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Unapproved Minutes of the October 15th, 2013
Sequence IV Surveillance Panel Meeting held in San Antonio, TX.

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A copy of the Agenda is included as **Attachment 1**.

The attendance sheet is included as **Attachment 2**. Also in attendance via teleconference line were Matt Bowden (OH Technologies, Inc.), Nathan Molds (Lubrizol) and Tim Miranda (BP Castrol). Membership changes noted during the meeting were Jeffery Hsu replacing Robert Sutherland for Shell Global Solutions, Kaustav Sinha replaces Joe Martinez for Chevron Oronite, Nathan Moles replaces Jerry Brys for Lubrizol and Mark Sutherland replaces Clayton Knight for Test Engineering, Inc. Proxies included Robert Stockwell for Bruce Matthews of GM.

Bill Buscher agreed to be the motion and action item recorder for the meeting.
Jason Bowden agreed to record the minutes for the meeting.

Minutes for the February 28, 2013 meeting were approved

Review of Action Items:

The following is the status of action items from the previous meeting:

1. Action Item – Create a task force that will review TGC and other industry documents, such as the *Standard Guide for Test Hardware Control* document, and develop a recommendation for tying these documents to existing and future engine test procedures.

Contact Ben Weber to provide update.

2. Action Item – OHT or surveillance panel chair to contact Nissan requesting the KA24E camshaft manufacturing information as soon as possible.

Completed

3. Action Item – Surveillance panel chair to schedule a conference call with the test laboratories, OHT and the TMC, to finalize the hardware order plan, prior to the 3/15/13 order deadline.

Completed

Update on Sequence IVB Test Development

Stand Presentation

Teri Kowalski and Jim Linden provided a presentation to the Surveillance Panel (included as **Attachment 3**) for the “Golden Stand” concept to be used for the Seq. IVB Test. The purpose of the Golden Stand Concept is to standardize most aspects of stand installations between all users of the test. The presentation outlined components that will be included in the Golden Stand concept along with dimensions and suppliers of components. The panel and individual labs

agreed that there are positives with the overall standardization concept such as reducing variability amongst labs, single sourcing, etc. There were also questions and comments during the presentation that Jim, Teri and SwRI answered. There were questions raised with regards to the dimensional restrictions at some labs with regards to the placement of the fluid conditioning rack. Jim commented that the fluid conditioning rack can be placed at any location around the engine. The intent will be to survey the labs that will be using the Seq. IVB to determine where individual labs plan on installing the fluid conditioning rack. Once this has been completed the connecting lines for this rack will be standardized to accommodate the lab with the longest plumbing connections, so that all labs will be using the same plumbing length. Al Lopez had concerns with regards to the fact that their lab had already begun preparations for the Seq. IVB by installing base plates and other equipment. Fred Gerhart commented that the base plates are designed to be bolted to either concrete or existing base plates. They do not have to be flush to the concrete floor. The base plates themselves are designed with two pallets to allow for easier swapping of test cell platforms. Lubrizol commented that they will have to review space restrictions in their lab as they currently have a Seq. IVA stand in place and did not plan on removing it before the installation of the stand for Seq. IVB. Mark Mosher inquired as whether the control boxes will arrive with all valves and fittings. Toyota confirmed that the control box will contain all valves and connections. Fred G. commented that if you currently run a Seq. VG test you can run this test. There is no steam, the stand uses a Midwest 1014a dyno, 50-50 coolant mixture and current plans are for the labs to supply back pressure controls.

There was a discussion with regards to the cost and availability of the Golden Stand. Bill Buscher commented that the stand design is 95% complete. There is still a lot of work to go with regards to process controls, hardware, etc. and they want to make sure that all stands are the same from day one. Jerry Brys and Al Lopez had concerns with regards to TEI's capacity to supply the stands to the industry and overall cost. Toyota commented that the number one priority will be to install stands at Intertek for matrix testing, followed by one stand each for labs that will be using this test and then proceed with additional industry stands. There was not a firm timeline provided with regards to delivery of this material during the meeting. Chris Castanien asked what will happen if a component fails that was originally supplied with the Golden Stand? Toyota commented that this will be replaced by the supplier of the stand and that if parts go out of production in the future or are not available, the Panel will be in charge of finding a suitable replacement. The supplier of the stand will be expected to carry an inventory of stand subcomponents to minimize the occurrences of replacement materials becoming unavailable.

During the summary, Teri stated that Toyota has interest in bringing additional test platforms into ASTM and believes that this may be a good first step with regards to standardization. Bill Buscher commented that Toyota selected this engine design because it is believed to be around for a significant period of time and Toyota is willing to support it into future categories.

The individual labs stated they would like to bring the Toyota Golden Stand Concept presentation back to their respective companies for review and provide comment and questions before the next Surveillance Panel meeting on November 20th, 2013.

Sequence IVB development update

Teri and Jim provided an update with regards to the IVB development. They stated that they are currently focusing on different operational and hardware variables to obtain the optimum wear. Bill was asked what current method is being used to measure wear. There are several different methods being reviewed by the test development group that include laser micrometers, Adcol, PDI traces pre and post test and long term solutions in the future that may include Brooker white light measurements. Currently the focus has been on using PDI traces. It was noted that in order for a lab to perform pre and post test traces they will have to have PDI software that is vintage '98 or earlier. Current software versions do not allow for pre and post test measurements. The labs created an action item to look at their current software version on their PDI devices. There was also a discussion with regards to the possibility of having a single source (CPD) measure camshafts pre and post test.

The panel broke for lunch and visited the Seq. IVB test stand installations at SwRI.

Seq. IVA Test Hardware Status

The labs indicated their current test hardware status.

Southwest Research –Bill Buscher commented that they are currently out of camshaft hardware. The final two camshaft batches that they had on hand were determined to be mild (~2.5 std mild) and they cannot reference this material. They have 55 each of the '99 camshafts, but have not had success on this material in the past and have not run this material.

Intertek- Al Lopez reported that they have enough camshafts on hand through the end of next year, assuming they can reference the '99 batches. Based on historical levels, they run 78 tests per year with two stands. They believe that this will be the max capacity available with the two stands even if SwRI is out of material.

Lubrizol- Jerry Brys reported they have 20 camshafts remaining of '08 batch, which should last approximately one year.

Ashland-Adam Sworski reported they have 20 camshafts remaining of '08 batch, which should provide enough inventory until Seq. IVB arrives.

Nissan Hardware Order Status

Three labs currently have purchase orders placed with Nissan for a total of approximately 1,100 camshafts. The original intent was to receive all 1,100 camshafts as one shipment in March of 2014. Based on recent developments with regards to SwRI being low on camshaft inventory, Bill Buscher contacted Nissan and requested a partial shipment be expedited for each purchasing lab based on prior sales volume. Nissan notified the three purchasing labs that a partial shipment (~218 each) was going to be shipped directly to OHT for regrinding.

Jason Bowden presented information to the panel including photographs (**Attachment 4**) that showed two shipments of camshafts that were received from Nissan on 10/11/13 & 10/15/13 that have been improperly packaged and the camshafts may be damaged. Jason explained that on

10/11/13 a shipment of 13 camshafts was received in very poor condition with camshafts exposed outside of their individual boxes and loosely packed in a box. All individual camshaft boxes were crushed and appeared to be shifting or bouncing during the shipment. Photos were sent to both Nissan North America and the Surveillance Panel chair requesting this material be returned to Nissan for inspection or replacement. During the 10/15/13 Panel meeting Jason was notified by Matt Bowden from OH Technologies that a second shipment containing 204 camshafts (for a total of 217 each) arrived with significant damage to the shipping boxes and individual camshaft boxes. Camshafts were also loose in the back of the LTL carrier's truck. Jason presented photos of this shipment as well (included in **Attachment 4**). The camshafts were loosely packed with 300 lbs. in boxes rated for 95 lbs with no strapping or shrink wrap to hold them on the pallets or keep them from tipping over. All individual boxes show signs of significant crush. 65 boxes have camshaft nose and/or lobes exposed through the boxes. The shipments were not rejected at receiving and turned away because OHT believed more damage or possible loss of components would occur during the return trip and this material is ultimately purchased by the three labs. Jason asked for input from the Surveillance Panel and the individual labs that purchased this material on the next steps. It is OHT's position that all of the material should be deemed questionable and be inspected or replaced, as all packaging appears to show significant stress or damage. Jason reminded the panel that the original intent with the regrinding of these camshafts was to conduct a pretest measurement of each camshaft to determine a reference point for production surface finish and other parameters. The condition of these camshafts could call these pretest measurements into question. OHT further confirmed that camshaft samples from these shipments in both boxes that were and were not punctured to be damaged. The panel members agreed that this is not acceptable and requested that OHT, Toyota and the Panel Chair contact Nissan and determine whether this material can be inspected or replaced. The panel also discussed what to do in the event that this material cannot be replaced or inspected by Nissan. Labs discussed the possibility of inspecting this material for visuals such as scratches, dings, chips and bends. OHT stated that they do not believe it is appropriate for them to determine whether a camshaft (that has not been purchased by OHT, but individual labs) is suitable for test solely based on visual inspection and would need specific direction from the panel before proceeding. The purchasing labs discussed the possibility of inspecting this material themselves to determine if they will be suitable. The panel agreed that the first step must be to contact Nissan to determine if they will replace or inspect this material and how long this will take. Once this action item has been completed the panel will discuss other possible solutions based on the outcome of the discussions with Nissan.

IVA Test items

Fred Gerhart mentioned that labs will need to tune their individual coolant systems if they install the new oil cooler. There is also a stud that is required along with the adapter to mount this oil cooler. A motion was made by Jason Bowden to include this stud in the test procedure. The part number for the stud is OHTKA24-007-1.

Introduction of New Reference Oil

This item was tabled until all calibrated labs are able to run the test and obtain a supply of the new camshafts.

Review of Scope and Objectives

Bill reviewed and updated the scope and objectives. (**Attachment 5**)

It was noted by Jason Bowden that with regards to the driveline and mounting differences , this topic has been open for a couple of years and the panel should decided if it is going to act or remove it from the objectives. This will be discussed at a further panel meeting, as there is still work being done on this topic.

Old Business

Jason reminded the panel that there are currently no harnesses available for this engine. Fred G. informed the panel that SwRI has had old harnesses refurbished by OHT and they are working fine.

New Business

Al Lopez mentioned that there was some confusion from customers as to how to handle negative SA values for wear. There was a motion made and approved to modify ASTM D6891 to require the report to show a value of zero for any negative ACW final result that has a negative SA.

Next Meeting

November 20th, 2013_ 8:00-10:00 am
Southwest Research Institute
San Antonio, TX

Adjourn

4:05 PM

Motion and Action Items from the October 15, 2013 meeting are included as **Attachment 6**.

Sequence IVA Surveillance Panel

San Antonio, TX

Southwest Research Institute, Building 209

October 15, 2013

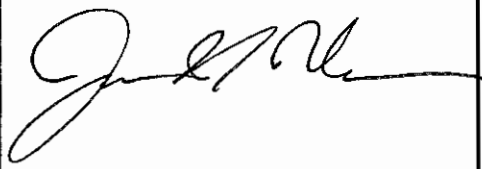


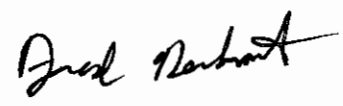

9:00 a.m. - 5:00 p.m.

A G E N D A


1. Chairman comments
2. Attendance sign-in sheet distribution
3. Membership changes
4. Motion and Action recorders
5. Approval of minutes for 2/28/2013 All
6. Action item review Chairman – Buscher
7. Update on Sequence IVB test development Kowalski/
Linden
 - Plan for test roll out to other tests labs
 - Status of IVB test development
8. Update on test hardware status All
 - Current industry hardware status
 - Status report from each lab
 - Nissan hardware order status
9. Introduction of new IVA reference oil All
10. Review Scope & Objectives Chairman – Buscher
11. Old business
12. New business
13. Motion and action item review
14. Next meeting
15. Adjourn

**MEMBERSHIP
ASTM IVA SURVEILLANCE PANEL**

October 15, 2013

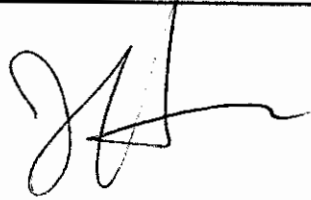

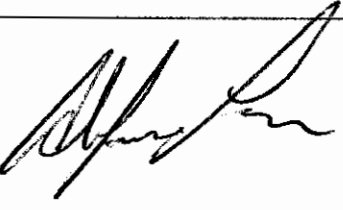

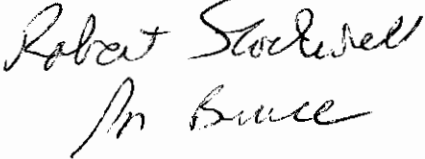
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Conrad, Michael Lubrizol





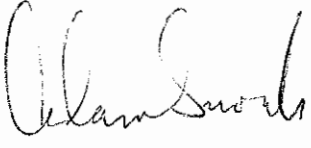
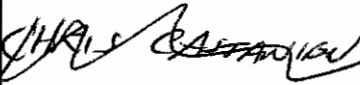
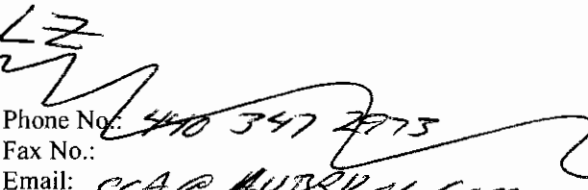

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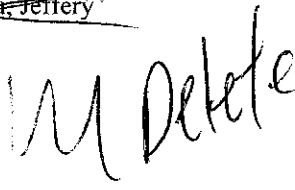
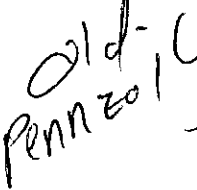
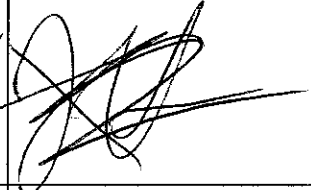
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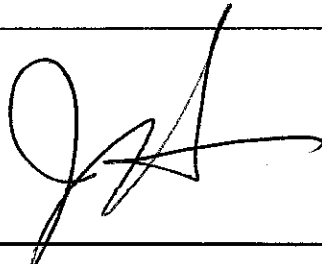
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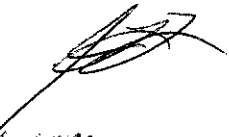

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**NON-MEMBER MAILING LIST
ASTM IVA SURVEILLANCE PANEL**

October 15, 2013

NAME	COMPANY-ADDRESS-PHONE-FAX-EMAIL	SIGNATURE
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Golden Stand Concept for the Sequence IVB Test

Presented to the Sequence IV Surveillance Panel

Teri Kowalski

Toyota – Ann Arbor, MI

October 15, 2013

Outline of Presentation

- Definition of Golden Stand
- Components of Golden Stand
- Suppliers of GS components
- GS Footprint and prototypes
- Benefits of GF
- Summary
- TMC Support

Golden Stand

- Definition - A collection of mechanical and instrumentation modular test systems fabricated to specification with production control
- Interfaces are provided for connection to existing laboratory data acquisition and control systems

Production Control

- A single supplier will oversee the fabrication of the defined systems and be responsible for shipping fabricated units to the laboratories when ordered
- All system components will be defined in prints, have part numbers assigned, and will be available as needed from the stand supplier.

Modular Systems

Bedplate with
Engine and
Dyno Pallets

Fluid
Conditioning
Rack

Speed and
Load Control
System

Driveline

Engine
Mounting

Electronic
Interface

Engine Pallet

- Engine
- Modified Front Cover
- Jacketed Rocker Arm Cover
- Coolant Connectors
- Water Pump Block-off Plate
- Intake Air Box
- Starter Motor
- Engine Wiring Harness
- Flywheel
- Bell housing
- Clutch Disk
- Pressure Plate
- Stub Shaft Assembly

Black = Fabricated and/or Assembled Component or System

Red = Off the Shelf Specified Component

Green = Supplied by Test Lab

Blue = Supplied by OHT

Engine Pallet

- Elephant Feet
- Sidewinders
- Engine Cradle
- Moisture Traps
- Starter Disconnect Switch
- Valves and Plumbing for Oil Sampling
- Air Box Mount
- Plumbing from Air Box to Intake Air Control System
- Exhaust Header Pipe
- Exhaust Turn-Down Pipe
- Exhaust Guard and Insulation
- Exhaust Cooling Fan
- Exhaust Cooling Fan Mount

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Engine Pallet

- Intake Air Control System (Humidity, Temperature and Pressure)
 - NOTE: Includes multiple components.
- Oil Temperature Control System
 - NOTE: Includes multiple components.
- Crankcase Ventilation Measurement and Control System
 - NOTE: Includes multiple components.
- Front Pulley Guard
- Front Engine Mount Assembly
- Rear Engine Mount Assembly
- Modified Oil Sump Drain Plug
- Thermocouples
- Oil Purge Return Device

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Dyno Pallet

- Midwest 1014A Dynamometer
- Load Cell
- Load Cell Linkage
- Load Cell Temperature Control System
 - NOTE: Includes multiple components.
- Dyno Torque Arms
- Dyno Torque Guard
- Dyno Coolant Manifold
- Dyno Coolant Hoses
- Dyno Coolant Flow Switch
- 60 Tooth Gear
- Magnetic Pick-up
- Dyno Tailshaft Guard
- Thermocouples

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Fluid Conditioning Rack

- 0820 Frame
- Engine Coolant Control and Delivery System
 - NOTE: Includes multiple components.
- RAC Coolant Control and Delivery System
 - NOTE: Includes multiple components.
- Fuel Conditioning and Delivery System
 - NOTE: Includes multiple components.
- Plumbing to and from Engine (Engine Coolant, RAC Coolant, Fuel)
- Power Distribution Cabinet
 - NOTE: Includes multiple components.
- Wiring from Power Distribution Cabinet to Data Acquisition and Control System
- Battery Box and Cables

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Speed and Load Control System

- DyneSystems Dyn-Loc V Digital Eddy Current Dynamometer Controller (Non Inter-Loc)
- DyneSystems Throttle Actuator
- Transformers for Dyn-Loc V
- Throttle Linkage

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Driveline

- Driveshaft
- Guard with Inner Loops
- Dynamometer Hub

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Electronic Interface

- **Data Acquisition and Control Computer System**
- Instrumentation Cabinet Fully Assembled and Wired With All Transducers, Thermocouple Jack Panel, Etc.
 - NOTE: Includes multiple components.
- Instrumentation Cabinet Pedestal
- Wiring from Instrumentation Cabinet to Data Acquisition and Control System
- Pressure Lines and Thermocouple Leads
 - Engine ECU
- Engine ECU Mount
 - Toyota Relays
 - Accelerator Sensor (Dummy Throttle Pedal)
- Throttle Actuator and Accelerator Sensor Mount

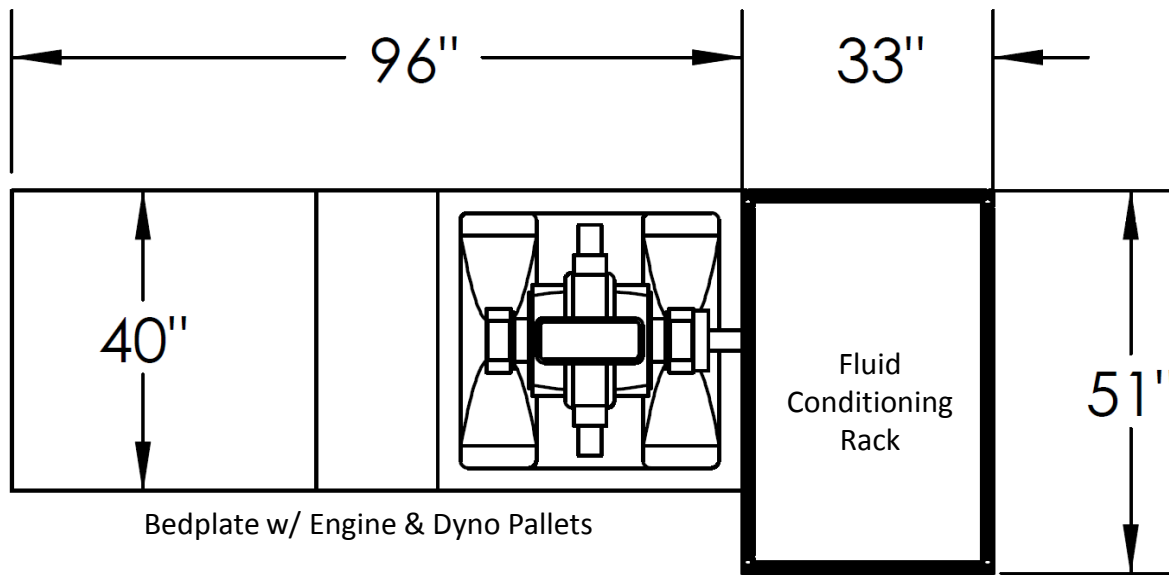
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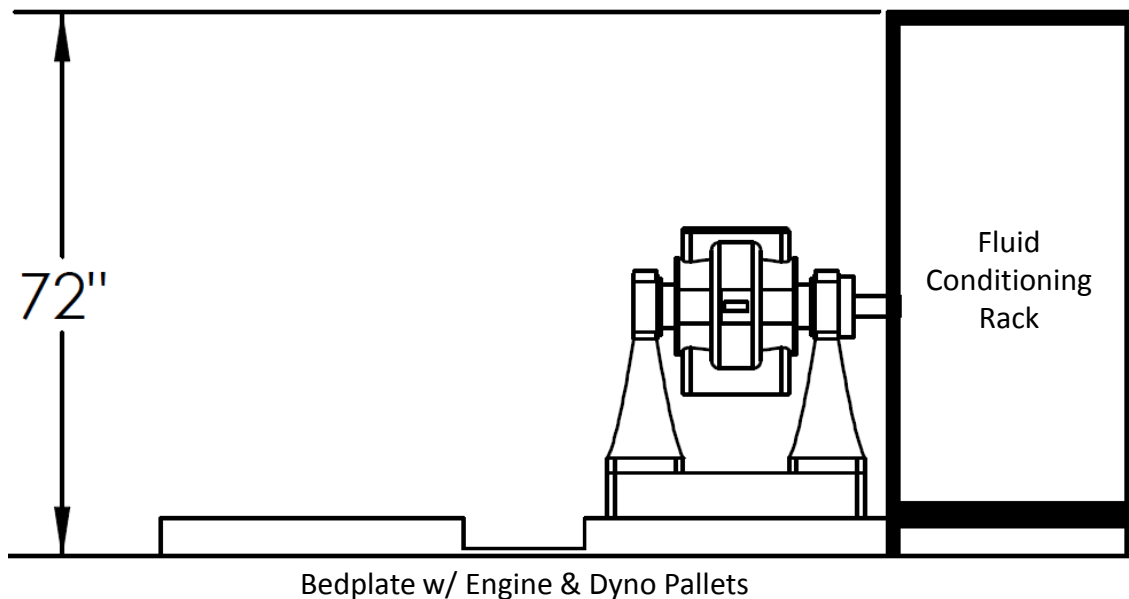
Green = Supplied by Test Lab

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Golden Stand Footprint



- Bedplate Dimensions:
L = 96", W = 40"
- Fluid Conditioning Rack Dimensions:
L = 33", W = 51", H = 72"
- NOTE: Location of the fluid conditioning rack will be flexible due to flexible coolant and fuel plumbing to the engine, but line lengths will be standardized.

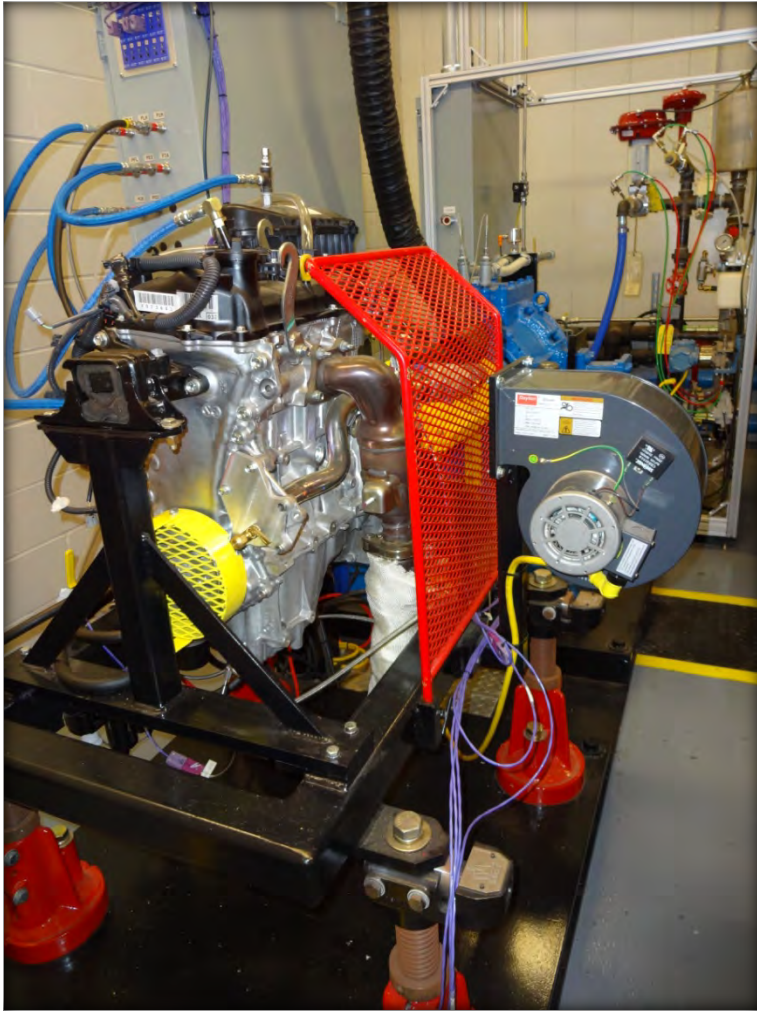


Golden Stand

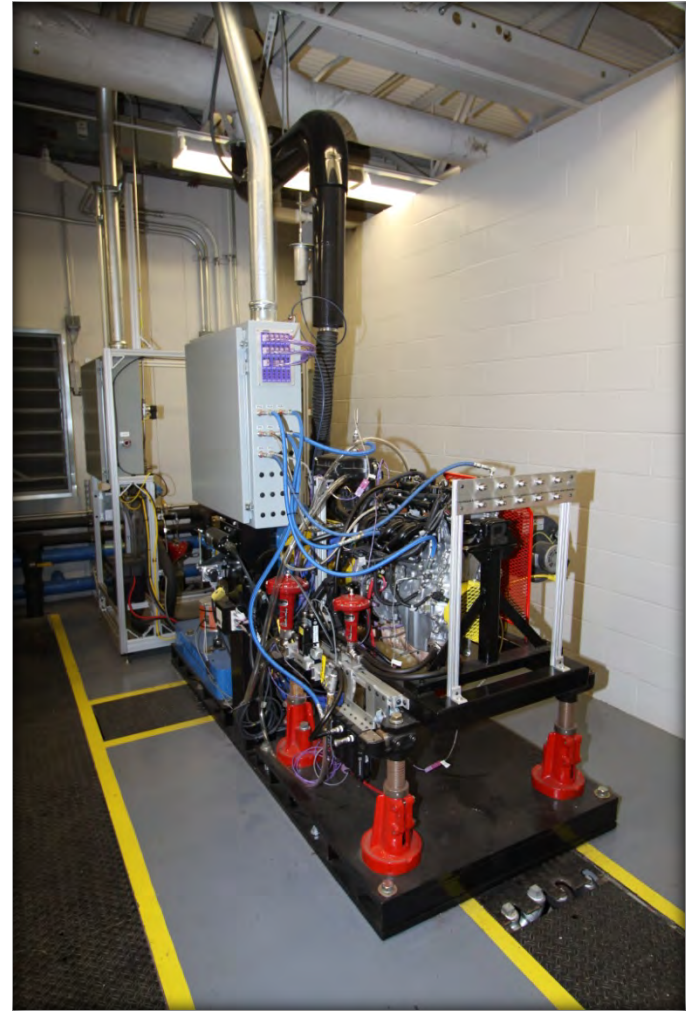


NOTE: Configuration and components subject to change as test development is finalized.

Golden Stand



Right Side



Left Side

NOTE: Configuration and components subject to change as test development is finalized.

Golden Stand



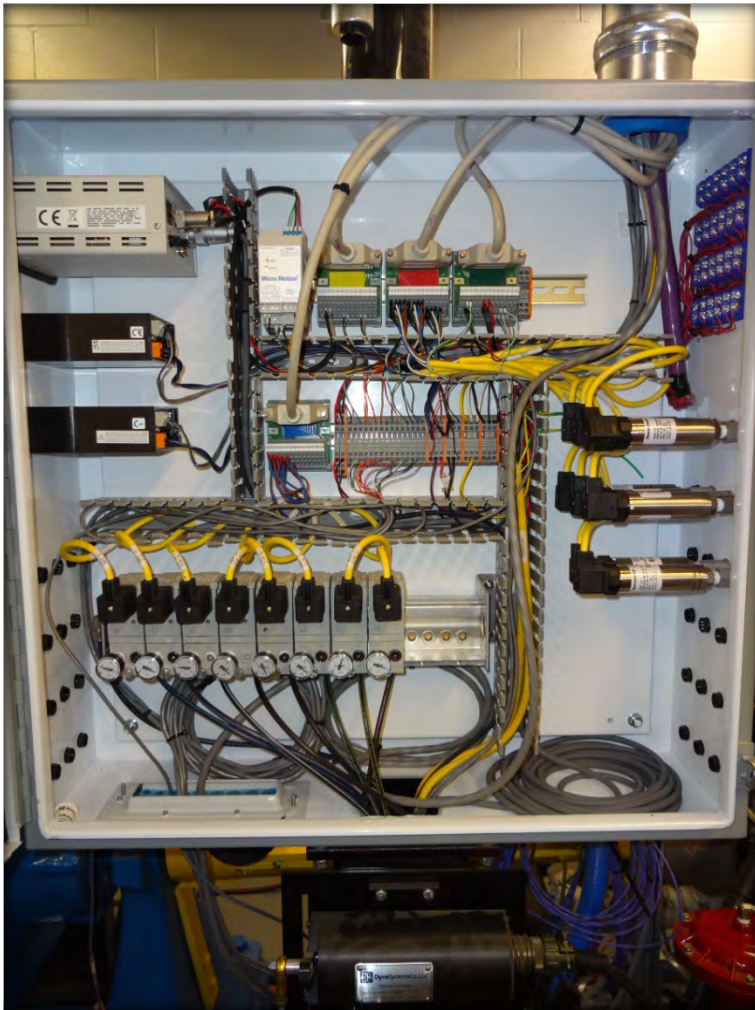
Fluid Conditioning Rack



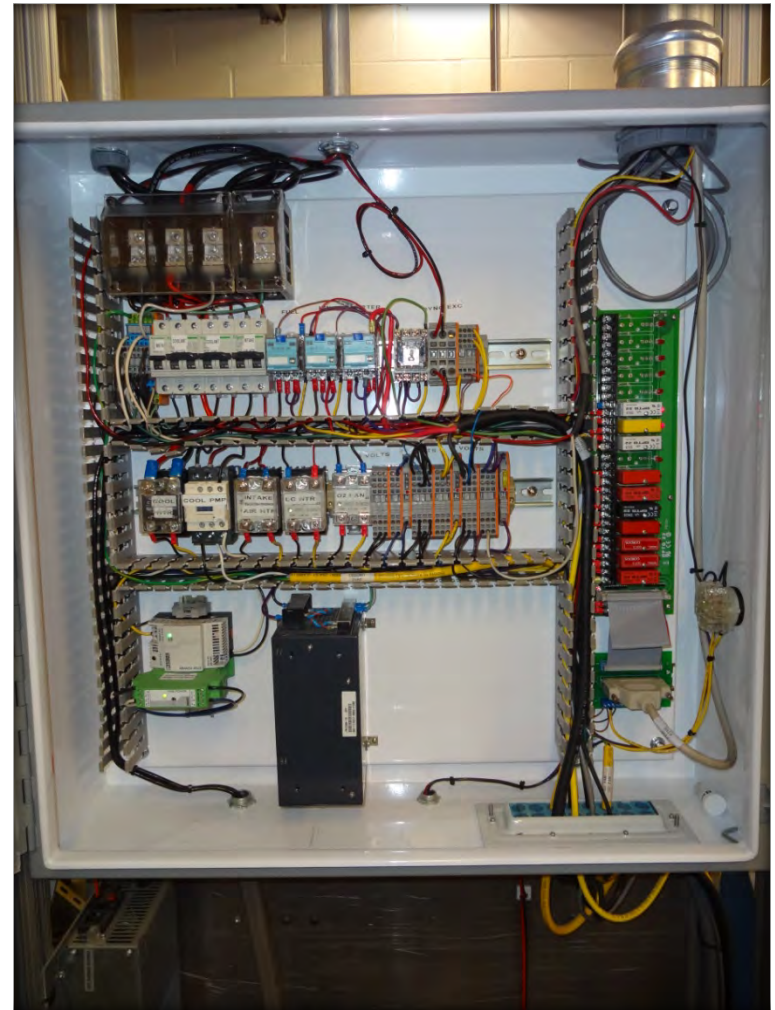
Driveline

NOTE: Configuration and components subject to change as test development is finalized.

Golden Stand



Instrumentation Cabinet



Power Distribution Cabinet

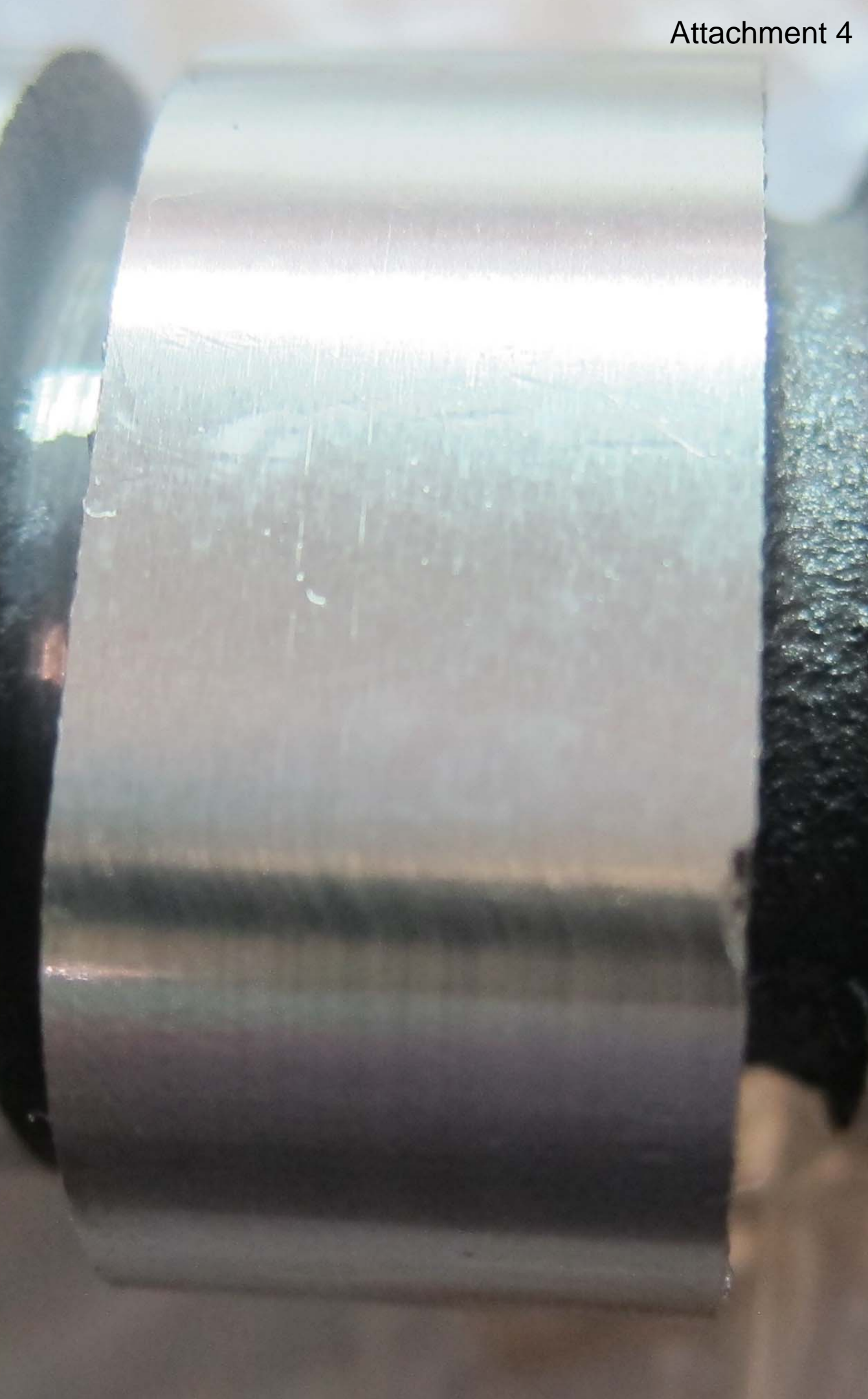
NOTE: Configuration and components subject to change as test development is finalized.

Benefits

- ✓ Reduce variation by standardization of test stand configuration across all laboratories
- ✓ Maintain industry test severity and test precision over time by keeping differences caused by individual lab bias to a minimum
- ✓ Reduce time for test stand installation
- ✓ Use of standardized components will allow replacements for components to be readily available from the supplier

Summary

- Previous experience with Sequence test stands has shown that “identical” stands are not identical
- Significant resources have been spent trying to reduce test variability by eliminating differences among industry test stands
- Toyota believes the use of the Golden Stand concept will eliminate the test variability caused by stand differences and result in a much better Sequence IV test
- **Next Step:** Review Golden Stand Concept with Sequence IV Surveillance Panel (October 15) and AOAP (~~November 14~~ December 12)





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ASTM Sequence IVA Surveillance Panel

Scope and Objectives

Scope

The Sequence IVA Surveillance Panel is responsible for the surveillance and continued improvement of the Sequence IVA test documented in Test Method D 6891 as updated by the Information Letter system. Data on test precision and laboratory versus field correlation will be solicited and evaluated at least every six months. Improvements in wear measurement technique, test operation, test monitoring and test validation will be accomplished through continual communication with the Test Sponsor and Parts Distributor, ASTM Test Monitoring Center, ASTM Committee D02.B0.01 and the ASTM Passenger Car Engine Oil Classification Panel. Actions to improve the process will be recommended when deemed appropriate based on input from the proceeding. The Panel will review development and correlation of updated test procedures with previous test procedures. This process will provide a suitable test procedure for evaluating an automotive lubricant's effect on controlling cam lobe wear for overhead valvetrain equipped engines with sliding cam followers.

Objectives

Target Date

- | | |
|--|------------------|
| 1. Secure hardware to sustain test through 2016. | <i>Dec 2013</i> |
| 2. Pursue engine mounting and driveline identification, optimization and maintenance procedure and interval. | <i>Nov 2013</i> |
| 3. Introduce GF-5 technology reference oil 300. | <i>June 2014</i> |

William A. Buscher III, Chairman
Sequence IVA Surveillance Panel

Updated: Oct. 2013

Sequence IVA Surveillance Panel
October 15, 2013
9:00AM – 5:00PM
Southwest Research Institute
San Antonio, TX

Motions and Action Items

As Recorded at the Meeting by Bill Buscher

1. Action Item – Labs to bring back Toyota’s Sequence IVB Golden Stand concept to their respective companies to digest the information and generate questions and concerns. A follow up discussion will occur at the next surveillance panel meeting.
2. Action Item – The TMC to conduct a lab survey of all potential Sequence IVB test labs to audit them for any restrictions to stand installation within their respective labs.
3. Action Item – Toyota to supply a list of connections and locations of connections for the data acquisition systems and power supplies (type, signal and range) and a list of support system minimum requirements (i.e. process water, chilled water, etc.).
4. Action Item – The Sequence IVB Golden Stand supplier to issue “ballpark” pricing to the potential Sequence IVB test labs as soon as possible.
5. Action Item – Potential Sequence IVB test labs to check their PDI software version to see if they have the Windows 98 software that is capable of pre-test/post-test trace overlays.
6. Action Item – SwRI to contact PDI to request a future software upgrade that will reintroduce trace overlay capabilities.
7. Action Item – Surveillance panel chair and JAMA members to contact Nissan Japan (NML) to discuss the condition of the 217 camshafts, from the Nissan partial shipment, that were just received at OHT and a plan to resolve the situation.

8. Motion – Modify ASTM D6891 to add OHT p/n OHTKA24-007-1 (oil cooler stud) to be used along with OHT p/n OHTKA24-005-1 (oil cooler adapter) and OHTKA24-006-1 (unplated oil cooler).

Jason Bowden / Bill Buscher / Passed unanimously

9. Action Item – Table introduction of new IVA reference oil (RO 300) until new Nissan hardware has been introduced at all participating laboratories, or when the surveillance panel deems the IVA hardware situation is acceptable to do so.

10. Motion – Modify ASTM D6891 to require labs to report any negative final ACW result as zero. Effective for tests completing on or after 10/15/13.

Jason Bowden / Robert Stockwell / Passed 10-0-5