Address *100 Barr Harbor Drive*
PO Box C700
W. Conshohocken, PA
19428-2959 | USA

Phone *610.832.9500*
Fax *610.832.9666*
Web *www.astm.org*

Committee D02 on PETROLEUM PRODUCTS AND LUBRICANTS

Chairman: KENNETH O. HENDERSON, Cannon Instrument Co., 2139 High Tech Road, State College, PA 16803, (814) 353-8000, Fax: (814) 353-8007, e-mail: kenohenderson@worldnet.att.net
First Vice-Chairman: BEN R. BONAZZA, TI Group Automotive Systems, Caro Research Center, 326 Green Street, Caro, MI, 48723 (989) 673-8181 ext. 227, Fax: (989) 673-3241, e-mail: bbonazza@us.tiauto.com
Second Vice-Chairman: JANET L. LANE, ExxonMobil Research & Engrg., 600 Billingsport Rd, Paulsboro, NJ 08066-0480 (856) 224-3302, Fax: (856) 224-3616, e-mail: janet.l.lane@exxonmobil.com
First Secretary: RALPH A. CHERRILLO, Shell Global Solutions (US) Inc., Westhollow Tech Ctr., 3333 Highway 6 South, Houston, TX 77082 (281) 544-8789, Fax: (281) 544-8150, e-mail: ralph.cherrillo@shell.com
Second Secretary : MICHAEL A. COLLIER, Petroleum Analyzer Co. LP, PO Box 206, Wilmington, IL 60481, (815) 458-0216, Fax: (815) 458-0217, e-mail: macvarlen@aol.com
Staff Manager: DAVID R. BRADLEY, (610) 832-9681, Fax: (610) 832-9668, e-mail: dbradley@astm.org

Issued: May 22, 2015

Reply to: Dan Worcester
Southwest Research Institute
6220 Culebra Rd.
San Antonio, TX 78238
Phone: 210.522.2405
Email: dworcester@swri.org

These are the unapproved minutes of the 05.21.2015 Sequence VI Precision Matrix call.

The meeting was called to order at 1:00 PM Central Time by Chairman Nathan Moles.

Agenda

The Agenda is to review the VIE Precision Matrix.

1.0 Roll Call

The Attendance list is Attachment 2.

2.0 Actions to Begin Precision Matrix

3.1 5W-30 Tech 1 oil is now available at TMC.

3.2 Labs will donate runs on this oil. This will compare 0W to 5W on this test. There is concern of 0W-16 response on this engine being severe.

3.3 A presentation from the Lubrizol on a possible method to run the Precision Matrix was discussed. This would involve running candidates during the Matrix. See Attachment 3.

3.4 A presentation from the Afton on an alternate possible method to run the Precision Matrix was discussed. This would involve beginning with higher hour engines then moving to new engines to achieve stand calibration. See Attachment 4.

ACTION: Labs will need to update their engine count with hours.

Next Conference Call will be at the Chair notification.

The meeting adjourned at 1:55 PM.

ASTM SEQUENCE VI

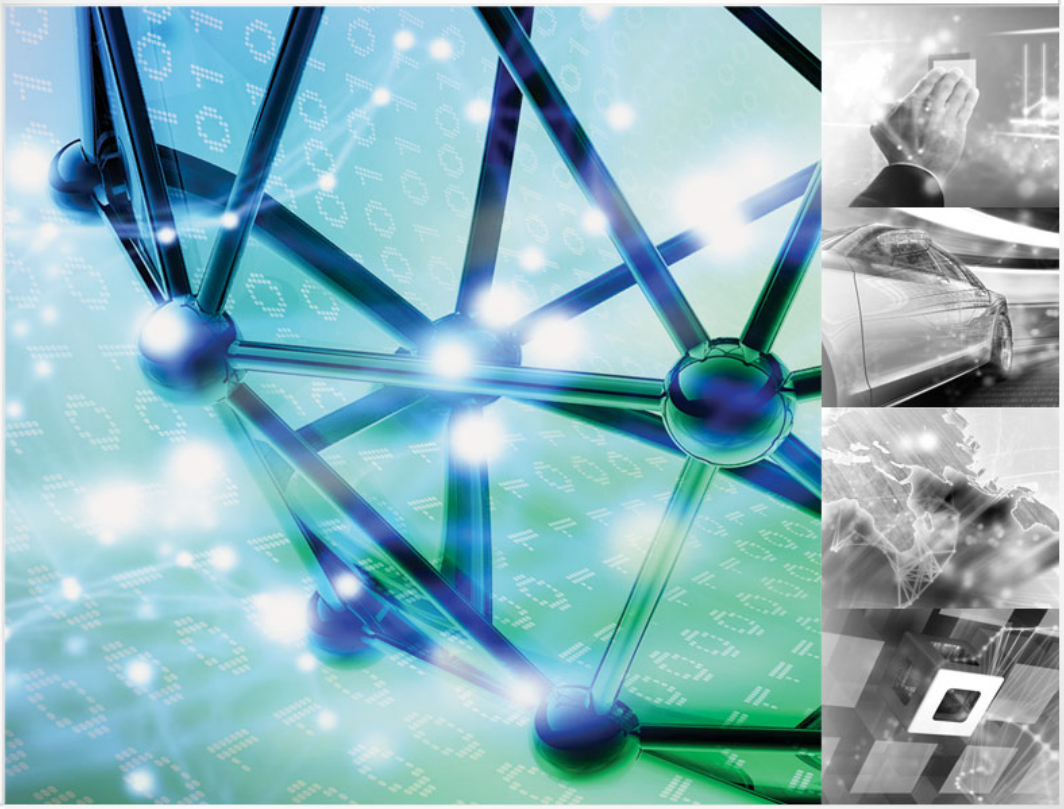
Name	Address	Phone/Fax/Email	Attendance
Jason Bowden Voting Member	OH Technologies, Inc.	Phone: 440-354-7007 jhbowden@ohtech.com	
Timothy Caudill Voting Member	Ashland, Inc.	Phone: 606-329-5708 Tlcaudill@ashland.com	ATTEND
David Glaenzer Voting Member	Afton Research Center	Phone: 804-788-5214 Dave.Glaenzer@aftonchemical.com	ATTEND
Rich Grundza Voting Member	ASTM TMC	Phone: 412-365-1034 reg@astmtmc.cmu.edu	ATTEND
Tracey King Voting Member	Haltermann	Phone: tking@jhaltermann.com	
Charlie Leverett Voting Member	Intertek Automotive Research	Phone: 210-647-9422 charlie.leverett@intertek.com	ATTEND
Teri Kowalski Voting Member	Toyota	teri.kowalski@tema.toyota.com	
Bruce Matthews Voting Member	GM Powertrain Engine Oil Group	Phone: 248-830-9197 bruce.matthews@gm.com	ATTEND
Timothy Miranda Voting Member	BP Castrol Lubricants USA	Phone: 973-305-3334 Timothy.Miranda@bp.com	
Nathaniel Moles Voting Member	Lubrizol	Phone: (440) 347-4472 Nathaniel.Moles@Lubrizol.com	ATTEND
Mark Mosher Voting Member	ExxonMobil	Phone: 856-224-2132 mark_r_mosher@exxonmobil.com	
Andy Ritchie Voting Member	Infineum	Phone: 908-474-2097 Andrew.Ritchie@infineum.com	
Ron Romano Voting Member	Ford Motor Company	Phone: 313-845-4068 rromano@ford.com	
Kaustav Sinha Voting Member	Chevron Oronite Company LLC	Phone: 713.432.6642 LFNQ@chevron.com	
Mark Sutherland Voting Member	TEI	Phone: 123.456.7890 msutherland@tei-net.com	
Haiying Tang Voting Member	Chrysler	Phone: 248-512-0593 HT146@Chrysler.com	
Dan Worcester Voting Member	Southwest Research Institute	Phone: 210.522.2405 dan.worcester@swri.org	ATTEND

ASTM SEQUENCE VI

Name	Address	Phone/Fax/Email	Attendance
Ed Altman	ed.altman@aftonchemical.com	Afton	
Bob Campbell	Bob.Campbell@aftonchemical.com	Afton	ATTEND
Todd Dvorak	todd.dvorak@aftonchemical.com	Afton	ATTEND
Christian Porter	Christian.porter@aftonchemical.com	Afton	
Terry Hoffman	Terry.Hoffman@aftonchemical.com	Afton	ATTEND
Jeremy Styer	Jeremy.styer@aftonchemical.com	Afton	
Greg Guinther	greg.guinther@aftonchemical.com	Afton	
Don Smolenski	donald.j.smolenski@gm.com	Evonik	
Doyle Boese	Doyle.boese@infineum.com	Infineum	
Mike McMillan	mmcmillan123@comcast.net	Infineum	
Bob Olree	olree@netzero.net	Intertek	
Addison Schweitzer	addison.schweitzer@intertek.com	Intertek	
Angela Willis	angela.p.willis@gm.com	GM	ATTEND
Jeff Kettman	Jeff.kettman@gm.com	GM	
Jerry Brys	Jerome.brys@lubrizol.com	Lubrizol	
Jessica Buchanan	Jessica.Buchanan@Lubrizol.com	Lubrizol	
Michael Conrad	Michael.Conrad@Lubrizol.com	Lubrizol	ATTEND
Dwight Bowden	dhbowden@ohtech.com	OHT	
Matt Bowden	mjbowden@ohtech.com	OHT	
Guy Stubbs	Guy.Stubbs@swri.org	SwRI	
William Buscher	william.buscher@intertek.com	Intertek	
Scott Stap	Scott.stap@tgdirect.com	TG Direct	
Robert Stockwell	Robert.Stockwell@chevron.com	Oronite	
Clayton Knight	cknight@tei-net.com	TEI	
Jeff Clark	jac@astmtmc.cmu.edu	TMC	
Hap Thompson	Hapjthom@aol.com	ASTM VIE Facilitator	
Tom Smith		Valvoline	
Mark Adams	mark@tribologytesting.com		
Dan Lanctot	dlanctot@tei-net.com	TEI	
Adrian Alfonso	adrian.alfonso@intertek.com 210.838.0431	Intertek	
Ricardo Affinito	affinito@chevron.com 510.242.4625	Oronite	
Zack Bishop	zbishop@tei-net.com 210.877.0223	TEI	
Patrick Lang	Patrick.lang@swir.org 210.522.2820	SwRI	ATTEND
Mike Warholic	Michael.warholic@Infineum.com 908.474.2065	Infineum	
Jordan Pastor	Jordan.pastor@Infineum.com	Infineum	

ASTM SEQUENCE VI

Name	Address	Phone/Fax/Email	Attendance
	313.348.3120		
Jim Linden	lindenjim@jlindenconsulting.com 248.321.5343	J Linden Consulting	
Gordon Farnsworth		Infineum	
Timothy Cushing		GM	
Valeriu Lieu		Oronite	
Jeff Hsu		Shell	
Jo Martinez		Oronite	
Amol Savant		Ashland	ATTEND
Kevin O’Malley		Lubrizol	
Andy Buczynsky		GM	
Chris Castanien		Nestles	



Sequence VIE Matrix Design

May 18, 2015

Lubrizol

Background

SUCCESS TOGETHER

The most recent VIE precision matrix design needs to be updated

- Approach used for the latest Sequence VIE Precision Matrix Design
  - To reduce matrix cost, labs will donate 3 runs in exchange for a calibrated engine post matrix
  - The labs were asked for engine hours on available engines

- Concerns with this approach
  - Labs donating older engines are penalized because they get less (or no) candidate runs post matrix
  - Since VIE engine life can go to 3000hrs, however new engines will only look at engine aging for ~1/2 the potential engine life
  - With new engines, the 3 donated calibration runs are during the engine life which will not see candidate testing, resulting in only 4 tests runs during the engine life which sees candidate oils.

Lubrizol

Most Recent VIE Design (will need to be updated)

SUCCESS TOGETHER

Run Order	XOM	Afton	Ashland	LZ	IAR Stand 1	IAR Stand 2	SwRI Stand 1	SwRI Stand 2
Engine	New	New	New	OHT#15	New	New	OHT#42	OHT#63
SOT EngHr	150	150	150	1700	150	150	1700	1200
1	1010-2	1010-2	Tech 1 0W-16	Tech 1 0W-16	Tech 1 0W-16	542-2	542-2	1010-2
2	Tech 1 0W-16	542-2	542-2	1010-2	1010-2	Tech 1 0W-16	Tech 1 0W-16	542-2
3	542-2	Tech 1 0W-16	1010-2	542-2	542-2	1010-2	1010-2	Tech 1 0W-16
4	542-2	Tech 1 0W-16	1010-2	542-2	542-2	Tech 1 0W-16	1010-2	Tech 1 0W-16
5	Tech 1 0W-16	542-2	542-2	1010-2	1010-2		Tech 1 0W-16	542-2
6	1010-2	1010-2	Tech 1 0W-16	Tech 1 0W-16	Tech 1 0W-16		542-2	1010-2
7	542-2	Tech 1 0W-16	1010-2	542-2	542-2		1010-2	Tech 1 0W-16
EOT EngHr	1550	1550	1550	3100	1550	950	3100	2600

**from presentation: GF-6 Precision Matrices – Statisticians Task Force Feb 26,2015*

Most Recent VIE Precision Matrix Design

- A Seq VIE engine can last be from ~2000-3000 hours
- For NEW engines those donated runs are on engine hours that candidate oils do not see

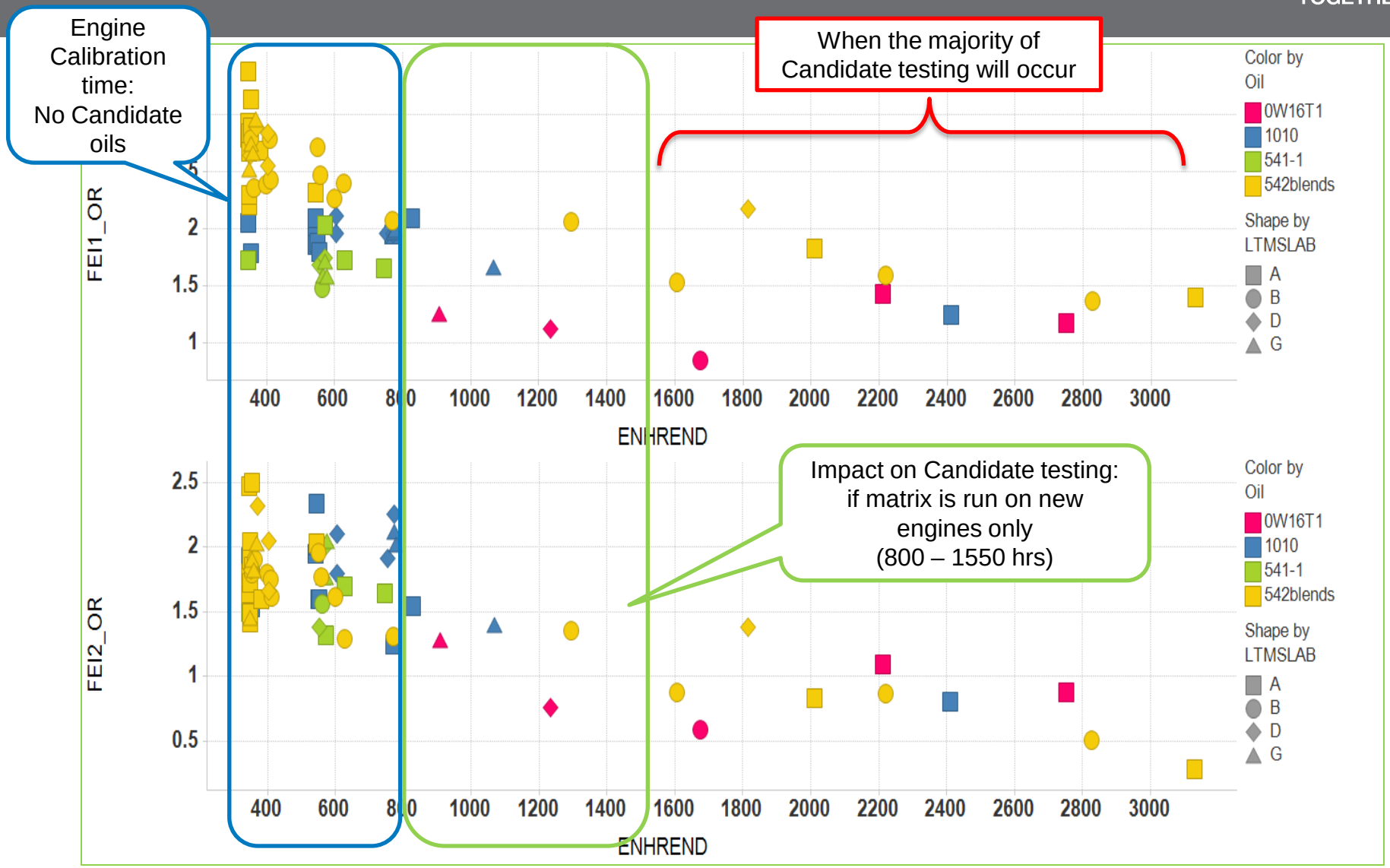
- This design:
  - Yellow: 15 runs cover for non-candidate test hours (0-800hrs) in 5 engines/ 4 labs
  - Green: 18 runs cover early candidate test hours (800-1550hrs) in 6 engines/ 5 labs
  - Blue: 21 (potential*) runs (> 1550 hrs) in 3 engines @ only 2 labs

**the engine could fail before the matrix is complete*

Lubrizol

VIE FEI Prove-Out by Engine Hour

SUCCESS TOGETHER



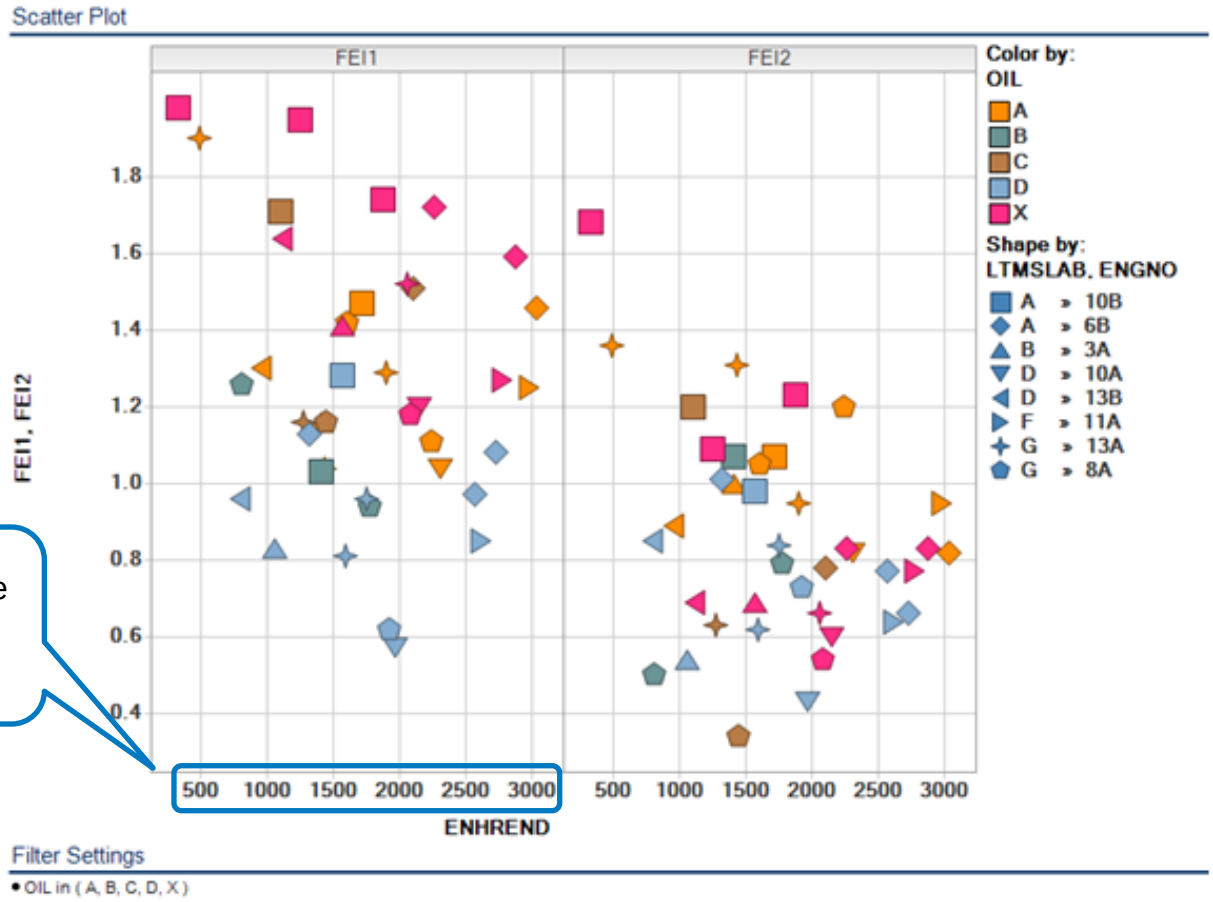
**from presentation: -SG VIE Prove-Out Data Analysis v4 March 19, 2015*

Lubrizol

VID Precision Matrix

SUCCESS TOGETHER

FEI by Engine Hours



Matrix Design encompassed engine hours where candidate testing occurs

**from presentation: -SG VIE Prove-Out Data Analysis v4 March 19, 2015*

5

Lubrizol

Statistical TF needs clear direction - Ideas….

SUCCESS TOGETHER

- Insert candidate oils into the matrix to broaden engine hours
  - Better represent the engine aging correction factor where candidate oils will be tested

Run Order	Z	Y	X	W	V 1	V 2	U 1	U 2
Engine	New	New	New	New	New	New	New	New
SOT EngHr	150	150	150	150	150	150	150	150
150	R	R	R	R				
350	R	R	R	R				
550	R	R	C	R				
750	R	C	C	C				
950	R	C	R	C				
1150	R	C	R	C				
1350	R	R	R	C				
1550	-	R	C	C				
1750	-	R	C	C				
1950	-	R	R	R				
2150	-		R	R				
2350	-			R				
2550	-			R				
EOT EngHr	1550	2150	2350	2750				

Lubrizol

Statistical TF needs clear direction - Ideas….

SUCCESS TOGETHER

- Design Matrix as Low, Medium, High engine hour engines rather than asking what engines are available
  - Better matrix design
  - Delays waiting for engines

Run Order	Z	Y	X	W	V 1	V 2	U 1	U 2
Engine	New	Old	New	Med	Med	Old	New	Old
SOT EngHr	150	TBD	150	TBD	TBD	TBD	150	tbd
1	R	R	R	R	R	R	R	R
2	R	R	R	R	R	R	R	R
3	R	R	R	R	R	R	R	R
4	R	R	R	R	R	R	R	R
5	R	R	R	R	R	R	R	R
6	R	R	R	R	R	R	R	R
7	R	R	R	R	R	R	R	R
EOT EngHr	1550	Hi	1550	Med	Med	Hi	1550	Hi

Lubrizol

Potential Path Forward For VIE Matrix Design

5/21/2015

Passion for Solutions™

VIE Engine Hours and Matrix Efficiency

- **Engine hours need to be accounted for in matrix**
- **Path forward needs to be win/win for industry and labs**
  - Industry “win” is getting sufficient data in a timely fashion to accurately account for engine hours
  - Lab “win” is ability to run candidates post matrix on calibrated engine
- **Matrix timeliness is a must**
  - VID test is in poor shape (hardware availability and pass/fail)
  - VIE matrix needs to complete in a timely fashion so correlation to VID can be determined

Potential Design To Cover Engine Hours Dilemma

							Engine 1														Engine 2			
	B/I	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		B/I	1	2	3	4
Stand	150	350	550	750	950	1150	1350	1550	1750	1950	2150	2350	2550	2750	2950	3150	3350	3550	Stand	150	350	550	750	950
1																			1					
2																			2					
3																			3					
4																			4					
5																			5					
6																			6					
7																			7					
8																			8					
				These tests may move up or down in test hours, depending on O/C rates and what engines are actually available																				

- **Some stands can start with older engines and swap to new ones to recoup calibration investment**
- **Reduces degrees of freedom but benefit may outweigh loss**
- **Should ensure adequate capacity during Tech Demo**

Conclusions

- **VIE matrix needs to run efficiently and without interruption**
- **Industry needs to understand engine hour effect thoroughly**
- **Labs need incentive to offer “older” engines**
- **Industry needs capacity immediately following matrix completion**