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Committee D02 on PETROLEUM PRODUCTS AND LUBRICANTS

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Issued: July 07, 2011

Reply to: Dan Worcester
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The unapproved minutes of the 06.29.2011 Sequence VI Surveillance Panel Conference Call.

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The meeting was called to order at 1:00 PM by Chairman Charlie Leverett.

Agenda

The Agenda is the included as Attachment 1.

1.0 Roll Call

The Attendance list is Attachment 2.

2.0) Approval of minutes

2.1) Approval of the minutes of the 03.17.2011 Conference Call.

Motion – Accept the minutes of the 03.17.2011 VID SP CC.

Rich Grundza / Charlie Leverett / Unanimous

3.0) Action Item Review

3.1 OHT to report VID engine usage and expected depletion date at all Surveillance Panel meetings. **Will be on-going.**
As of 06.29.2011, there are 56 engines in inventory at OHT. See Attachment 3.

3.2) VID Engine Rebuild Task Force – Update on 2011 engine at SwRI
We will discuss later in old business.

3.3) SP Chair to request data from ACC on Baseline
This was done and has be sent to this distribution.
We will discuss later in old business.

4.) Old Business

4.1) Review initial data from reference oil RO 1010, we determined we
The decision was made to not update targets and review again at 30 tests on this oil. FEI2 does seem to have shifted slightly with recent results.

4.2) Update on Engine Build Task Force
The 2012 Malibu engine has been received at SwRI. There was a change to the front cam caps to include chain oiling holes, and the method to set cam thrust is different on these engines, as is the front cover. See photos in Attachments 4 and 5. GM will supply fixed cam gears for this engine. There was discussion on what level of testing to perform on this engine. That has been tabled for now, and will be reviewed when SwRI provides Break-In traces on the new engine.

4.3 Shift Baseline Shift discussion, here is the original discussion item:

The ACC had a test that was invalidated for high baseline shift (BLB2 versus BLA). The ACC questioned the TMC as to the legitimacy of doing this. A review of reference data showed a number of instances of BLB2 vs BLA >0.6 and several very high ones were invalid for operational or hardware related issues. One reference result was deemed to be valid with a delta shift 1.48, which is about the same as the ACC reported result which was deemed invalid. I thought that tests were not to be invalidated for baseline shift alone, but neither the VID nor VIB tests address this.

There was discussion on BL shifts. When the shift occurs is critical. The question is whether a validity criteria is needed.

Motion – BL review will not be continued and there will not be a limit on BL delta.

Tim Caudill / Dave Glaenzer / 8 Yes, 5 Waive, 0 No. The Motion carries.

5.) New Business

5.1) Best Lab Practice Task Force

Template for acceptance of new te	BPLTD minutes 20110519.doc	BPLTD Task Force Scope and Objectives

Best lab practices comments are due by the end of July.

5.2) There was no New Business.

6.) Next Meeting

At the call of the chairman

7.) Meeting Adjourned

The meeting adjourned at 1:35 PM.

Sequence VI Surveillance Panel
Conference Call

Agenda

1.0) Roll Call

2.0) Approval of minutes
2.1) Approve the minutes from the 03/17/011 Sequence VI Surveillance Panel conference call.

3.0) Action Item Review

3.1 OHT to report VID engine usage and expected depletion date at all Surveillance Panel meetings. **Will be on-going.**
As-of 3/11/11 there are 57 engines in inventory at OHT.

3.2) VID Engine Rebuild Task Force – Update on 2011 engine at SwRI
We will discuss later in old business.

3.3) SP Chair to request data from ACC on Baseline
This was done and has be sent to this distribution. **We will discuss later in old business.**

4.) Old Business

4.1) Review initial data from reference oil RO 1010, we determined we
The decision was made to not update targets and review again at 20 tests on this oil.

4.2) Update on Engine Build Task Force

4.3 Shift Baseline Shift discussion, here is the original discussion item:

The ACC had a test that was invalidated for high baseline shift (BLB2 versus BLA). The ACC questioned the TMC as to the legitimacy of doing this. A review of reference data showed a number of instances of BLB2 vs BLA >0.6 and several very high ones were invalid for operational or hardware related issues. One reference result was deemed to be valid with a delta shift 1.48, which is about the same as the ACC reported result which was deemed invalid. I thought that tests were not to be invalidated for baseline shift alone, but neither the VID nor VIB tests address this.

5.) New Business

5.1) Best Lab Practice Task Force

Template for acceptance of new te	BPLTD minutes 20110519.doc	BPLTD Task Force Scope and Objectives

5.2) Any New Business?

6.) Next Meeting

At the call of the chairman

7.) Meeting Adjourned

ASTM SEQUENCE VI SURVEILLANCE PANEL

Name	Address	Phone/Fax/Email	Attendance
			Motion No BLS limit
Bowden, Jason Voting Member	OH Technologies, Inc. P.O. Box 5039 Mentor, OH 44061-5039	Phone: 440-354-7007 Fax: 440-354-7080 dhbowden@ohtech.com	W
Bruce Matthews Voting Member	GM Powertrain Engine Oil Group Mail Code: 483-730-472 823 Joslyn Rd	Pontiac, MI 48340: 248-830-9197 bruce.matthews@gm.com	Y Y
Andy Ritchie Voting Member	Infineum 1900 East Linden Ave. Linden, NJ 07036-0735	Phone: 908-474- Fax: 908-474-3637	Y
Ron Romano Voting Member	Ford Motor Company 21500 Oakwood Blvd POEE Bldg Rm DR 167 MD 44 Dearborn, MI 48121-2053	Phone: 313-845-4068 rromano@ford.com	Bruce has proxy
Leverett, Charlie Voting Member	Intertek Automotive Research 5404 Bandera Road San Antonio, TX 78238	Phone: 210-647-9422 Fax: 210-523-4607 charlie.leverett@intertek.com	Y
Grundza, Rich Voting Member	ASTM TMC 6555 Penn Ave. Pittsburgh, PA 15206-4489	Phone: 412-365-1034 Fax: 412-365-1047 Dml@tmc.astm.cmri.cmu.edu	W
Miranda, Timothy Voting Member	BP Castrol Lubricants USA 1500 Valley Road Wayne, NJ 07470	Phone: 973-305-3334 Timothy.Miranda@bp.com	W
Mosher, Mark Voting Member	ExxonMobil 600 Billingsport Road Paulsboro, NJ 08066	Phone: 856-224-2132 Fax: 856-224-3628 mark_r_mosher@exxonmobil.com	W
Caudill, Timothy Voting Member	Ashland, Inc. 21st and Front Streets Ashland, KY 41101	Phone: 606-329-5708 Fax: 606-329-3009 Tlcaudill@ashland.com	Y
Dan Worcester Voting Member	Southwest Research Institute (SwRI) 6220 Culebra Road San Antonio, TX 78228	Phone: Fax: dan.worcester@swri.org	Y
Szappanos, George Voting Member	Lubrizol 29400 Lakeland Blvd. Wickliffe, OH 44092	Phone: 440-347- Fax: 440-347-4096 George.Szappanos@lubrizol.com	W
Glaenzer, David Voting Member	Afton Research Center 500 Spring Street Richmond, VA 23218	Phone: 804-788-5214 Fax: 804-788-6358	Y
Sutherland, Mark Voting Member	Chevron Oronite Company LLC 4502 Centerview Ste. 210 San Antonio, TX 78228	Phone: 210-731-5605 Fax: 731-5621 msut@chevrontexaco.com	Y
Robert Stockwell Voting Member	ConocoPhillips Lubricants R&D Passenger Car Engine Oil	office 580-767-6894 Robert.T.Stockwell@conocophillips.com	
Tracy King Voting Member	Chrysler	Phone: 248-576-7500 tek1@chrysler.com	
Teri Kowalski	Toyota	teri.kowalski@tema.toyota.com	

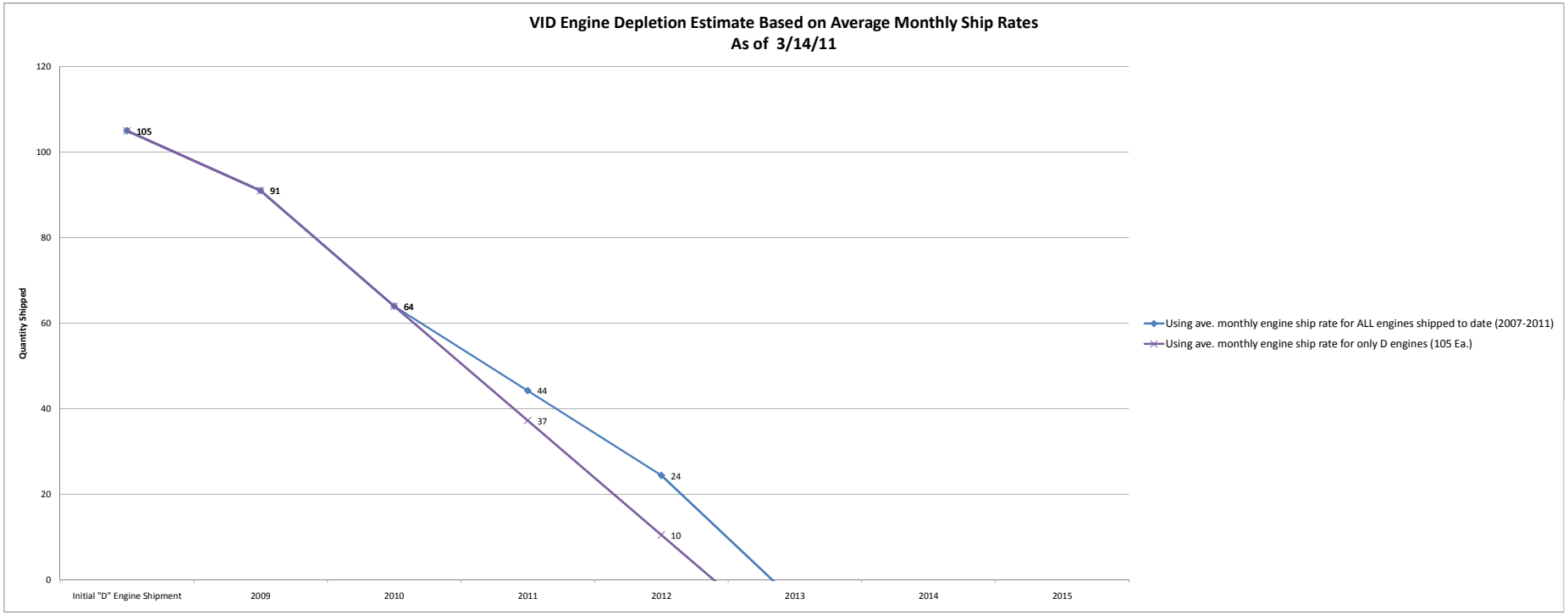
ASTM SEQUENCE VI SURVEILLANCE PANEL

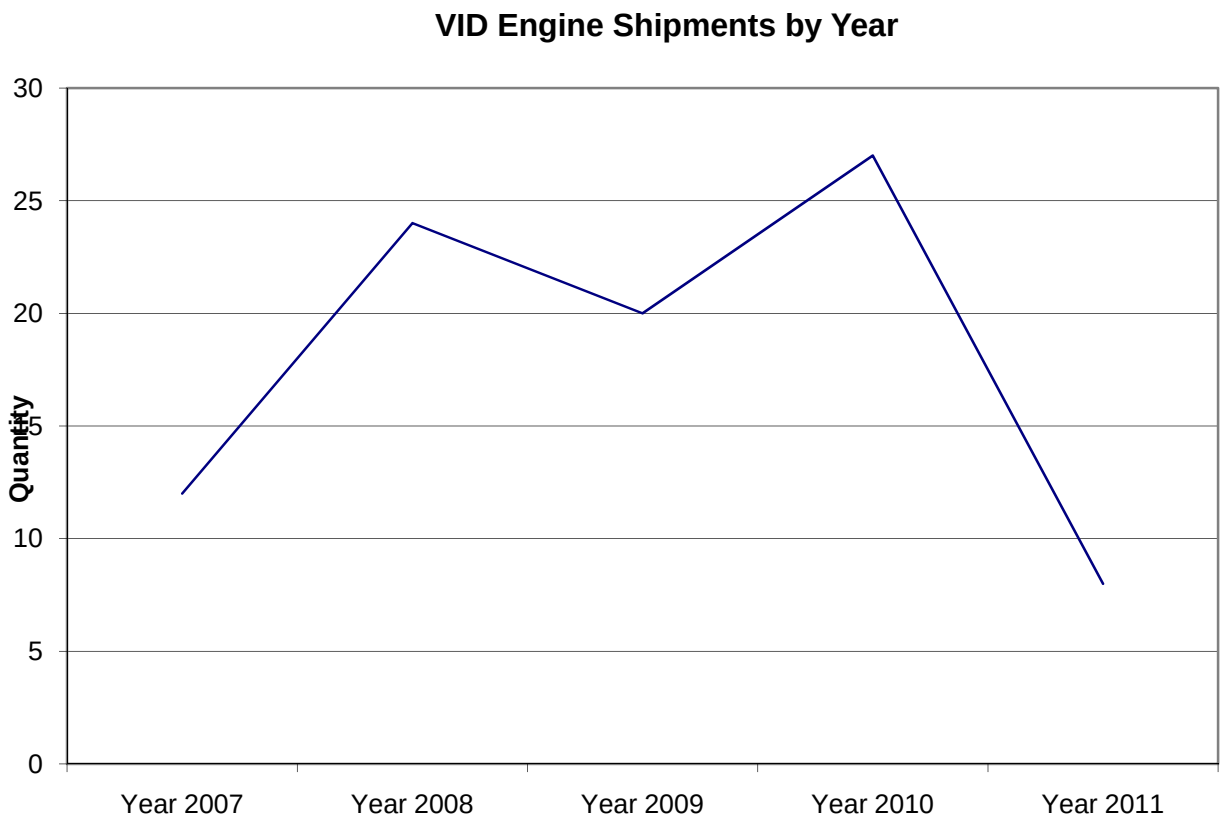
Name	Address	Phone/Fax/Email	Attendance

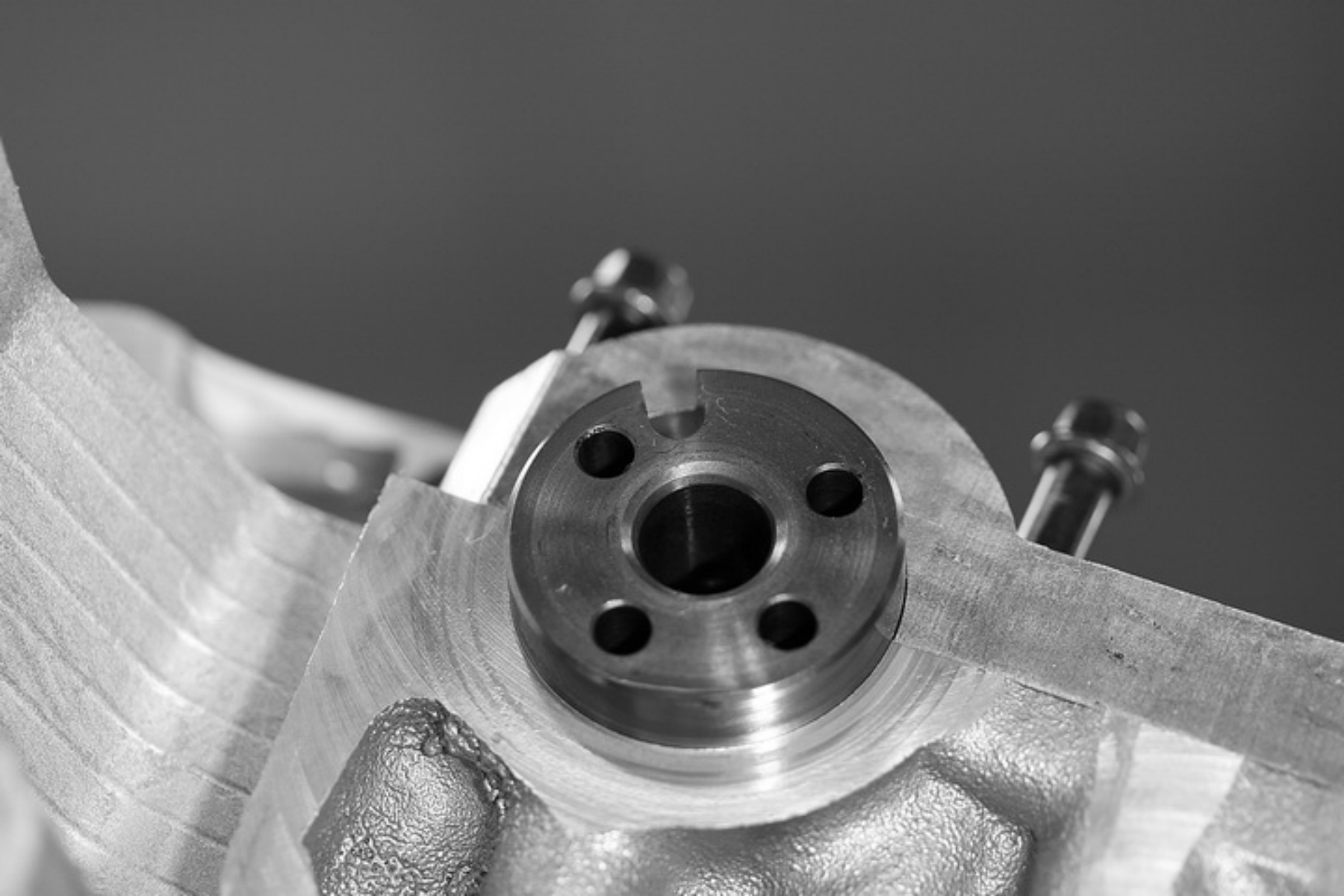
Guest Present at meeting

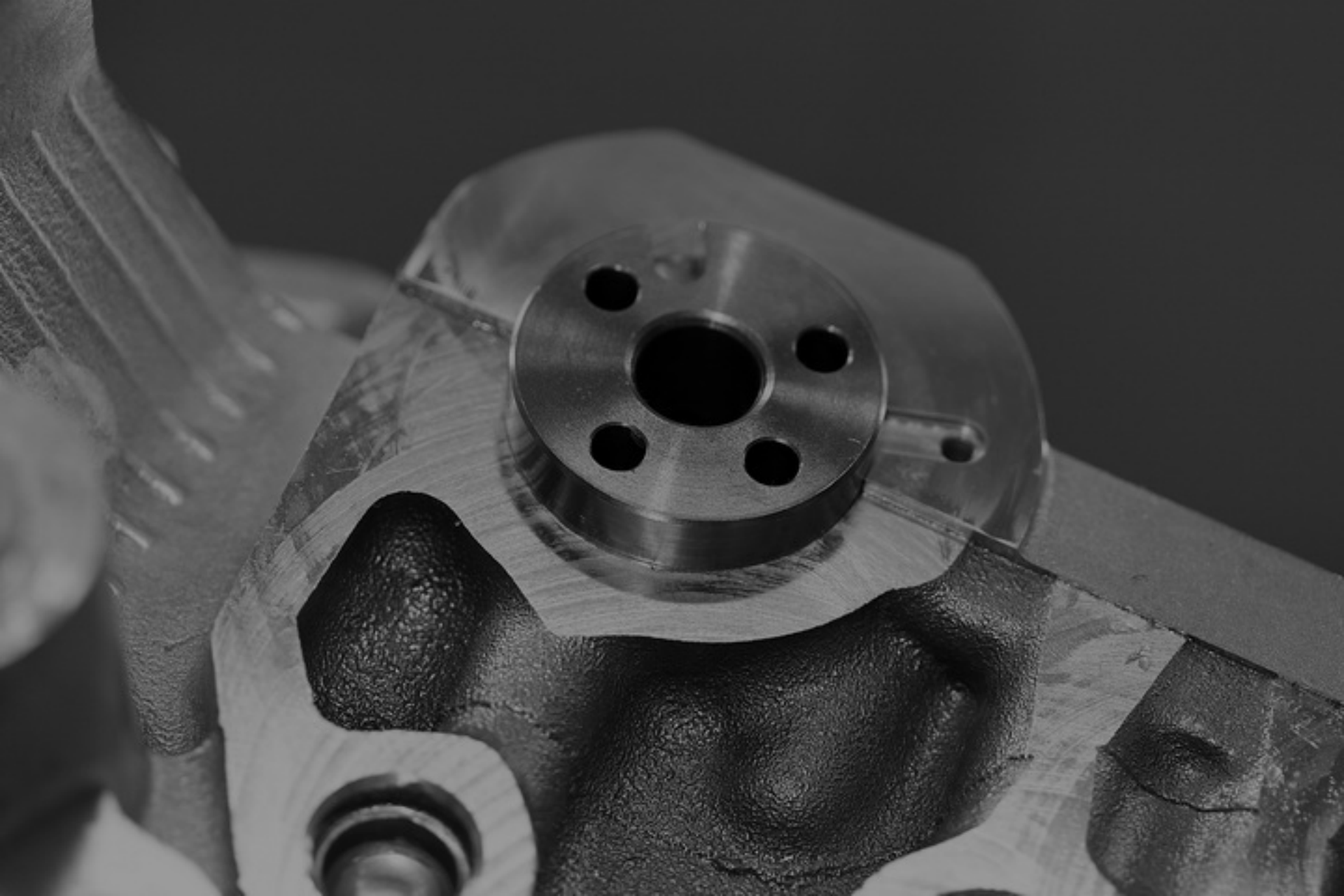
Doyle
Mike Mc
Chris

VID Engine Quantity Required for GF5 using Ave. Monthly Ship Rate for "D" Engines Only	VID Engine Quantity Required for GF5 using Ave. Monthly Ship Rate for all Engines Shipped to Date	Average Monthly Ship Rate by Year	
As of: 3/14/10 (Ship Dates from 8/9/09-6/29/11)	**As of: 6/29/11**	2007	1.00
Average = 49 engines / 22 months = 2.23	Average= 1.65	2008	2.00
		2009	1.67
Months left in GF-5 (7/01/11 thru 12/31/2015) (54)	Months left in GF-5 (7/01/11 - 12/31/2015) (54)	2010	2.25
		2011	1.14
54 months X 2.72 per month = 146	54 months X 1.65 per month = 89	2012	
		2013	
Current Engine Balance (6/29/11) (56)	Current Engine Balance (6/29/11) (56)	2014	
		2015	
Difference (146-56= 90)	Difference (89-56=33)		
Quantity Short	**Quantity Short**		
90	**33**		


VID Engine Depletion Estimate Based on Average Monthly Ship Rates
As of 3/14/11
Quantity Shipped
120
100
80
60
40
20
0
105
91
64
44
37
24
10
Initial "D" Engine Shipment
2009
2010
2011
2012
2013
2014
2015
Using ave. monthly engine ship rate for ALL engines shipped to date (2007-2011)
Using ave. monthly engine ship rate for only D engines (105 Ea.)


VID Engine Shipments by Year
Quantity
30
25
20
15
10
5
0
Year 2007
Year 2008
Year 2009
Year 2010
Year 2011





Best Practices in Lubricant Test Development: May 19, 2011

Jim Moritz
Bill Buscher
Frank Farber
Charlie Leverett
Chris Castanien
David Glaenzer
Jeff Clark
Jim Rutherford
Greg Shank

Chairman's comments: compilation of old documents. A test developer asked how this will be used. This checklist is meant for the earliest stages of test development. It should include technical recommendations in development like using forced oil adds instead of fill to full. If this group has recommendations for changes to Appendix K of the ACC Code of Practice, then they should be forwarded. A suggestion was made to update the draft template to remove references to engine oil testing to include bench and gears.

This guide should be a tool for the Surveillance Panels, engineers and test developers to use in the early phases of test development to archive details like controlling load cell temperatures and forced oil adds. RTV is a source of foaming. Also, the size of parts batches and how to introduce new fuel must be included. The guide will make clear that the TMC is able to hold Intellectual Property for items like fuel recipes. The suggestion was made that to be a fuel supplier, the recipe will have to be sent to the TMC. TMC will sign non-disclosure agreements and meet any fuel supplier's requirements. The feeling is that for new categories, the requirement be made that the fuel recipe will go to the TMC.

PC Surveillance Panel meetings (III, IV, V) in early June will include as an agenda item to brainstorm and discuss items for the guide.

Best Practices (draft list of recommendations):

- Forced oil consumption with fresh oil make up rather than fill to full.
- Control load cell temperatures (where relevant)
- Control inlet air restriction and exhaust back pressure and other pressures in absolute units if practical. If not, don't mix absolute and gage across the engine.
- RTV is a source of foaming
- Parts and fuel batches have been a major source of variability and severity shifts.
- Test developer/parts suppliers develop methods to prevent running parts changes or supplier sourcing changes. At a minimum, notification is necessary.
- Test platform/apparatus part numbers be clearly listed somewhere to refer back in time.

Best Practices in Lubricant Test Development Task Force

Scope and Objectives

Scope

The scope of this task force is to create a template/checklist for best practices in lubricant test development, to be utilized for effective future test development. The goal is to build this template/checklist from a compilation of existing documents available within the industry and knowledge and data from previous test development.

Objectives

This document will assist future test development groups answer the following questions: What are we trying to measure (what are our objectives), how can the measured parameters be correlated to field service and/or back to previous test(s) being replaced, what impacts the parameters being measured.

Updated: January 27, 2009

Items to consider:

1. Define Need
    a. Define parameters to measure (must have sufficient range)
    b. Define platform
    c. Define funding
    d. Define participants (minimum of 2 independent labs)
2. Demonstrate test's ability to discriminate
3. Reference oil selection
    a. Target calculation
4. Calibration period
5. LTMS version
   ftp://ftp.astmtmc.cmu.edu/docs/LTMS%20v2%20Task%20Force%20Documents/
    a. Decide whether to chart final original units or final transformed units
6. Hardware control – ensure consistency (2 references below)
    a. Define critical parts and handling (CPD)
    b. Sufficient supply of quality parts in beginning and through out
    c. Supplier system to prevent running hardware and sub-suppliers changes
7. Fuel supply – notes from fuel task force:
    a. Incorporate fuel as a parameter and fuel suppliers as a partner in early test development.
    b. Include in the development discussions the use of modern, relevant fuel.
    c. Define recipe for fuel rather than finished specs.
    d. Develop a test that is insensitive to fuel if possible.
    e. Define ways to report identifying factors, such as fuel batch id parts batches, etc…
    f. Define standard batch id reporting
8. Instrumentation (DACA II below)
9. Rating and measurement methods
    a. Range of measurement large enough to correct for shifts
    b. If merit systems used, factor in range for corrections and shifts
    c. Determine appropriate significant digits for results
    d. Clearly state calculation methods for calculated results
10. Research Report ftp://ftp.astmtmc.cmu.edu/docs/Research_Report_Template.pdf

ACC Code of Practice Appendix K is a good place to start.
ftp://ftp.astmtmc.cmu.edu/docs/Technical_Guidance_Committee/Meeting_Minutes/BestPractices/ACCAppendixK.pdf

Other documents and guidelines that have already been developed:
TMB Rules and Regulations
ftp://ftp.astmtmc.cmu.edu/docs/test_monitoring_board/TMB%20Rules%20and%20Regulations.pdf

Information Letter Task Force Report
ftp://ftp.astmtmc.cmu.edu/docs/test_monitoring_board/minutes/information_letter_task_force_report.pdf

DACA II
ftp://ftp.astmtmc.cmu.edu/docs/quality_index_and_data_acquisition/daca_II_report_and_system_time_response.pdf

Test Hardware Control
ftp://ftp.astmtmc.cmu.edu/docs/Technical_Guidance_Committee/Meeting_Minutes/TestHardwareControl/Test%20Hardware%20Control.pdf

Sequence IID and IIIE Information Letter 60
ftp://ftp.astmtmc.cmu.edu/docs/Technical_Guidance_Committee/Meeting_Minutes/TestHardwareControl/IL60.pdf

PC-10 Lessons Learned
ftp://ftp.astmtmc.cmu.edu/docs/Technical_Guidance_Committee/Meeting_Minutes/BestPractices/HDECP20071204att3.pdf

Form and Style for ASTM Standards http://www.astm.org/COMMIT/Blue_Book.pdf

Other ASTM Committee work (relevance varies)
http://www.astm.org/COMMIT/SUBCOMMIT/D0294.htm
http://www.astm.org/COMMIT/SUBCOMMIT/E1120.htm

Template for Acceptance of New Tests

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TEMPLATE FOR ACCEPTANCE OF NEW TESTS

Introduction

This Template defines the elements and the limits required for achieving precise and discriminating engine tests, processes for controlling key variables that can affect precision and discrimination, and methods to measure those key performance variables.

The "Acceptance Criteria" represent:

- the minimum acceptable levels of precision and discrimination;
- methods for precision and severity control charting;
- methods for handling multiple test results; and
- "Action Plans" for addressing variables that can affect precision and discrimination over the life of the test, or for addressing procedures that must be done during test development.

The "Action Plans", with recommended approaches, address:

- reference oils;
- test parts;
- test fuels;
- test procedures;
- rating and reporting of results;
- calibration, monitoring, and surveillance; and
- development of guidelines for read-across and interchangeability.

Purpose

The main objective of the Template is to ensure through the "Acceptance Criteria" and the "Action Plans" that the accuracy of the measuring tools, the integrity of the data developed, and the interpretation of the results from these tools are founded upon technically correct and statistically sound principles; and that processes are in place to maintain quality. The end result will be more cost-effective testing and a greater confidence that a lubricant meets its intended performance.

RELATIONSHIP TO ENGINE OIL CATEGORIES

Quality processes relating to engine tests, which when applied collectively with specific test limits, form the basis for defining an engine oil category. A demonstration oil is necessary to establish the performance limits of the tests comprising the category. Such an oil must meet the performance limits of each of the tests within the category.

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ACCEPTANCE CRITERIA

The following are requirements for acceptance of new tests:

A. Precision, Discrimination and Parameter Redundancy

The quality of a test is measured by the capability of the test to yield mutual agreement between individual results and to differentiate adequately between passing and failing oils at the performance limit. Acceptance of a test is dependent upon the test's capability to meet the defined precision and discrimination criteria based upon a homogeneous data set. Any bias between test laboratories and/or test stands must be removed before calculating these parameters. Each pass/fail parameter must have a unique and significant purpose in terms of the engine oil performance standard.

Requirements

A.1 Precision

The value, E_p, of repeat runs on the same lubricant must be 1.0 or greater for all pass/fail criteria based on ASTM D4485. All calculations must be in transformed units, where applicable, at the pass/fail limit.

$E_p = dp/Spp$

Where,

dp = Smallest difference of practical importance as determined with input from industry as appropriate, e.g., ASTM, API, SAE, AAM, EMA.

S_{pp} = Pooled standard deviation (best estimate using all available reference and replicate candidate data at target level of performance).

An example is provided below.

Parameter	dp	Spp	Ep	Ep≥1.0
A	0.3	0.2	1.5	Yes
B	0.3	0.4	0.75	No

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A.2 Discrimination

For each test parameter in A.1, at least one of the oils used in proof-of-concept testing, matrix testing, or reference testing must be significantly different from at least one of the remaining oils. This difference must be in the correct direction, i.e., a poor oil should not perform significantly better than a good oil. Significant difference may be declared with a p-value of 10% or less. Note that these least-squares means are not necessarily proposed LTMS targets. An example is provided below.

Parameter: AAAA

			p-value for t-test of equal means (Tukey)		
Oil	Least-Square Mean	95% Confidence Interval for Mean	Vs 1	Vs 2	Vs 3
1	314.3	277.8 to 350.8		0.48	0.002
2	345.1	304.9 to 385.3	0.48		*0.04*
3	415.6	375.6 to 455.7	*0.002*	*0.04*	

A.3 Parameter Redundancy

Each pass/fail parameter has a unique and significant purpose in terms of the engine oil performance standard. Parameter redundancy is concluded if a correlation coefficient is 0.85 or greater. An example is provided below.

Correlation Coefficients

	Parameter A	Parameter B	Parameter C	Parameter D
Parameter A	1.00	*0.91*	0.23	0.02
Parameter B	*0.91*	1.00	0.19	-0.01
Parameter C	0.23	0.19	1.00	0.56
Parameter D	0.02	-0.01	0.56	1.00

B. Severity and Precision Control Charting

A Lubricant Test Monitoring System (LTMS) is a key gauge for evaluating overall test performance. Key attributes of any LTMS system are the monitoring and tracking of severity and precision for both abrupt and long term changes, alarm points, and alarm responses at various levels (stand, lab, industry).

Requirements

B.1 A LTMS for reference oil tests is in place.

B.2 Appropriate data transforms are applied to test results as needed in order to assure the approximate normality of the data population and/or to minimize non-constant variance.

C. Interpretation of Multiple Test Results

The method of interpretation of multiple test results must be a data-based approach for evaluating the quality and performance of a formulation through the consideration of all operationally valid test results. The method of multiple test result interpretation selected should recognize the precision of the test and the statistical reality that confidence in a result increases as the number

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of tests on the oil increases. Additionally, the method selected should include a methodology for the handling of discordant results.

Requirements

C.1 There is a system to handle the results of repeat tests run on a candidate, which takes into account current industry precision.

C.2 The appropriateness of a statistical method for the determination and handling of outlier results has been determined and the method defined.

D. Action Plan

Action plans must be developed and in place that address the following items:

D.1 Reference Oils

The choice, quantity, quality, supply, and distribution of reference oils are critical elements of the template. The oils chosen must include those used in calculating discrimination, dp_{-}. Long-term consistency and availability must be assured through documented quality systems.

Consistent with the ASTM Test Development Flow Plan, the majority of reference oils used must be representative of technology "current" when the applicable engine oil performance standard was established.

To ensure that the severity and precision control charts accurately reflect the severity and precision of the test, the appropriate number of reference oils must be included to help determine shifts in test quality for all critical parameters.

Additionally, the majority of reference oils run must be of passing or borderline pass/fail performance.

Recommended Approaches

D.1.1 Oil supply and distribution are handled through an independent monitoring organization.

D.1.2 A quality control plan is defined and in place to assure the long-term quality of oils.

D.1.3 A turnover plan is defined and in place to ensure the uninterrupted supply of existing reference oils and an orderly transition to reblends.

D.1.4 A process for the introduction of replacement reference oils is defined and in place.

D.1.5 Oils are blended in a single homogeneous quantity to last five years.

D.2 Test Parts

Critical test parts, defined as those parts, which may affect severity and/or precision, must be identified. A system must be defined and in place to maintain all testing on uniform

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hardware through a consistent and stable single-source supply of critical parts. There must be a formal system in place for engineering support and test parts supply.

Recommended Approaches

D.2.1 Critical parts are distributed through an equipment distributor (who may or may not be the test developer).

D.2.2 Critical parts are serialized, and their use documented, in the test report.

D.2.3 All parts are used on a first in/first out basis.

D.2.4 All rejected (unused) critical parts are accounted for and returned to the equipment distributor.

D.2.5 The equipment distributor provides a status report to the independent industry-recognized body responsible for the calibration, monitoring, and surveillance of the test method, at least semi-annually.

D.2.6 Quality control and turnover plan is in place for critical test parts to help assure consistency of parts among laboratories. These plans include the identification and measurement of key part attributes. Furthermore, a system for part quality accountability is defined and operable. A turnover plan is in place to ensure that all testing facilities use new parts batches or supply sources simultaneously.

D.2.7 There is a formal system for engineering support and test parts supply. Examples of support include:

Active participation in the independent industry-recognized body, e.g., ASTM Surveillance Panel, responsible for the calibration, monitoring, and surveillance of the test; and

Active participation in industry-sponsored test matrices.

D.3 Test Fuel

The test fuel is part of the test procedure; therefore, it is as important as any other aspect of an engine test. The fuel must be specified and the supplier(s) must be identified.

If small variations in test fuel quality influence the results of an engine test, the fuel must be considered a critical part.

Recommended Approaches

D.3.1 As a minimum, the following items are addressed:

- Fuel supplier and fuel specification (chemical and physical properties) are identified.
- Approval guidelines are in place for fuel certification (batch, supplier, etc.).
- A process is in place to monitor fuel stability over time.

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D.3.2 If the test fuel is treated as a critical part of the test procedure; the following additional items are addressed:

- Approval engine testing plan and severity monitoring plan for each fuel batch is in place.
- A quality control plan is defined and in place to assure the long-term quality of the fuel.
- A turnover plan is defined, in place and demonstrated to ensure the uninterrupted supply of existing test fuel and an orderly transition to reblends.

D.4 Test Procedure

The establishment of any continuous improvement efforts requires a clear statement of a starting point. This starting point is the written test procedure where key aspects related to the running, rebuilding, and rating of a test are documented.

Recommended Approaches

D.4.1 A technical report is published, consistent with the ASTM Test Development Flow Plan, that

- documents test precision for reference oils,
- documents field correlation, and
- documents test development history.

D.4.2 Test preparation and operation are clearly documented in a standards format, e.g., ASTM.

D.4.3 Test stand configuration requirements are documented and standardized.

D.4.4 Milestones to measure precision improvements are established and routinely evaluated for progress.

D.4.5 Routine engine builder workshops are conducted.

D.5 Rating and Reporting of Results

Consistent test parameter rating and the use of severity-adjusted results improve test precision and accuracy. The rating of only relevant parameters helps ensure cost effective testing. To ensure that the severity and precision control charts accurately reflect the test labs' severity and precision, no referee ratings are to be used in the determination of final test results. All reference and candidate tests must be rated in the same manner by a qualified test laboratory rater.

Recommended Approaches

D.5.1 Averaging of ratings from various raters is not permitted.

D.5.2 There is a laboratory or stand-based severity adjustment system which relies on reference oil performance to determine corrections in the mild or severe direction.

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D.5.3 Each pass/fail parameter has a unique and significant purpose in terms of the engine oil performance standard.

D.5.4 All rated items must have a defined basis for judging operational validity, interpretation of the test, or performance against oil specifications.

D.5.5 Routine rater workshops are conducted.

D.6 Calibration, Monitoring and Surveillance

The independent monitoring of test performance with blind reference oils provides the data necessary for tracking severity and precision. Test procedure acceptability and appropriate adjustments to test results are based on reference oil performance relative to industry targets. A reference oil system administered by an industry recognized independent body assures laboratory confidentiality and unbiased test surveillance.

Recommended Approaches

D.6.1 A process is in place for independent monitoring of severity and precision with an action plan for maintaining calibration of all laboratories.

D.6.2 Control charts based on industry reference oil data are used to judge the calibration status of laboratories, stands, and industry.

D.6.3 The maximum allowable time between blind references within a test stand does not exceed 15 times the minimum length of time to conduct a standard candidate test (test time plus turnaround). This maximum elapsed time between reference tests is defined in the test procedure.

D.6.4 An industry panel is in place to provide test surveillance.

D.7 Guidelines for Read Across

A plan is defined for the establishment of data to assist in the development of base oil and viscosity grade read across guidelines and interchangeability. This plan will have been developed in concert with other interested parties such as API, ASTM, etc.

Recommended Approaches

D.7.1 A matrix that encompasses the investigation of viscosity grade influence as well as base oil influence has been developed as part of the test development process.

D.7.2 Results of investigations into viscosity grade influence as well as base oil influence have been summarized and included in the Technical Report in D.4.1.

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TEMPLATE CHECKLIST

Purpose

The Checklist for Comparing Tests to the Template is used to assess progress in new engine test development and Action Plans. The checklist is updated periodically during the course of test development and is provided to, and discussed with, the appropriate ASTM test development task force.

The rating scale for comparing test development to the Template is as follows:

A - Completed

B - In Progress

C - Planned

D - No Action

Test Name_____ Assessment Date_____

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Template for Acceptance of New Tests

Checklist for Comparing Tests to the Template

A. Precision and Discrimination

A.1 Precision

$E_p = d_p/Spp$, $E_p \geq 1.0$ for all pass/fail parameters
d_p = Smallest difference of practical importance
Spp = Pooled standard deviation at target level of performance

An example is provided below.

Parameter	dp	Spp	Ep	Ep≥1.0
A	0.3	0.2	1.5	Yes
B	0.3	0.4	0.75	*No*

Comments:

A.2 Discrimination

For each test parameter in A.1, at least one of the oils used in proof-of-concept testing, matrix testing, or calibration testing must be statistically significantly different from at least one of the remaining oils. This difference must be in the correct direction, i.e., a poor oil should not test out as significantly better than a good oil. Significant difference may be declared with a p-value of 10% or less. Multiple comparison techniques (Tukey, Scheffe, Bonferroni, etc.) for the least-square means of the oils are preferred comparison techniques and should be stated in the analysis. Note that these least-squares means are not necessarily proposed LTMS targets. An example is provided below.

Parameter: AAAAA

			p-value for t-test of equal means (Tukey)		
Oil	Least-Square Mean	95% Confidence Interval for Mean	Vs 1	Vs 2	vs 3
1	314.3	277.8 to 350.8		0.48	0.002
2	345.1	304.9 to 385.3	0.48		*0.04*
3	415.6	375.6 to 455.7	*0.002*	*0.04*	

Comments:

A.3 Parameter Redundancy

Each pass/fail parameter has a unique and significant purpose in terms of the engine oil

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performance standard. Parameter redundancy is concluded if a correlation coefficient is 0.85 or greater. An example is provided below.

Correlation Coefficients

	Parameter A	Parameter B	Parameter C	Parameter D
Parameter A	1.00	*0.91*	0.23	0.02
Parameter B	*0.91*	1.00	0.19	-0.01
Parameter C	0.23	0.19	1.00	0.56
Parameter D	0.02	-0.01	0.56	1.00

B. Severity and Precision Control Charting

Requirements

B.1 Is an LTMS for reference oil tests in place? _____

B.2 Are appropriate data transforms applied to test results? _____

Comments:

C. Interpretation of Multiple Tests

Requirements

C.1 Is a suitable system in place to handle repeat tests on a candidate oil? _____

Type: MTAC Tiered Limits Other

C.2 Has a method for the determination and handling of outlier results been defined? _____

Comments:

D.Action Plan

D.1 Reference Oils

Do the majority of reference oils represent current technology? _____

Are the majority of reference oils of passing or borderline pass/fail performance? _____

RATING SCALE: A - Completed; B - In Progress; C - Planned; D - No Action

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Recommended Approaches

D.1.1 Is reference oil supply and distribution handled through an independent organization? _____

D.1.2 Is a quality control plan defined and in place? _____

D.1.3 Is a turnover plan defined/in place to ensure uninterrupted supply of reference oil and an orderly transition to reblends? _____

D.1.4 Is a process for introducing replacement reference oils defined and in place? _____

D.1.5 Are oils blended in a homogeneous quantity to last 5 years? _____

Comments:

D.2 Test Parts

Are all critical parts identified? _____

Is a system defined/in place to maintain uniform hardware? _____

Is there a system for engineering support and test parts supply? _____

Recommended Approaches

D.2.1 Are critical parts distributed through a Central Parts Distributor (CPD)? _____

D.2.2 Are critical parts serialized, and their use documented in test report? _____

D.2.3 Are all parts used on a first in/first out basis? _____

D.2.4 Are all rejected critical parts accounted for and returned to the CPD? _____

D.2.5 Does the CPD make status reports to the test surveillance body at least semi-annually? _____

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D.2.6 Is there a quality control and turnover plan in place for critical test parts, including identification and measurement of key part attributes, a system for parts quality accountability, a turnover plan in place for simultaneous industry-wide use of new parts or supply sources? _____

D.2.7 Is the CPD active in industry surveillance panel/group, and in industry sponsored test matrices? _____

Comments:

D.3 Test Fuel

Recommended Approaches

D.3.1 Is the fuel specified and the supplier(s) identified? _____

Is a process in place to monitor fuel stability over time? _____

Are approval guidelines in place for fuel certification? _____

D.3.2 If the test fuel is treated as a critical part of the test procedure: Is an approval plan and severity monitoring plan for each fuel batch in place? _____

Is a quality control plan defined and in place to assure long term quality of the fuel? _____

Is a turnover plan defined, in place and demonstrated to ensure uninterrupted supply of fuel? _____

Comments:

D.4 Test Procedure

Recommended Approaches

D.4.1 Is a technical report published documenting, per ASTM Flow Plan: Test precision for reference oils? _____

Field correlation? _____

RATING SCALE: A - Completed; B - In Progress; C - Planned; D - No Action

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Test development history? _____

D.4.2 Are test preparation and operation clearly documented in a standard format, e.g., ASTM, CEC? _____

D.5 Rating and Reporting of Results

D.4.3 Are test stand configuration requirements documented and standardized? _____

D.4.4 Are milestones for precision improvements established? _____

D.4.5 Are routine engine builder workshops planned/conducted? _____

Comments:

Recommended Approaches

D.5.1 Are the reported ratings from single raters (i.e. not averages from various raters)? _____

D.5.2 Is a suitable severity adjustment system in place? _____

D.5.3 Is each pass/fail parameter unique and have a significant purpose for judging engine oil performance? _____

D.5.4 Do all rate and report parameters judge operational validity, help in test interpretation or judge engine oil performance? _____

D.5.5 Are routine rater workshops conducted/planned? _____

Comments:

D.6 Calibration, Monitoring and Surveillance

Recommended Approaches

D.6.1 Is a process in place for independent monitoring of severity and precision with an action plan for maintaining calibration of all laboratories? _____

D.6.2 Are stand, lab, and industry reference oil control charts of all pass/fail criteria parameters used to judge calibration status? _____

RATING SCALE: A - Completed; B - In Progress; C - Planned; D - No Action

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D.6.3 Does the specified calibration test interval allow no more than 15 non-reference oil tests between successful calibration tests? _____

D.6.4 Is an industry surveillance panel in place? _____

Comments:

D.7 Guidelines for Read Across

Recommended Approaches

D.7.1 Is a plan defined to establish data for development of BOI and VGRA? _____

D.7.2 Has VGRA and BOI data been summarized and included in the technical report in D.4.1? _____

Comments:

Rating Scale: A - Completed; B - In Progress; C - Planned; D - No Action

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