AOAP eBallot - Motion that the Ford Chain Wear Test will be Ready for (Precision) Matrix Testing

The AOAP met on July 9, 2015 to review each of the GF-6 Engine Test Development programs. After the review of the *"Ford Engine Test Development Update Chain Wear"* presentation there was a motion that the "**Ford Chain Wear Test will be Ready for (Precision) Matrix Testing**".

After discussion the motion was agreed to be as follows:

Motion	The Chain Wear Test will be "ready for matrix testing" for the GF-6 specification with the prove out testing to be conducted at the Four Test Labs with the results to show discrimination between the high and low wear oils and minimizes the lab to lab variation and are operationally valid tests. Required tests shown below: • Intertek will run a Technology 1, SAE 0W-16 Precision Matrix Oil. • SwRI will run the Ford Reference Oil, SAE 5W-30. • Afton 1 Run Pending (Ford Ref. Oil) • Ashland 3 Runs Pending (2 Runs Low Wear Oil + TBD 0W-16 or Ford Ref Oil)
Motion by:	Ron Romano, Ford Motor Co.
Seconded by:	Don Smolenski, Evonik Oil Additives USA, Inc.

There was an AOAP voice vote on the Motion "**Ford Chain Wear Test will be Ready for (Precision) Matrix Testing**". A summary of the AOAP Voice Vote is presented below.

Auto Members		**Oil Members**	
Vote Results		**Vote Results**	
Yes	**11**	**Yes**	**14**
No	**0**	**No**	**2**
Abstain	**0**	**Abstain**	**5**
Not Present	**0**	**Not Present**	**5**
Total	**11**	**Total**	**26**

⅔ of Votes Affirmative	Yes
50% of All Possible Votes Affirmative	Yes
Auto Approval	**Yes**

⅔ of Votes Affirmative	Yes
50% of All Possible Votes Affirmative	Yes
Oil Approval	**Yes**

The result of the AOAP Voice Vote was approval of the motion "**Ford Chain Wear Test will be Ready for (Precision) Matrix Testing**". However, the voice vote included two negative votes, which according to the AOAP Voting process necessitates an eBallot on the motion (Ref. Annex C, paragraph C.2.2 Voting which states "*A letter ballot should be used whenever negative votes are cast during AOAP meetings."*)

AOAP members are now asked to cast their vote on AOAP motion "**Ford Chain Wear Test will be Ready for (Precision) Matrix Testing**" using the API eBallot Website at http://mycommittees.api.org/lubricants/AOAP/default.aspx

eBallot Motion: Ford Chain Wear Test will be Ready for (Precision) Matrix Testing

Motion	The Chain Wear Test will be "ready for matrix testing" for the GF-6 specification with the prove out testing to be conducted at the Four Test Labs with the results to show discrimination between the high and low wear oils and minimizes the lab to lab variation and are operationally valid tests. Required tests shown below: • Intertek will run a Technology 1, SAE 0W-16 Precision Matrix Oil. • SwRI will run the Ford Reference Oil, SAE 5W-30. • Afton 1 Run Pending (Ford Ref. Oil) • Ashland 3 Runs Pending (2 Runs Low Wear Oil + TBD 0W-16 or Ford Ref Oil)
Motion by:	Ron Romano, Ford Motor Co.
Seconded by:	Don Smolenski, Evonik Oil Additives USA, Inc.

Documentation supporting the motion is provided on the eBallot Website. Also included are the complete results of the AOAP Voice Vote.

This e eBallot will close in two weeks on Wednesday, August 5, 2015.

Note that all Negative Votes must include comments as described in API 1509 Annex C paragraph C.2.2. (a. Specific paragraph, section, or part negative ballot pertains to. b. Specific substantive reason(s) for negative vote. c. Proposed wording or action to resolve negative vote.) Additionally all Abstains must be explained.

eBallot Documentation
Ford Chain Wear

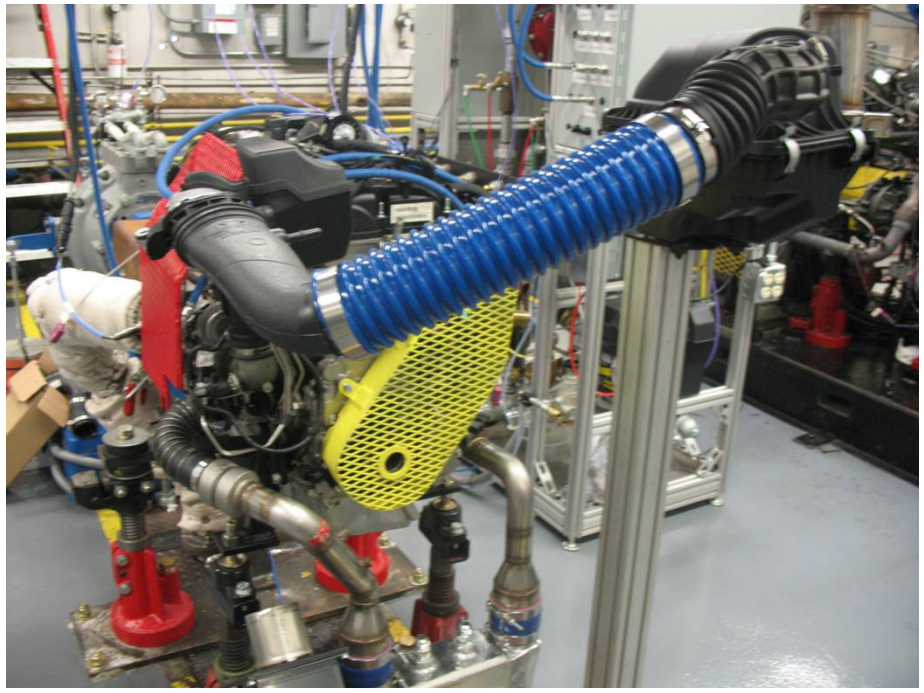
Ford Engine Test Development Update

Chainwear

Ron Romano
Ford Motor Company
July 9, 2015

Timing Chain Wear Test Overview

- Test engine: 2012 Ford 2.0L, EcoBoost, 4-cylinder
  - 178Kw@5500
  - 366N-m@3000
- Soot induced chain wear
- Low- moderate speed and load.
- Two stage test, low and normal running temperatures.
- Test duration 216 hours



Chain Wear Prove Out Test Data

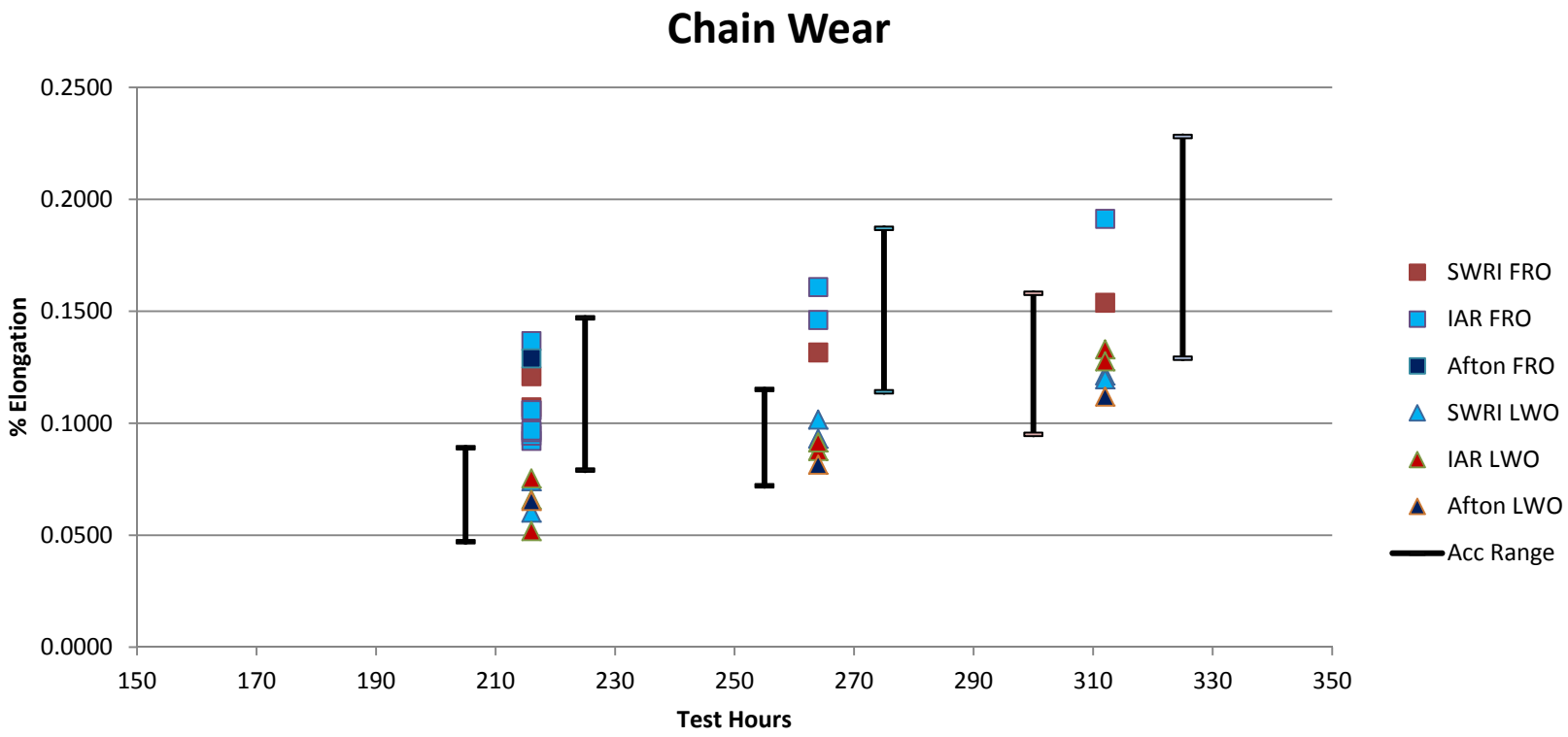
216 Hour Test Length			
Ford Ref Oil		Low Wear Oil	
Afton	0.0960	Afton	0.0518
Afton	Sched		
Ashland	In Prog	Ashland	Sched
		Ashland	Sched
IAR 93-0-11	0.1058	IAR 93-0-8	0.0659
IAR 93-0-4	0.1367	IAR 93-12	0.0600
IAR 93-0-7	0.1290	IAR 95-19	0.0753
IAR 94-0-22	0.1071		
IAR 95-0-14	0.0968		
IAR 95-0-18	0.1057		
IAR 95-0-20	0.1210		
SWRI 27-2	0.0921	SWRI 27-3	0.0653
SWRI 8-18	0.0945	SWRI 8-17	0.0741
avg	0.1085		0.0654

264 Hour Test Length			
Ford Ref Oil		Low Wear Oil	
Afton	N/A	Afton	0.0815
Ashland	N/A	Ashland	N/A
		Ashland	N/A
IAR 93-0-11	0.1461	IAR 93-12	0.0914
IAR 95-0-20	0.1608	IAR 95-19	0.0876
SWRI 8-18	0.1316	SWRI 27-3	0.0931
		SWRI 8-17	0.1016
avg	0.1462		0.0910

312 Hour Test Length			
Ford Ref Oil		Low Wear Oil	
		Afton	0.1119
IAR 95-0-20	0.1913	IAR 95-0-19	0.1330
		IAR 93-12	0.1277
SWRI 8-18	0.1538	SWRI 8-17	0.1213
		SWRI 27-3	0.1196
avg	0.1726		0.1227

- Proveout testing complete at SWRI, and IAR.
- Afton needs 1 test on Ford reference oil. Should be complete before matrix starts
- Ashland need to complete all tests. Test stand updates in progress
- Lab inspection complete at SWRI, IAR, Afton and Ashland.
- SAE 0W-16 oil candidate data provided by two test sponsors
- Oils tested (All oils are fully formulated oil designed with the intention to pass all tests)
  - Ford Reference Oil - GF-5 5W-30
  - Low Wear Oil – GF-6 prototype 5W-30
  - A 0W-16 - SN additive system, KV100=6.48 cSt, HTHS150=2.14 cP (actually a 0W-12)
  - B 0W-16 - GF-6 prototype, KV100°C=7.3 cSt, HTHS150°C=2.4 cP

Chain Wear Prove Out Test Data (cont.)



- P-Values show statistical difference between Ford Reference Oil and Low Wear Oil at 216 hours
- Test length finalized at 216 hours
- Low Wear Oil shows 40% reduction in wear at 216 hours
- Statistical analysis on data shows no advantage running beyond 216 hours.
- Lab effect is borderline statistically significant, should improve with more data from Afton and lab and operation improvements in place

CHAIN WEAR PROVE OUT ANALYSIS

D. Boese

June 3, 2015

Performance you can rely on.

Infineum

Chain Wear Prove Out Data

Ford Chain Wear Test

Reference Data Results

% Chain Stretch

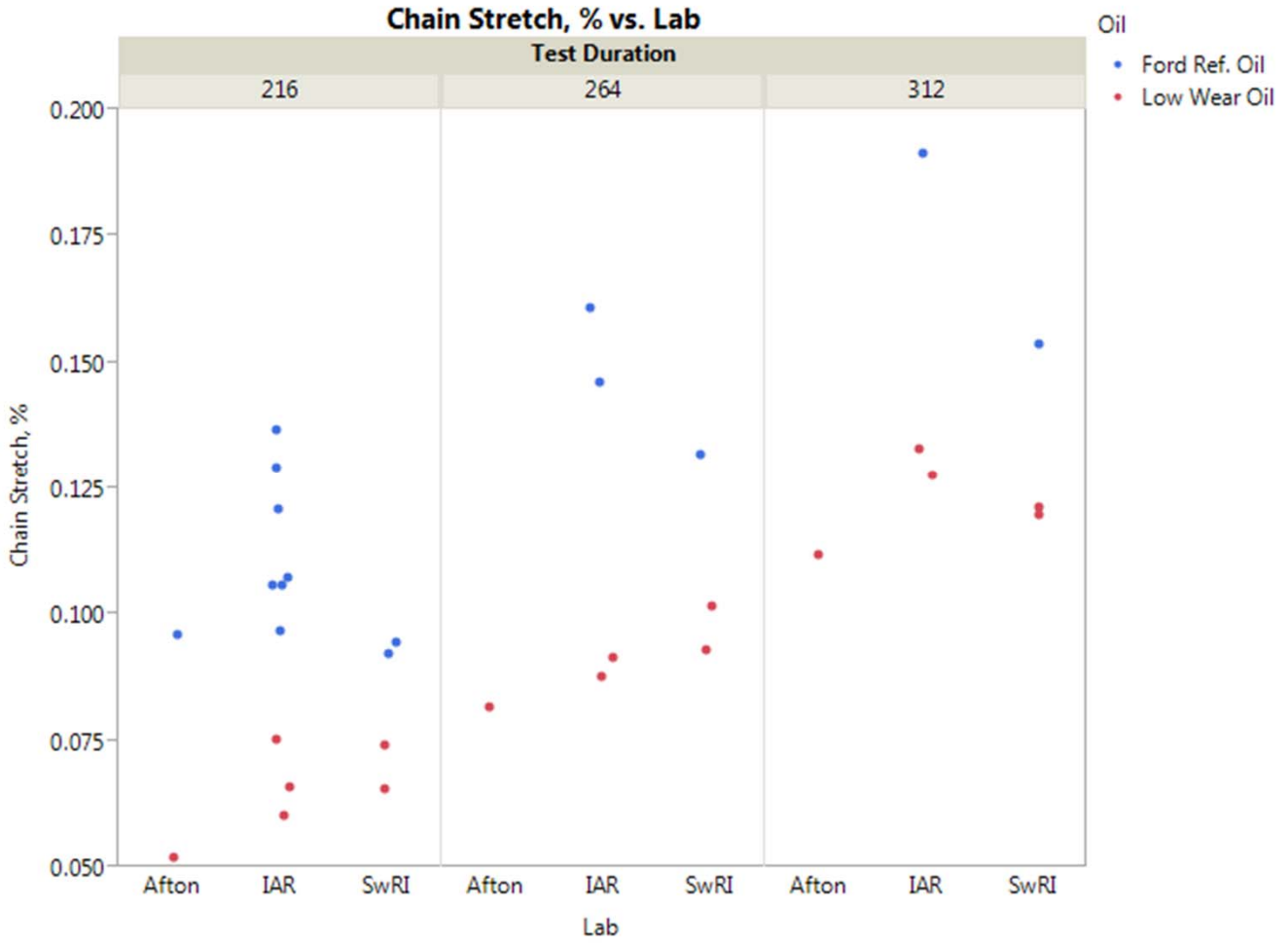
216 Hour Test Length			
Ford Ref Oil		Low Wear Oil	
IAR 95-0-14	0.0968	IAR 93-0-8	0.0659
IAR 95-0-18	0.1057	IAR 95-0-19	0.0753
IAR 93-0-4	0.1367	SWRI 8-17	0.0741
IAR 93-0-7	0.1290	Afton	0.0518
IAR 94-0-22	0.1071	SWRI 27-3	0.0653
IAR 93-0-11	0.1058	IAR 93-12	0.0600
SWRI 27-2	0.0921		
SWRI 8-18	0.0945		
Afton	0.0960		
IAR 95-0-20	0.1210		
Average	0.1085		0.0654
Std. Dev.	0.0154		0.0088

264 Hour Test Length			
Ford Ref Oil		Low Wear Oil	
IAR 93-0-11	0.1461	IAR 95-19	0.0876
SWRI 8-18	0.1316	SWRI 8-17	0.1016
IAR 95-0-20	0.1608	Afton	0.0815
		SWRI 27-3	0.0931
		IAR 93-12	0.0914
Average	0.1462		0.0910
Std. Dev.	0.0146		0.0074

312 Hour Test Length (NG)			
Ford Ref Oil		Low Wear Oil	
SWRI 8-18	0.1538	IAR 95-0-19	0.1330
IAR 95-0-20	0.1913	SWRI 8-17	0.1213
		Afton	0.1119
		SWRI 27-3	0.1196
		IAR 93-12	0.1277
Average	0.1726		0.1227
Std. Dev.	0.0265		0.0081

Prove out analysis is based on the above data.

Chain Wear Prove Out Data



Visually, discrimination of oils is apparent for each lab at each test duration.

Acceptance Ranges

- The Acceptance Range is the 95% interval of a result which would not be statistically significantly different from the mean of currently available data.
- For each test duration, a pooled standard deviation for the two oils of the natural logarithm transformed % Chain Stretch is utilized.

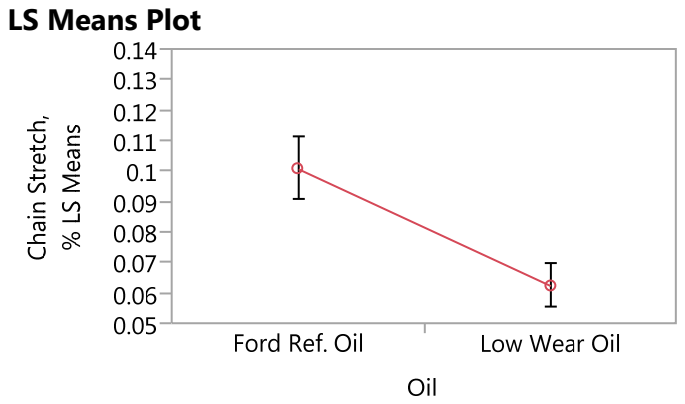
Test Duration, Hrs	216		264		312	
Oil	Ford Ref. Oil	Low Wear Oil	Ford Ref. Oil	Low Wear Oil	Ford Ref. Oil	Low Wear Oil
Sample Size	10	6	3	5	2	5
Lower Bound	0.079	0.047	0.114	0.072	0.129	0.095
Upper Bound	0.147	0.089	0.187	0.115	0.228	0.158

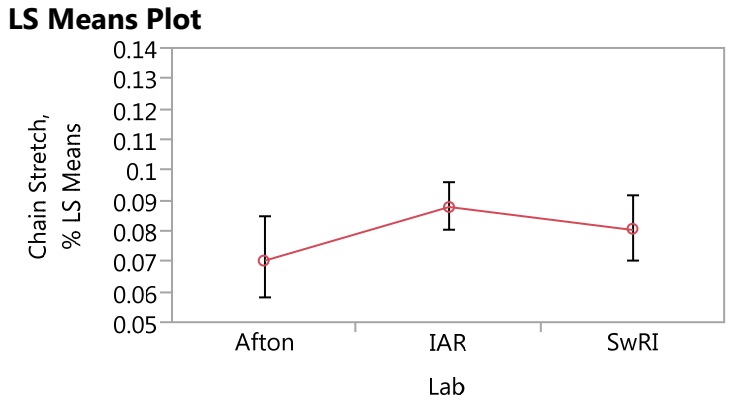
Regression Analysis of 216 Hour Data

- Transformed response using natural logarithm [Ln(% Chain Stretch)].
- Regressed Ln(% Chain Stretch) on Lab and Oil.
  - Oil effect is strongly statistically significant.
  - Lab is borderline statistically significant.

Effect Test

Term	DF	F Ratio	p-Value
Oil	1	55.5	7.74E-06
Lab	2	3.0	0.089



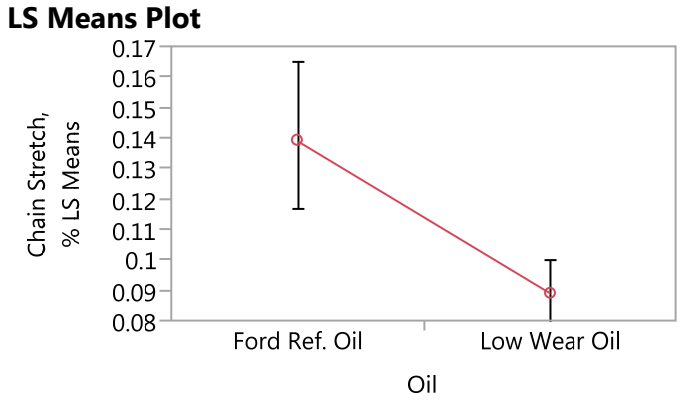


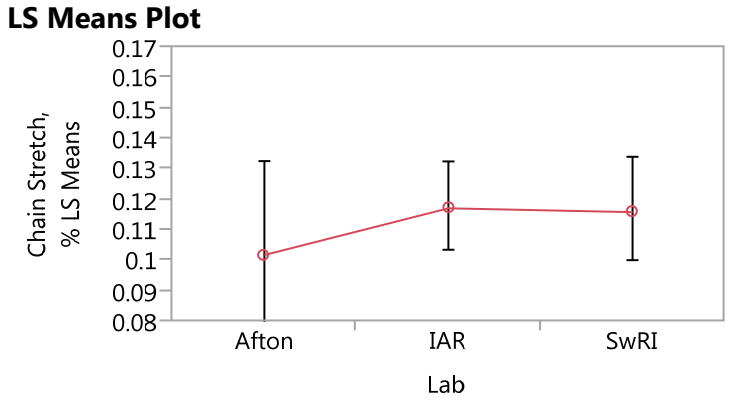
Regression Analysis of 264 Hour Data

- Transformed response using natural logarithm [Ln(% Chain Stretch)].
- Regressed Ln(% Chain Stretch) on Lab and Oil.
  - Oil effect is strongly statistically significant.
  - Lab effect is not statistically significant.

Effect Test

Term	DF	F Ratio	p-Value
Oil	1	41.6	0.003
Lab	2	0.9	0.464





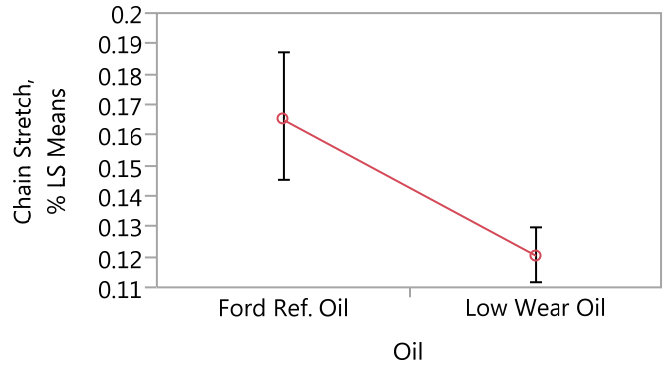
Regression Analysis of 312 Hour Data

- Transformed response using natural logarithm [Ln(% Chain Stretch)].
- Regressed Ln(% Chain Stretch) on Lab and Oil.
  - Oil effect is strongly statistically significant.
  - Lab effect is borderline statistically significant.

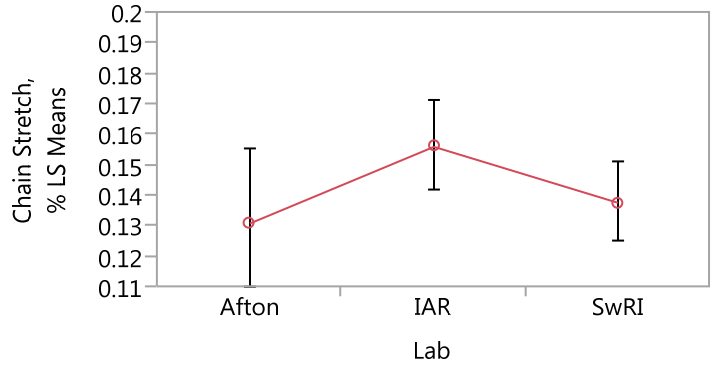
Effect Test

Term	DF	F Ratio	p-Value
Oil	1	53.3	0.005
Lab	2	6.8	0.076

LS Means Plot



LS Means Plot



Which Test Duration Provides Best Discrimination

- At each test duration, Oil effect is statistically significant.
  - Significance is partially a function of number of tests and structure of database so must consider factors attributable to the test which are not based on sample size or data structure (that is, should not base decision of which test duration to utilize solely on p-Value).
- In Ln units, difference in LS Means for two oils (higher is better) is highest for 216 hours.
- Ratio of Oil LS Means to RMSE (higher is better) is highest for 312 hours.

Test Duration, Hrs	216	264	312
Sample Size	16	8	8
Oil p-Value	7.74E-06	0.003	0.005
LS Mean (% Stretch)			
Ford Ref. Oil	0.101	0.139	0.165
Low Wear Oil	0.063	0.089	0.121
LS Mean (Ln Units)			
Ford Ref. Oil	-2.294	-1.973	-1.801
Low Wear Oil	-2.772	-2.417	-2.115
Difference	0.478	0.444	0.314
RMSE	0.122	0.089	0.050
Diff/RMSE	3.926	4.994	6.321

SAE 0W-16 Chain Wear Test Data

Stage 1 Operational Data	Oil A SAE 0W-16			Oil B SAE 0W-16			94-0-22 SAE 5W-30			18-FCW-8 SAE 5W-30		
Parameter	Setpoint	AVG	Min	Max	Avg	Min	Max	avg	min	max	Avg	Min	Max
Engine Speed	1550.00	1549.98	1535.34	1561.81	1550.05	1540.00	1559.00	1549.99	1537.99	1562.31	1549.98	1534.00	1562.00
EBP	104.00	104.00	103.09	105.04	104.20	103.30	104.70	104.00	103.55	104.55	98.27	97.50	99.00
Oil Gallery Temp	50.00	50.00	49.86	50.12	48.21	32.10	57.10	50.00	48.64	50.93	50.00	49.90	50.30
Torque	50.00	50.00	42.34	55.91	49.98	47.80	51.90	50.00	46.13	53.26	49.99	45.10	53.70
Coolant Out Temp	45.00	44.96	13.43	45.34	44.93	39.20	45.80	45.00	44.49	45.46	45.00	44.10	45.70
Coolant Flow	40.00	40.00	39.14	40.89	40.00	38.10	49.30	40.00	39.52	40.48	39.85	37.60	40.50
Inlet Air Temp	32.00	31.99	30.25	33.62	31.96	30.40	33.80	31.96	29.45	34.76	29.99	28.10	31.60
Air Charge Temp	30.00	29.86	27.33	33.08	29.95	27.90	31.40	29.84	25.78	30.79	32.00	30.90	35.90
BB HX Temp In	20.00	20.00	19.93	20.07							23.67	21.30	43.50
AFR Ratio	0.78	0.78	0.76	0.85	0.76	0.76	0.77	0.78	0.76	0.79	0.77	0.77	0.77
Inlet Air Press	0.05	0.05	0.04	0.06	0.05	0.02	0.08	0.05	0.04	0.06	0.05	0.03	0.07
Oil Gallery Press		401.67	370.56	435.65	374.76	345.70	452.50	435.74	409.33	475.98	451.99	422.70	482.10

Stage 2 Operational Data	Oil A SAE 0W-16			Oil B SAE 0W-16			94-0-22 SAE 5W-30			18-FCW-8 SAE 5W-30		
Parameter	Setpoint	AVG	Min	Max	Avg	Min	Max	avg	min	max	avg	min	max
Engine Speed	2500.00	2499.92	2480.66	2509.96	2499.96	2495.00	2503.00	2499.99	2489.14	2510.87	2500.04	2497.00	2504.00
Torque	128.00	128.00	124.73	132.48	127.94	123.60	133.40	128.00	124.48	132.41	127.77	123.90	131.10
EBP	107.00	107.00	106.54	107.75	106.99	106.00	108.60	107.00	106.23	108.01	98.82	97.60	100.00
Oil Gallery Temp	100.00	99.93	96.85	100.77	97.41	91.60	99.20	100.01	98.59	100.55	100.00	99.70	100.30
BB HX Temp In	85.00	85.03	84.80	86.08							80.12	76.80	84.60
Coolant Out Temp	85.00	85.10	77.62	85.66	84.95	84.30	85.60	85.11	84.39	85.83	84.99	83.20	87.60
Coolant Flow	70.00	69.99	69.18	70.91	69.99	67.40	73.80	70.00	69.15	71.13	69.69	68.40	70.20
Inlet Air Temp	32.00	31.72	30.36	32.23	31.96	31.60	32.30	31.97	31.41	32.23	30.01	28.80	37.30
Air Charge Temp	30.00	30.00	28.88	31.11	29.99	29.30	30.90	30.22	28.60	32.20	32.00	31.70	32.30
AFR Ratio	1.00	1.01	0.98	1.10	0.99	0.98	1.01	1.00	0.99	1.04	0.99	0.99	1.00
Inlet Air Press	0.05	0.05	0.02	0.08	0.05	-0.01	0.13	0.05	0.04	0.07	0.05	0.01	0.09
Oil Gallery Press		276.90	257.51	313.84	267.41	254.90	299.00	288.13	264.18	338.87	346.64	329.40	380.20

- Operational data provided on two different SAE 0W-16 candidate oils
- One test was operationally valid.
- Second test couldn’t achieve oil temperature. Investigation determined that there was a control problem with the oil cooling system not allowing the cooling water to be shut off.
- Data shows that an operationally valid test can be conducted with a SAE 0W-16 viscosity oil

Chain Wear Field Correlation

		Chain Material	
Lab		Orange	Green
	Test Time	Ford Ref Oil	Ford Ref Oil
SWRI	hrs.	% stretch	% stretch
(8 hr BI)	120	0.07	0.09
(24Hr BI)	192	0.13	0.23
(24Hr BI)	192	0.12	0.21
IAR			
(8 hr BI)	144	0.06	0.09
(24 hr BI)	120	0.04	0.05
(24 hr BI)	192	0.16	0.23

	Proveout data	
Test Time	Orange	Orange
hrs.	Ford Ref Oil	LWO
216	% stretch	% stretch
Average	0.11	0.07
Minimum	0.09	0.05
Maximium	0.14	0.08
	10 Tests	6 Tests

- Initial testing was conducted using two different chain materials
- Orange chains performed better in the field than green chains on “all” GF-5 oils. This includes Ford reference oil.
- The Chain Wear test was developed to show discrimination between the two chain materials since it would show correlation to the field and a good wear oil wasn’t available for correlation at that time.
- The development team felt that if the test could discriminate wear performance between chain materials it would also discriminate wear performance between oils.
- Data above shows discrimination between the two chain materials in the same direction shown in the field.
- Test times and break-in times are different as these tests were conducted during early development before these were finalized. Other test conditions, speed load, temperatures are the same.

Chain Wear Field Correlation (cont.)

- Field performance: chain wear issues in the field have been shown with GF-5 oils, (Ford Reference oil).
- Material change has been made in the field (green to orange) but additional wear performance is needed from the oil.
- Chains still have field issues due to soot and oil degradation in GTDI engines with GF-5 oils.
- Passing oil must be better than Ford reference oil. An oil of equivalent performance to Ford reference oil shouldn't be able to pass the test. Estimating pass/fail limit to be 0.07% at 216 hours based on the present prove out data. This will also depend statistical review of all the prove out data and precision matrix data.
- Testing at Ford shows that GF-5 oil results in chain wear 10% beyond acceptable limits, so an oil with a similar performance to the low wear reference oil will provide adequate wear protection.

Task Force

- The task force voted the test ready for matrix on June 30, 2015.
- 5 approve
  - Afton, Infineum, Intertek, Southwest, Ford
- 1 negative
  - Lubrizol
- 4 waive
  - Ashland, Oronite, TEI, TMC
- Task Force reviewed operational data for the prove out tests and made operational recommendations to improve test control.

New Test Readiness Checklist

- Reference Oils – Reference oil should be at TMC by July
- Test Parts – final hardware at all the labs. Enough parts at labs for one reference period or more beyond precision matrix
- Test Fuel – EEE.
- Test Procedure – 2nd edition of draft procedure posted on the TMC website. Facilitator working on procedure.
- Rating and Reporting of Results – chain stretch measurement method finalized.
- Calibration, Monitoring and Surveillance – LTMS will be set up after precision matrix
- Test prove out data – complete at SWRI and IAR. Remaining testing scheduled and running at Afton and Ashland.
- Prove out test data available on the TMC website. Includes oil analysis and operational data.
- SAE 0W-16 oil successfully tested.

Questions?

Thank You

- Ford would like to sincerely thank our development partners for their contributions to the Chain Wear test development.
  - Intertek
  - Southwest Research Institute
  - Infineum
- Ford would also like to thank Haltermann and OHT for donating a quantity of fuel and hardware to the labs during the test development. Also like to thanks Lubrizol for developing the chain wear measurement rig and procedure
- Ford would also like to thank a few anonymous donors for things like oil, data, etc.

Motion for the AOAP and PCEOCP consideration

Motion: The Chain Wear Test is “ready for matrix testing” for the GF-6 specification with the matrix testing to be conducted at SWRI and Intertek , with the inclusion of Afton and Ashland upon the successful completion of their required prove-out tests.

Auto-Oil Advisory Panel
Voice Vote

July 9, 2015

Auto Oil Advisory Panel Voting Membership

Auto Members

Daihatsu Motor Co., Ltd
Fiat Chrysler Automobiles
Ford Motor Company
Fuji Heavy Ind. (Subaru)
General Motors
Honda Motor Co., Ltd.
Mazda Motor Corp.
Mitsubishi Motors Corp.
NISSAN Motor Co. Ltd
SUZUKI Motor Co., Ltd
Toyota Motor Corporation

Oil Members

BP Lubricants
Chevron Lubricants
ExxonMobil
Idemitsu
Imperial
Petro-Canada
Phillips 66 Company
Pinnacle
Safety-Kleen
Shell Global Solutions
SK Lubricants
Total
Valvoline

Oil Members

Afton Chemical
BASF
Calumet
Chemtura
Croda, Inc.
Dow Chemical
Evonik Oil Additives USA
Infineum
Lubrizol
Motiva
Neste Oil
Oronite
Vanderbilt Chemicals

Auto Oil Advisory Panel

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Auto Oil Advisory Panel

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4	Idemitsu	Scott Rajala	Srajala@ILACorp.com
5	Imperial	Doug Hakala	Doug.Hakala@esso.ca
6	Petro-Canada	Darryl Purificati	DPurificati@Suncor.com
7	Phillips 66 Company	Reginald Dias	reginald.m.dias@P66.com
8	Pinnacle	Antonio Medina	AMedina@pinnoil.com
9	Safety-Kleen	Rodney Walker	Rodney.Walker@safety-kleen.com
10	Shell Global Solutions	Scott Lindholm	Scott.Lindholm@Shell.com
11	SK Lubricants	Mike Brown	mike.brown@sk.com
12	Total	James Linden	lindenjim@hotmail.com
13	Valvoline	Thom Smith	trsmith@ashland.com

Auto Oil Advisory Panel

Oil Members

14	Afton Chemical	Brent Calcut	Brent.Calcut@AftonChemical.com
15	BASF	Eugene Scanlon	Eugene.scanlon@basf.com
16	Calumet	Christopher L. Miano	Chris.Miano@CLMT.com
17	Chemtura	E. Brian Fox	brian.fox@chemtura.com
18	Croda, Inc.	Scott A. Davis	Scott.Davis@croda.com
19	Dow Chemical	Ellen Hock	EDHock@dow.com
20	Evonik Oil Additives USA	David Gray	David.Gray@Evonik.com
21	Infineum	Joan Evans	joan.evans@infineum.com
22	Lubrizol	Gail Evans	Gail.Evans@Lubrizol.com
23	Motiva	Greg Raley	Gregory.Raley@Motivaent.com
24	Neste Oil	Chris Castanien	Chris.castanien@nesteoil.com
25	Oronite	Jerry Wang	JWDY@chevron.com
26	Vanderbilt Chemicals	Simon Tung	STung@VanderbiltChemicals.com

AOAP Vote On
Ford Chain Wear Test is Ready for Precision Matrix Testing

July 9, 2015

Motion 1

The Chain Wear Test will be “ready for matrix testing” for the GF-6 specification with the prove out testing to be conducted at the Four Test Labs with the results to show discrimination between the high and low wear oils and minimizes the lab to lab variation and are operationally valid tests. Required tests shown below:

- Intertek will run a Technology 1, SAE 0W-16 Precision Matrix Oil.
- SwRI will run the Ford Reference Oil, SAE 5W-30.
- Afton 1 Run Pending (Ford Ref. Oil)
- Ashland 3 Runs Pending (2 Runs Low Wear Oil + TBD 0W-16 or Ford Ref Oil)

Motion: Ron Romano

Second: Don Smolenski

Auto Oil Advisory Panel

	Auto Members		Motion 1
1	Daihatsu Motor Co., Ltd	Shinichi KITAMURA	Yes By Proxy
2	Fiat Chrysler Automobiles	Haiying Tang	Yes
3	Ford Motor Company	Ron Romano	Yes
4	Fuji Heavy Ind. (Subaru)	Yusuke KUWAHARA	Yes By Proxy
5	General Motors	Eric R Johnson	Yes
6	Honda Motor Co., Ltd.	Hatta Takeshi	Yes By Proxy
7	Mazda Motor Corp.	Yoichi KUJI	Yes By Proxy
8	Mitsubishi Motors Corp.	Hideo KURASHINA	Yes By Proxy
9	NISSAN Motor Co. Ltd	Takumaru SAGAWA	Yes By Proxy
10	SUZUKI Motor Co., Ltd	Toshio YAMAUCHI	Yes By Proxy
11	Toyota Motor Corporation	Teri Kowalski	Yes

Auto Oil Advisory Panel

	Oil Members		Motion 1
1	BP Lubricants	Barbara Dennis	Yes
2	Chevron Lubricants	Matthew Ansari	Abstain
3	ExxonMobil	Mike Ragomo	Abstain
4	Idemitsu	Scott Rajala	Yes
5	Imperial	Doug Hakala	Yes
6	Petro-Canada	Darryl Purificati	Yes
7	Phillips 66 Company	Reginald Dias	Not Present
8	Pinnacle	Brad Chatterjee	Not Present
9	Safety-Kleen	Rodney Walker	Yes
10	Shell Global Solutions	Scott Lindholm	Yes
11	SK Lubricants	Mike Brown	Not Present
12	Total	James Linden	Abstain
13	Valvoline	Thom Smith	Abstain

Auto Oil Advisory Panel

	Oil Members		Motion 1
14	Afton Chemical	Brent Calcut	Yes
15	BASF	Eugene Scanlon	Yes
16	Calumet	Christopher L. Miano	Yes
17	Chemtura	E. Brian Fox	Yes
18	Croda, Inc.	Scott A. Davis	Not Present
19	Dow Chemical	Ellen Hock	Not Present
20	Evonik Oil Additives USA	David Gray	Yes
21	Infineum	Joan Evans	Yes
22	Lubrizol	Gail Evans	No
23	Motiva	Greg Raley	Abstain
24	Neste Oil	Chris Castanien	Yes
25	Oronite	Jerry Wang	No
26	Vanderbilt Chemicals	Simon Tung	Yes

Motion#1 Voice Vote Summary

Auto Members	
Yes	11
No	0
Abstain	0
Not Present	0
Total	11

Oil Members	
Yes	14
No	2
Abstain	5
Not Present	5
Total	26

⅔ of Votes Affirmative	Yes
50% of All Possible Votes Affirmative	Yes
Auto Approval	**Yes**

⅔ of Votes Affirmative	Yes
50% of All Possible Votes Affirmative	Yes
Oil Approval	**Yes**