Sequence X

ASTM D8729

Ford Chain Wear Test
Surveillance Panel Meeting Minutes

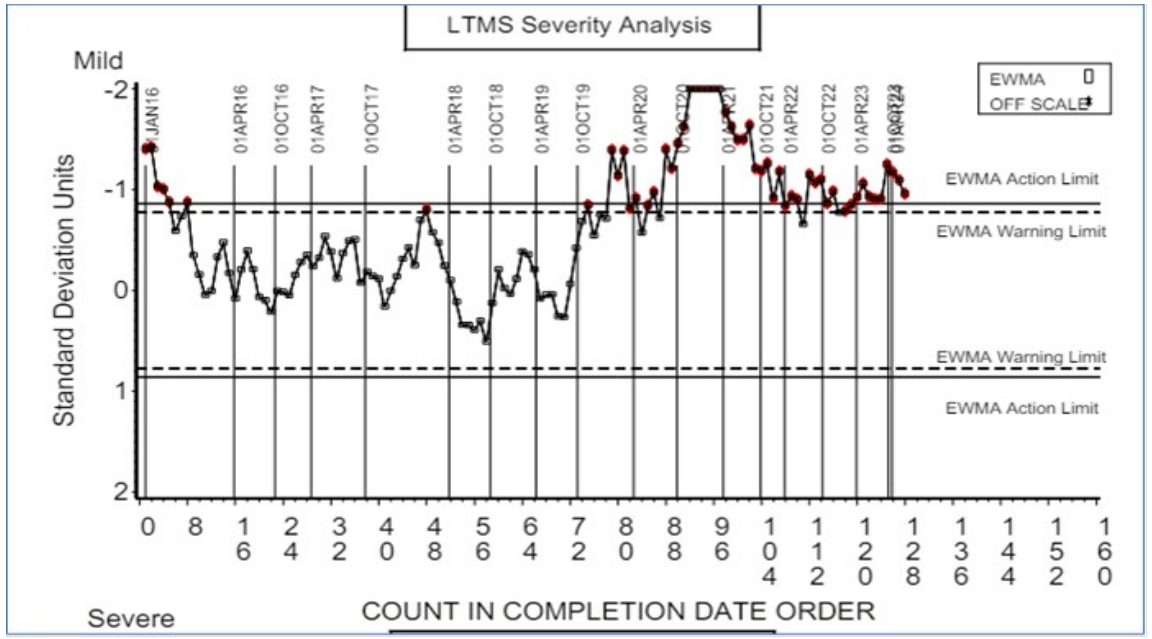
June 4, 2024

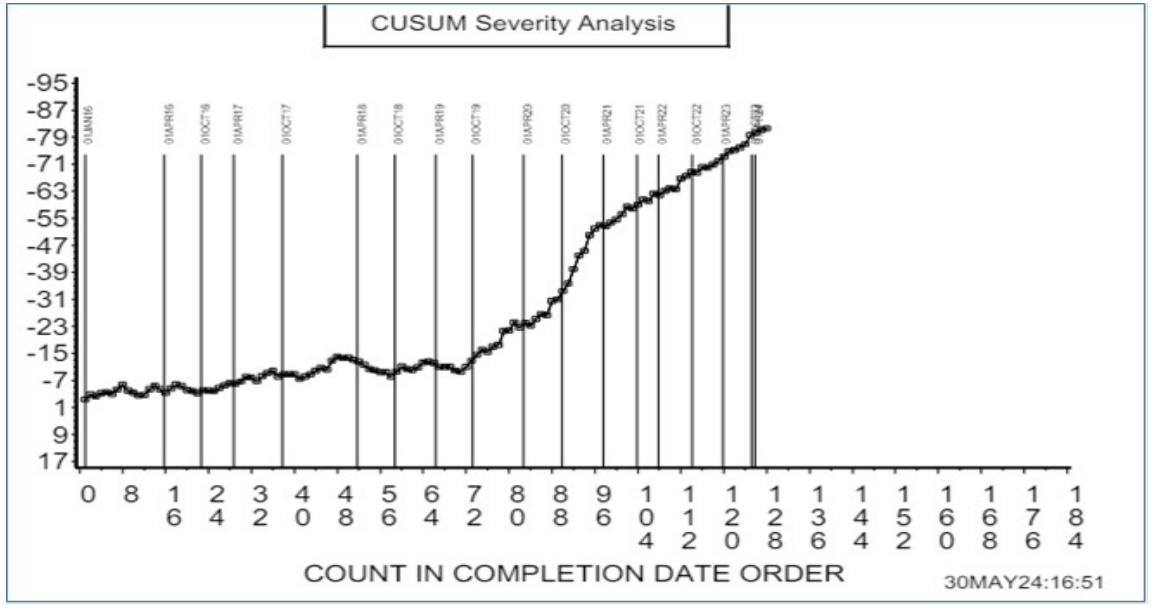
Prepared By: Alfonso Lopez, S.P. Chairman

Sequence X Surveillance Panel Meeting Agenda 06/04/24

- Roll call
- Action Items
- TMC Report
- OH Report
- Alternative Fuel Matrix
- Report to Sub B in Next Meeting

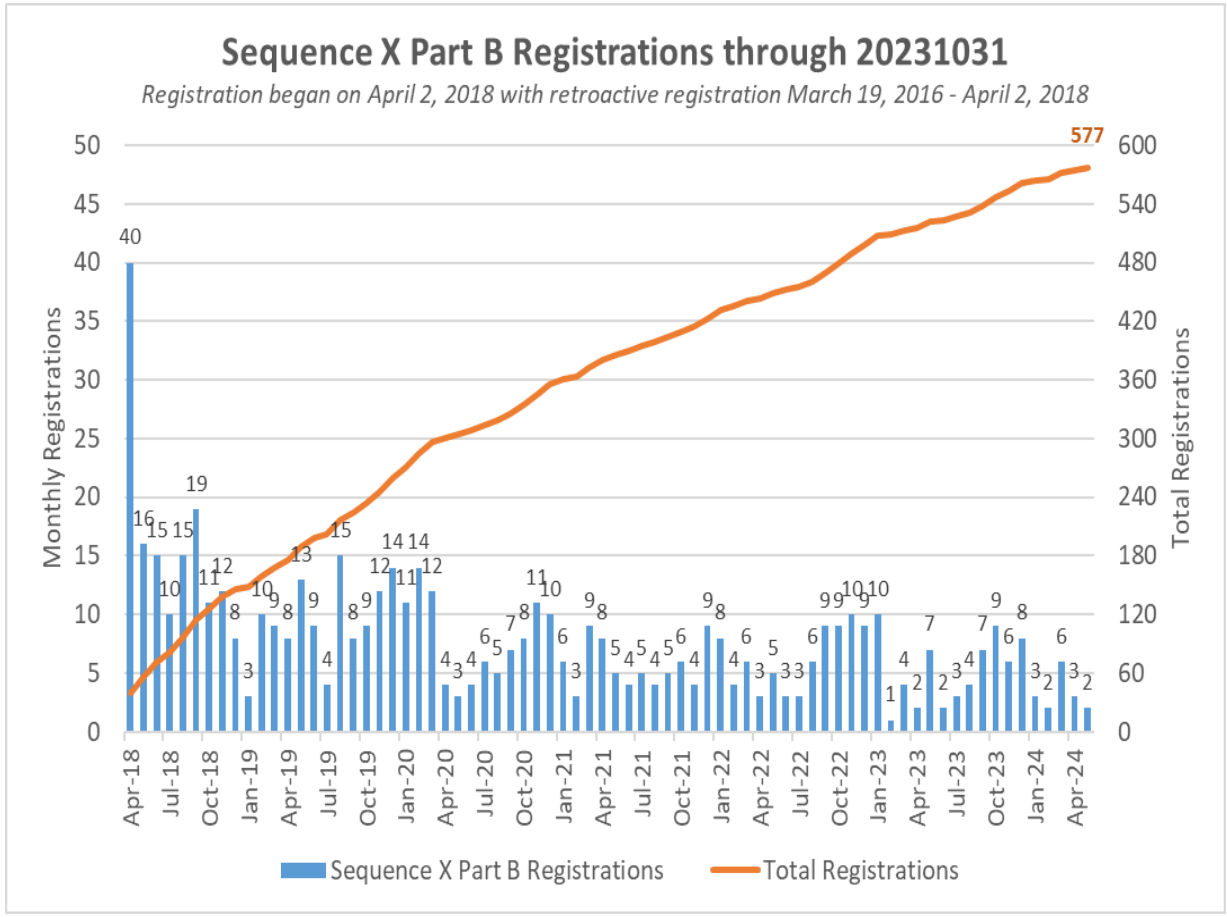
- TMC REPORT
  - Current industry control charts show mild alarm.
  - Stockwell – references tests are 1 sigma mild mostly. Severity adjustment system doing its job.
  - All passing 270 results have shown discrimination on oil 271.





Sequence X Candidate Activity

- 16 Registered tests have been conducted in 2024 through end of May.
- GF7 demand expected to increase



Sequence X Alternate Fuel Task Force Update

- The Statistics group designed the testing matrix. Two stands, 3 tests per stand with TMC 270, and a discrimination run with TMC 271 per stand for a total of 8 tests.
- The Seq X Alternate Fuel Task Force approved the Alternate Fuel Approval Requirements Draft.
- Items for discussion:
    - Review Alternate Fuel Approval Requirements Draft.
        - Fuel tank cleaning procedure prior to starting alternate fuel testing.
        - Implementation of a new fuel.

Testing Matrix

Stand #1	Stand #2
270	270
270	270
270	270

Sequence X Alternate Fuel Approval Requirements
Document Sent to Panel For Review – Eballot Vote in 2 Weeks

Alternate Fuel Approval Requirements

For an alternate fuel to be approved for Sequence X test, the fuel supplier shall demonstrate, through chemical analyses and engine testing, that the fuel provides the same performance to the currently approved fuel. The supplier shall provide a Certificate of Analysis documenting that the fuel meets the current Sequence X fuel specification, as well as conducting a prove-out program.

Prove-out Program—Complete the prove-out program using the Sequence X test, which is to be performed on a minimum two test stands from different test laboratories. Test stands chosen must have an active calibration status. Fuel approval tests are to be run on the same critical parts batches and reference oil blends as the most recent reference on each stand. Reference oil 270 (or subsequent approved re-blends) will be used. The test matrix is shown in Table AX.X. Please note that the testing lab(s) must ensure that the tanks for the alternate fuel program are to be cleaned and have none of the previous fuel blend in them.

Table AX.X Testing Matrix

Stand #1	Stand #2
270	270
270	270
270	270

In addition, the fuel will be required to show that it can discriminate, using reference oil 271. The results in both stands must meet the requirements given in the LTMS document for showing discrimination with reference oil 271. The supplier can have the discrimination test run at any time in the matrix, i.e., beginning, after run 1, etc.

A member of the Subcommittee B statisticians group will conduct the analysis of the results of the test matrix. The list of members can be found using the link "Data Analyst List" found on the TMC homepage. The parameter used in the analysis will be End of Test Chain Wear Percent Elongation (CHST). For this parameter, determine the current exponential weighted moving average, or Zi, for each test stand immediately prior to beginning the prove-out program. Each test stand will have its own unique Zi value. The Zi value calculated for each stand will be referred to as Z_{cal} in the all subsequent calculations. For each test conducted on a stand, calculate the difference between the standardized test result Yi and the previously determined Z_{cal} value. This difference is the prediction error, or Ei value. That is, Ei = Yi – Z_{cal} . Note that because of the use of Z_{cal} instead of Z_{i-1}, this is slightly different than the definition of Ei in the LTMS document. Here Y_i is defined as:

$$Y_i = \frac{R_i - M}{S}$$

where:
Y_i = standardized test result at test order *i*
R_i = actual reference oil test result, expressed as Ln units for CHST
M = reference oil target mean from LTMS, and
S = reference oil target standard deviation from LTMS.

The results of the prove-out testing must meet the following criteria:

The average of the six Ei results for each parameter shall be less than 0.60.

A 95% confidence interval on the mean of the Ei results for each parameter shall have no part of the interval beyond +/- 1.5. The interval will be formed as

Sample Mean +/- 1.05 * Sample Standard Deviation

1.05 is derived from a t-distribution multiplier of 2.571 based on the 5% significance level with 5 degrees of freedom divided by the square root of 6 results.

If a single test has an Ei value beyond this limit of ±2.066, all data from this test can be discarded and can be replaced with another test on the same test stand and reference oil. Only one replacement can occur.

For the discrimination test, the Zi used for Ei calculation will be the average of the Stand Yi values from the three reference oil 270 results.

The Surveillance Panel will approve the fuel for use following confirmation of these results. If the supplier believes the fuel is providing equivalent performance to the current approved fuel without meeting the criteria listed above, they may petition the surveillance panel to conduct an additional review. At this point, the actions taken by the Surveillance Panel to accept or reject the fuel will vary depending on the results and judgement of the panel members.

Implementation of a new fuel - Each laboratory can choose which approved fuel to use for individual stands, provided all candidate testing is conducted on the same fuel used to calibrate the stand. When switching from one supplier to another, a full Certificate of Analysis shall be conducted on a sample consisting of no more than 10% of the current batch from the current supplier taken from the purchasing laboratory's tank and at least 90% of the new batch from the new supplier. The Certificate of Analysis for this blended sample shall meet the current Sequence X fuel specifications. Once approved, a laboratory shall use this Certificate of Analysis only for a storage tank that consists of that same blend of current and new fuel.
This should probably be handled by the surveillance panel. We can keep it and let them address it.

Sequence X O&H Update

- The last meeting took place at the end of January 2024. A new meeting will be scheduled later this month to address new operational and hardware issues.
- A rolling document has been created to address hardware changes. The document keeps track of part numbers and lists which critical and non-critical components are approved for testing.
- Efforts to rebuild the Ford 2.0L Ecoboost engine are in place to extend the life of the test.

Sequence X O&H Update

- Pending Resolution
  - How the blowby average is calculated after a piston ring re-work.
- New Items for discussion
  - PCV valve flow is coming in low. Labs are struggling to meet procedural specification.
  - Engine wiring harness shortage.
  - Turbo to exhaust clamp.
- Reference Oils
  - TMC 271- discrimination oil, no inventory problems.
  - TMC 270- primary reference oils, no inventory problems.
  - TMC 1011- original batch has been depleted. New batch 1011-1 on hold.

Attendance

Sequence X Surveillance Panel Meeting		
June 4, 2024		
	Attendance	
Porter, Christian <Christian.Porter@AftonChemical.com>		Afton
Martin Chadwick Intertek <martin.chadwick@intertek.com>		IAR
Dan Lanctot <DLanctot@tei-net.com>	x	TEI
Dave Passmore		IMTS
Mathew Bowden		OHT
Jason Bowden <jhbowden@OHTech.com>	x	OHT
'Rich Grundza' (reg@astmtmc.cmu.edu)	x	TMC
Jason Soto Intertek <jason.soto@intertek.com>	x	IAR
Martinez, Jo G. (jogm) <JoMartinez@chevron.com>	x	Chevron
J.Hsu@shell.com	x	Shell
Samuel Seth Demel	x	Shell
Gleason, Joseph <Joseph.Gleason@lubrizol.com>	x	Lubrizol
Kostan, Travis G. <travis.kostan@swri.org>	x	SWRi
William Hairston		Haltermann
Indresh Mathur	x	Haltermann
Khaled , Zreik Khaled.zreik@gm.com		GM
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Paul Rubas, ExxonMobil		ExxonMobil
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'Bob.Campbell@aftonchemical.com'		Afton
Amanda Stone	x	Afton
Jason Lekavich	x	Afton
Patrick M. Lang <patrick.lang@swri.org>	x	SWRI
Stockwell, Robert T (Robert.Stockwell@chevron.com)	x	Chevron
Bill Buscher Intertek <william.buscher@intertek.com>		IAR
Ritchie, Andrew <Andrew.Ritchie@Infineum.com>	x	Infineum
Todd Dvorak	x	Infineum
Rais, Khaled <khaled.rais@swri.org>		SWRi
Stevens, Andrew <Andrew.Stevens@Lubrizol.com>		Lubrizol
Matthews, Tim <Tim.Matthews@uk.bp.com>		BP
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Lopez, Alfonso <al.lopez@intertek.com>		Intertek
Deegan, Michael (M.D.) <mdeegan@ford.com>	x	Ford
Lochte, Michael D. <michael.lochte@swri.org>		SWRi
George Szappanos	x	LZ
Tony Catanese		LZ
Timothy Cushing <timothy.cushing@gm.com>		GM
Wingert, Dean (D.) <dwingert@ford.com>		Ford
Michael Luhard		Afton
Ben Maddock		Afton
Angela Willis		
Haing Tang		Chrysler
na.tyrer@gm.com		GM
Ricado Affinito	x	Chevron
sam@astmtmc.org, Sean Moyer		TMC
Mike Kunselman	x	
Tonstad, Christopher <Christopher.Tonstad@Infineum.com>		Infineum
Reichenbächer, Lutz <lreichenbaecher@h-c-s-group.com>	x	
Spangenberg, Albrecht <aspangenberg@h-c-s-group.com>	x	
Bovensiep, Bill <lGabrel@h-c-s-group.com>	x	Haltermann Carless

Sequence X History

Sequence X Milestones	
1/1/2012	Start of Chain Wear Test Development
12/7/2017	AOAP Approval for GF6
4/2/2018	Live Registration (03/19/16 Retro - Registration)
2/20/2019	Surveillance Panel Procedure Acceptance Vote
4/4/2019	Subcommittee B Ballot
6/16/2019	Main Committee D02 Ballot - ASTM Procedure D8279
11/7/2019	Memorandum 19-043 Use of Calibrated Sequence X Stands to Generate Used Oil Samples for Seq IX (LSPI)
11/20/2020	Information Letter 20-1 Procedure Edits / Drive Shaft Spec
1/27/2020	Information Letter 20-2 Criteria for Multiple Test Type Calibration
6/1/2020	Mild Severity Shift Task Force Formed
9/11/2020	Information Letter 20-3 Correction to Table 12
10/14/2020	Information Letter 20-4 (1) Correcting PCV Flow Meters (2) Correction to Section 12.1.1
4/8/2021	Oil 271 Suspended from use due to mild results
9/17/2021	Information Letter 22-1 Engine run limits, honing procedure, connecting rod orientation, blowby gas thermocouple orientation
5/3/2023	Information letter 23-1. Use oil 271 as a discrimination oil
6/9/2023	Information letter 23-2. Procedure revision Fig 2