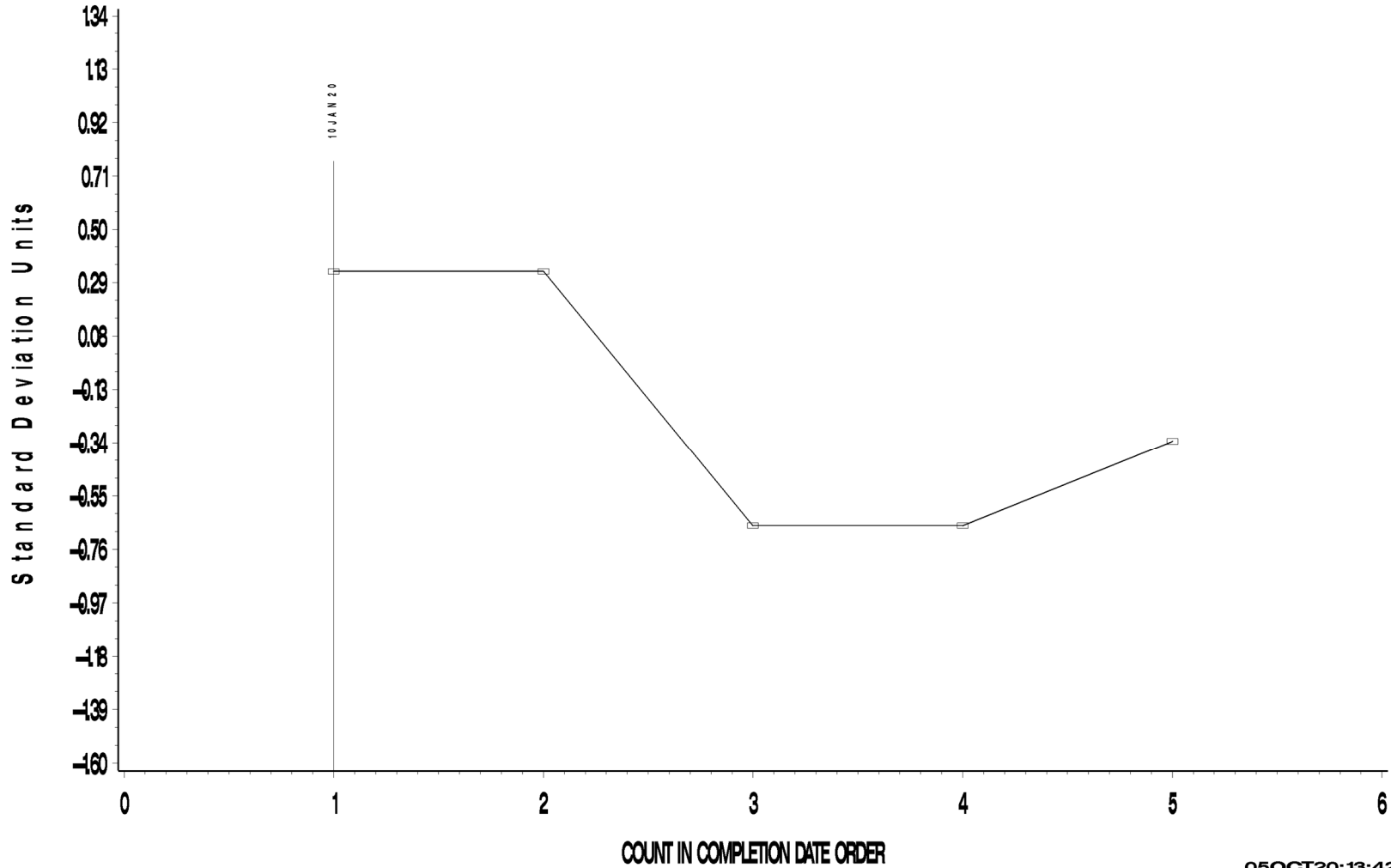
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L-37-1 (D8165)

L-37-1 LUBRITED INDUSTRY OPERATIONALLY VALID DATA
FINAL PINION GEAR PITTING/SPALLING

Results for 155-1 reference oil were not included in this SPIT charts based on the current targets for the oil leading to undefined calculations

CUSUM Severity Analysis



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L-37-1 (D8165)

TIMELINE ADDITIONS

Effective Date	Information Letter	Event
June 11, 2020	20-2	The surveillance panel approved the Strange axle housing for test use.

LAB VISITS

No lab visits were conducted during this reporting period.

L-37-1 (D8165)

INFORMATION LETTERS

Information letter 20-2 was issued this period.

L-37-1 (D8165)

LTMS DEVIATIONS

No LTMS deviations were written this report period.

L-37-1 (D8165)

STATUS OF REFERENCE OIL SUPPLY

Oil	Cans @ Labs	@ TMC	
		Cans	Gallons
117	9	321	321.5
118	3	156	156.0
134	1	0	0.0
134-1	24	136	136.0
152-2	21	74	74.0
155	5	27	27.5
155-1	21	49	49.8
Total	84	763	764.8

The TMC quantity remaining presumes usage only for L-371 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.