

# DAIMLER

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## **ASTM DD13 Scuffing Taskforce (Meeting #1)**

- Friday November 13<sup>th</sup>, 2015
- Phone Conference

## Presentation Overview

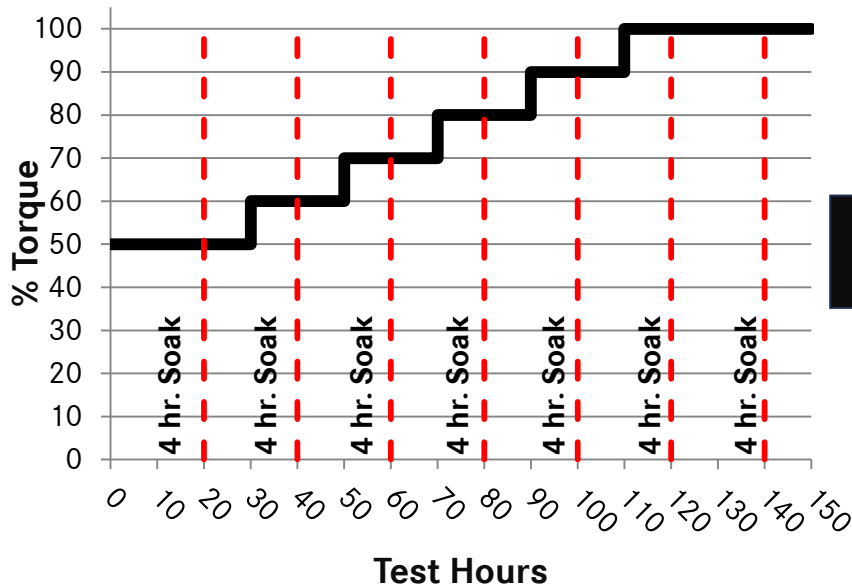
1. Daimler Participant Introductions
2. Test Cycle Description
3. DD13 Development 2015 Timeline
4. Oil Descriptions / Part Availability
5. Testing Overview
6. Parameters to Determine Scuffing
7. Liner Rating Scale
8. Future Plans
9. Next Meetings

## Participating Daimler Development Members

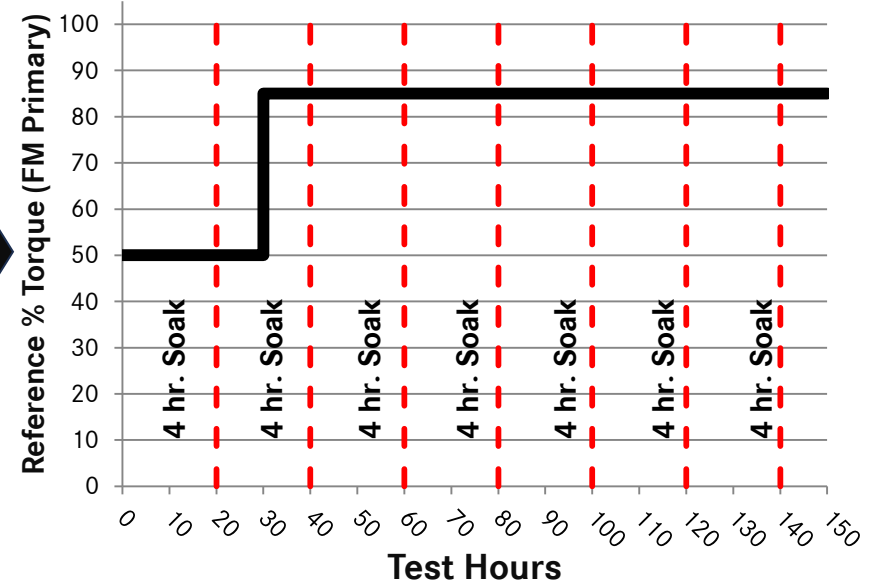
2014 Representative	2015 Representative	Title
<del>John Cruz</del>	Suzanne Neal	Powertrain Fluids Engineer
Gregory Braziunas	Gregory Braziunas	Manager, Oil and Coolant Systems, Mechatronics and Durability Interface

## Old vs. New Test Procedure

### Old Test Procedure



### New Test Procedure



### New Testing Procedure:

Testing Parameters:

- ~~Open loop control~~ → Boost pressure control
- ~~Torque control~~ → Fuel mass control

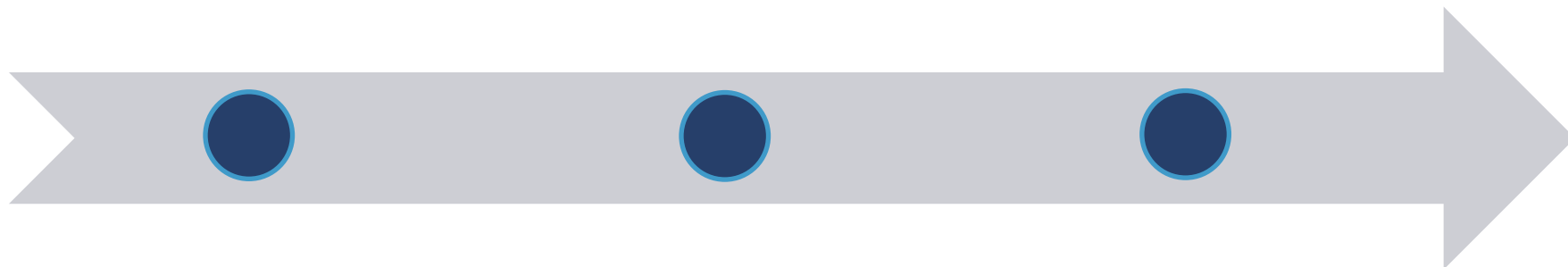
Test Cycle:

- ~~Alternating Load~~ → Steady State

Tightened Control Parameters

- Coolant flow, coolant pressure, intake manifold temperature, CAC delta pressure

- In addition to our weekly/bi-weekly development meetings there were 3 additional in person development workshops in 2015

**January 2015**

Build Workshop  
between 3 Labs

**August 2015**

Parts, Data, and  
Procedure/  
Parameter Review  
Workshop

**October 2015**

ASTM Preparation,  
Precision Data and  
Procedure Review  
Workshop

## Oil Descriptions

### **Oil C:**

- Original Oil C from previous taskforce that showed field scuffing

### **Oil D:**

- Original Oil D from previous taskforce that did not show field scuffing.

### **Oil X:**

- New oil with performance intent to be similar to Oil C and will be used for a reference oil moving forward as it can be a controlled formulation.

## Part Availability

All parts are available through TEI.

## Testing Overview

Details	Oil C	Oil D	Total Tests
Number of Tests	14	6	20
Tests used for Precision Matrix	8	2	10

## Planned Testing

Details	Oil X (Future Reference Oil)
Number of Tests (Currently Running)	3 +

## Testing Overview – Tests Included vs. Not Included

Oil C Testing		
LZ	IAR	SWRI
LZ1 - C	IAR1 - C	SWRI1 - C
LZ2 - C	IAR2 - C	SWRI2 - C
LZ3 - C	IAR3 - C	SWRI3 - C
LZ4 - C	IAR4 - C	SWRI4 - C
LZ4a - C		
LZ5 - C		

Oil D Testing		
LZ	IAR	SWRI
LZ1 - D	IAR1 - D	SWRI1 - D
LZ2 - D	IAR2 - D	SWRI2 - D

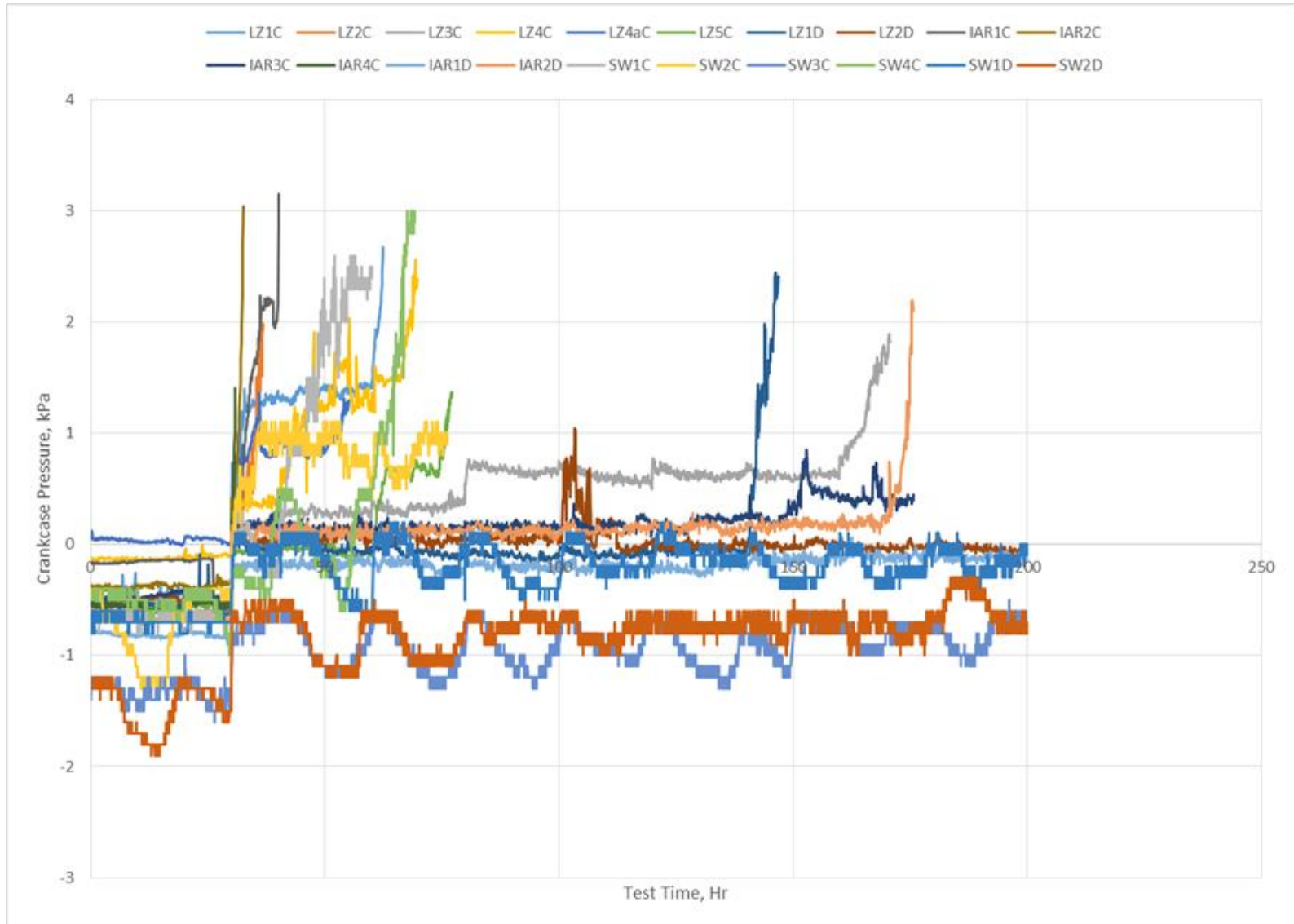
	Test will be used in precision matrix
	Test will not be used in precision matrix



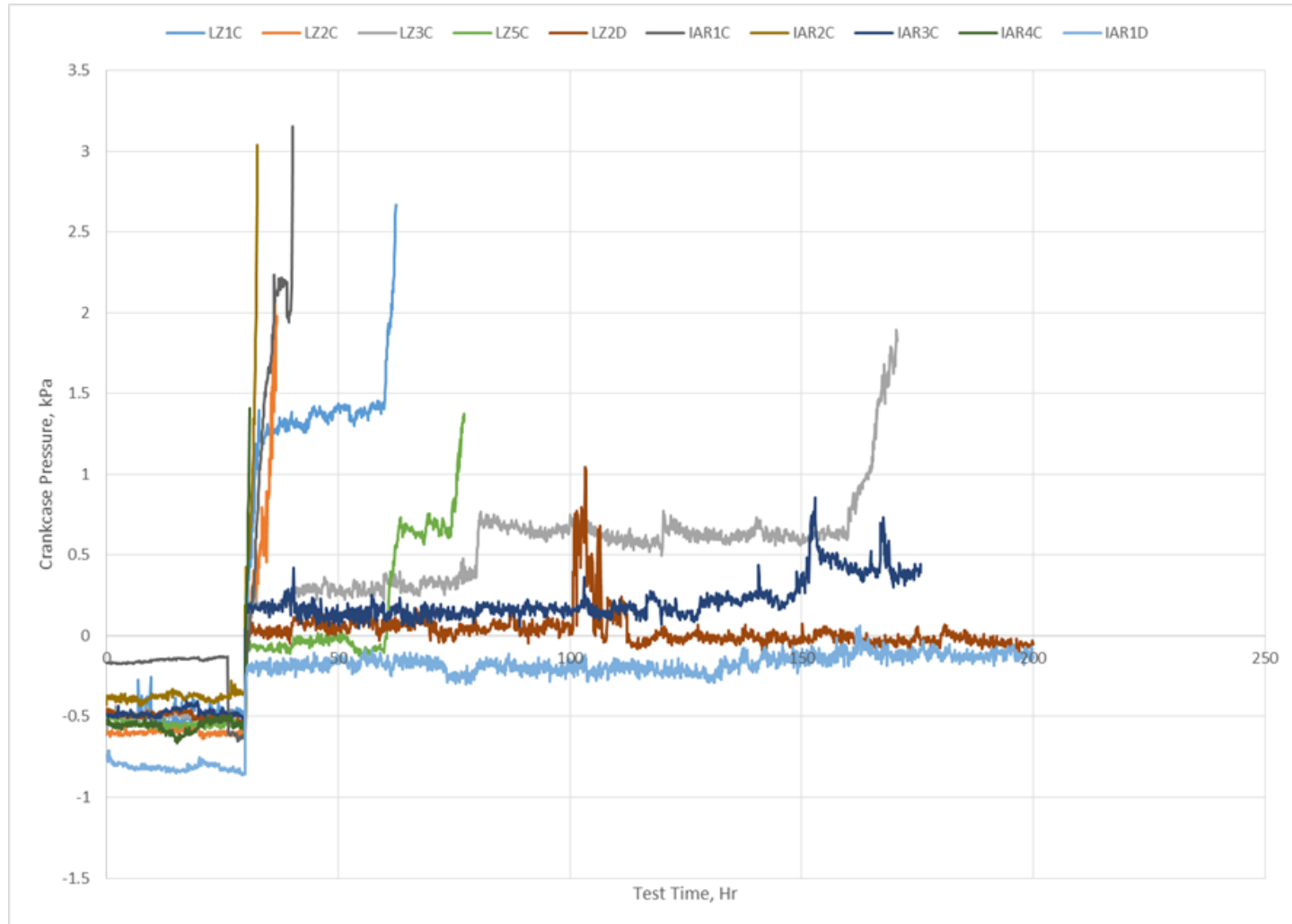
## Testing Overview – Reasons for Eliminated Tests

Tests Eliminated from Precision Matrix	Reason for Elimination
LZ4 - C	(EGR valve closed from 20-40hrs)
LZ4A - C	(run on non-industry stand, not helpful to precision, several operational issues)
LZ1 - D	(mechanical failure)
IAR2 - D	(mechanical failure)
All SWRI Data (6 Tests)	<ul style="list-style-type: none"><li>- Tests did not run for appropriate test length due to programming issue with test time</li><li>- S1D, S3C had intake manifold control issues</li><li>- Ramp between stage 1 and stage 2 not representative of current procedure.</li></ul>

## Testing Overview - Overall Completed Tests [12 Oil C / 8 Oil D]



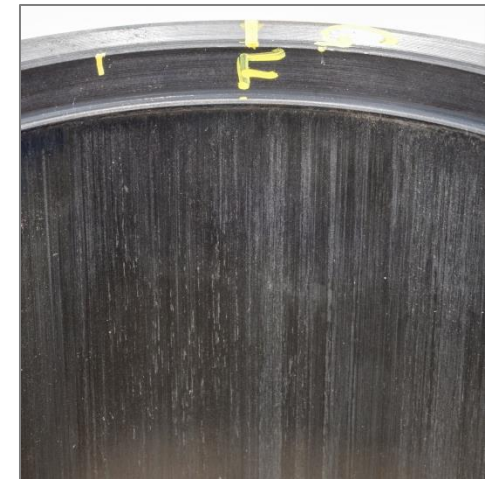
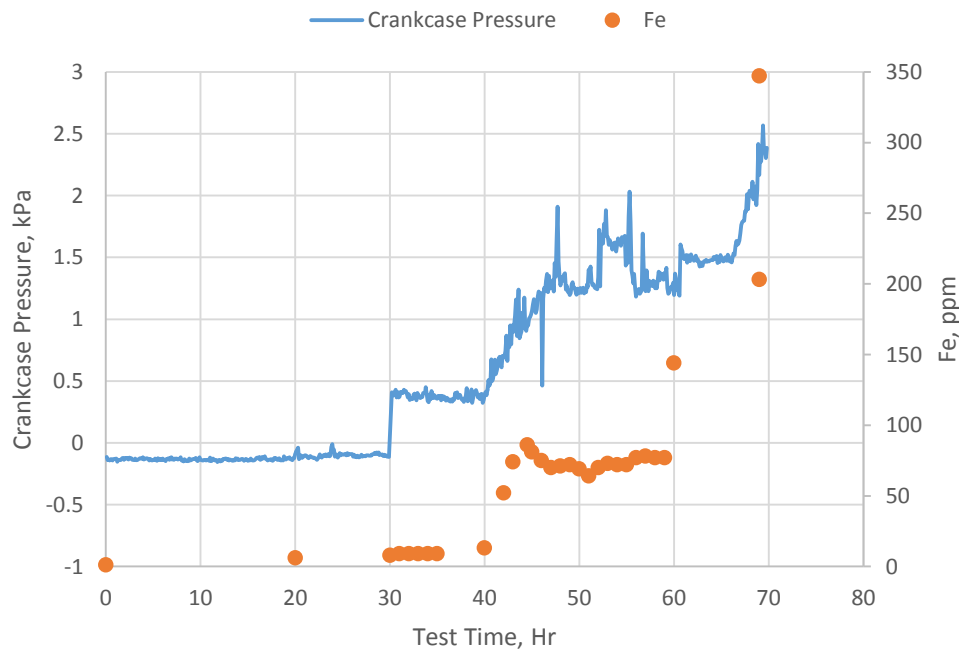
## Testing Overview - Precision Matrix Tests [ 8 Oil C / 2 Oil D ]



## Parameters Being Reviewed to Determine a Scuffing Event

Parameters (During Test)	Parameters (After Test)
ICP (Iron, ppm)	Visual Inspection of the Liner and Rings
Crankcase Pressure	Ring weight loss

Scuffing Event Example

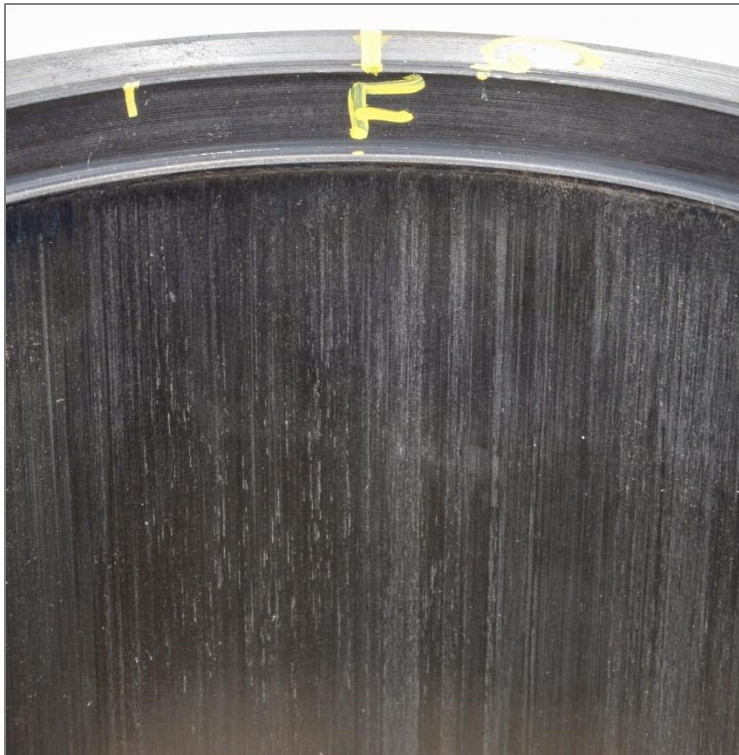


## Rating Liner Scuffing

- CAT Single Cylinder Liner Evaluation Method will be used, cross hatches must be removed to be considered scuffing. Rating workshop to be scheduled.

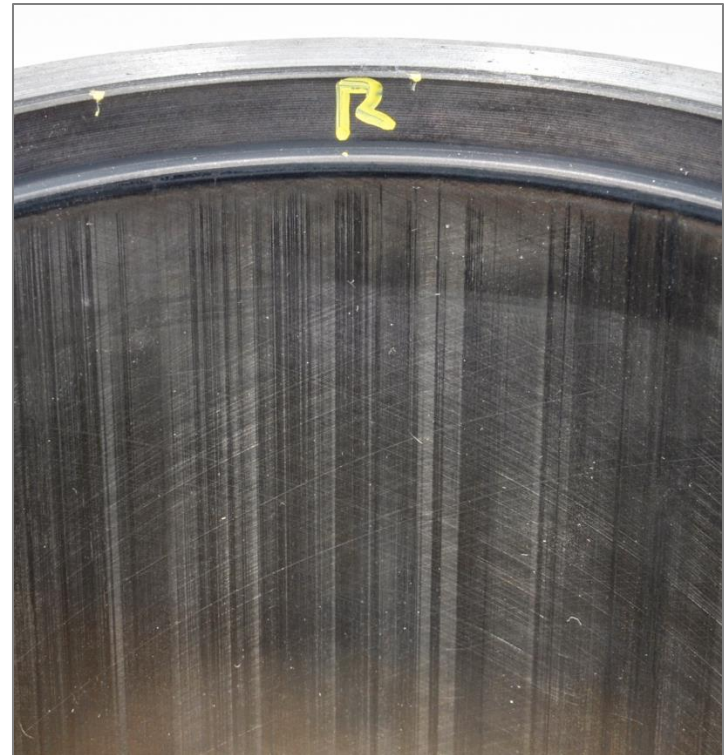
### Scuffing

- Honing lines removed



### Vertical Scratching

- Honing lines still intact



## Future Plans

- |  |
|--|
| 1. Review precision matrix.                          |
| 2. Determine if additional tests are needed.         |
| 3. Review operational data from oil X runs.          |
| 4. Complete procedure review by the end of the year. |
| 5. Schedule a date for a rating workshop.            |

## Next Meeting

Meeting	Type	Date	Time
Meeting # 1	Phone	11/13/2015	1:00 PM - 2:00 PM
Meeting # 2	Phone	Taskforce decided to meet 11/30/2015	2:00 PM - 3:30 PM
Meeting # 3	In-Person @ ASTM D02	<del>*12/8/2015</del>	<del>*9:00AM - 11:30AM</del>
Meeting # 4	-	-	-

\*Proposed meeting times, subject to change.

\*\*\*[This slide was updated after the taskforce meeting (1:50 PM EST 11/13/2015)]