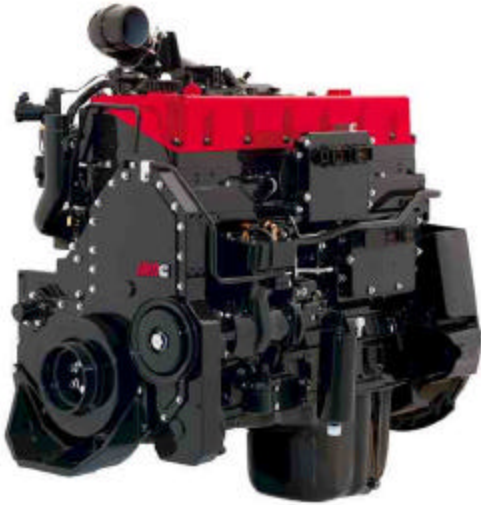


# ISM Task Force Report HDEOCP

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Phoenix, AZ



# Scope

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- Scope – To develop a lubricant performance test on a Cummins ISM test platform that can discriminate and provide a quality assessment of motor oils in a similar manner as the current M11 test (that includes both the M11 EGR and M11 HST). The ISM test development will consider the following parameters for lubricant quality evaluation:

## Primary Parameters

Crosshead weight loss

Top Ring weight loss

Sludge

Oil filter delta P

## Secondary Parameters

Liner wear

Rocker hat weight loss

Push tube scuffing

Bearing wear

Intake and Exhaust screws

# Scope

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- In addition to insuring the continuation of API categories CH-4 and CI-4 the following parameters, in addition to those incorporated from ASTM D6975 and D4485, will be added for PC-10.

## Primary Parameters

Injector adjusting screw wt. loss  
Push tube scuffing

## Secondary Parameters

Liner wear  
Rocker hat weight loss  
Bearing wear  
Intake and Exhaust screws

# Objectives

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## Objectives:

1. Draft of test procedure 10/03 (similar to ASTM D 6975)
2. Finalize matrix plan 10/03 (complete)
  - 4 initial tests planned for discrimination
    - Two tests on TMC 1004
    - Two tests on an “excellent” reference (commercial oil)
3. Begin matrix testing 11/03 (delayed)
  - Matrix testing has been delayed and the ISM O&H Panel has been meeting via teleconference on a weekly basis to resolve pending issues.
4. Review first 4 tests and make decision to continue 1Q 2004

# ISM O&H Activity Summary

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- Familiarize test engineers with new engine management software
- Review and insure operating conditions
  - Labs to run power sweep and test conditions to verify
- OEM availability for one on one troubleshooting increased
- Verify sensor locations as per ASTM D6975 where applicable
- Labs to prepare and pre-measure test kits to reduce timing
- TMC to ship TMC 1004 and “Excellent” oil to labs
- Target matrix start for beginning of January 2004

# ISM Test Conditions:

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Parameter	Unit	A (Soot)	B (Rated)
Stage Length	H	50	50
Engine Speed	r/min	1800	1600
Torque	N·m (lb·ft)	1300 (960)	1930 (1424)
Fuel Rate	Kg/hr (lb/hr)	58 (128)	64.4 (142)
Intake Manifold Air Temperature	°C (°F)	<b>80 (176)</b>	65.5 (150)
Coolant Out Temperature	°C (°F)	65.5 (150)	65.5 (150)
Oil Gallery Temperature	°C (°F)	115.5 (240)	115.5 (240)

**150 hr soot: 5.5% - 6.0%**

# 9/5/03 Task Force Mtg. Summary

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- ISM test is planned to replace the M11 EGR and M11 HST.
  - The ISM test will have two sets of limits
    - 1 set for alternate pass/fail in the M11 HST
    - 1 set for alternate pass/fail in the M11 EGR
- The ISM test is proposed to be 200 hours in length and run on a similar cycle to the M11 EGR test
- Target level soot is 5.5% at 150 hours
- The ISM test will run on 500 ppm S fuel and use double wire screen filters

# Comments and Questions

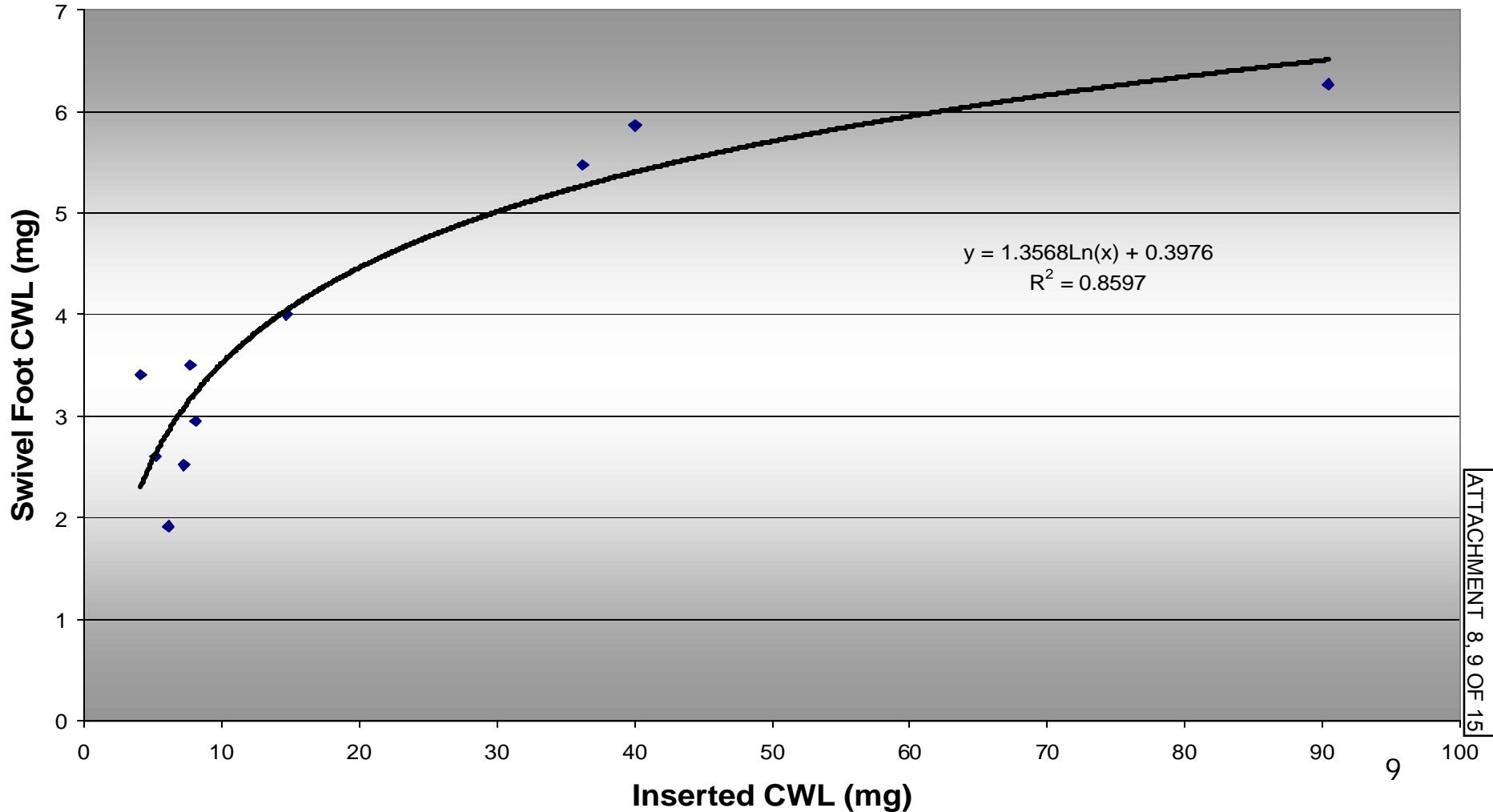
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- The ISM test will be carried forward into PC 10
  - Cummins will request oil data in the ISM test
- Can the labs get additional rebuild parts for the M11 HST/EGR?
  - Current parts availability will not carry through the hardware matrix and PC 10.



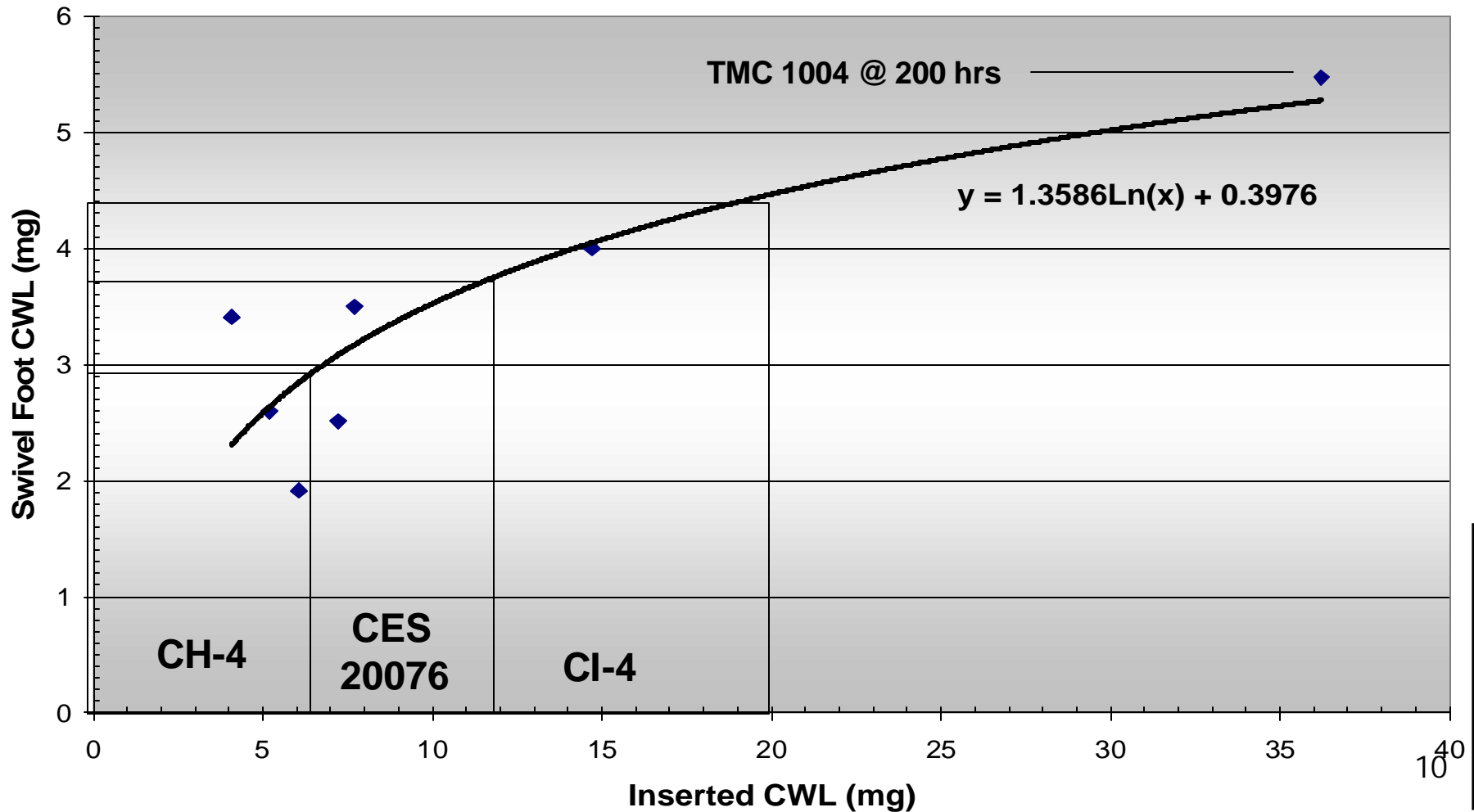
# Swivel Foot Rockers vs Inserted Rockers

## CWL Correlation



# Swivel Foot Rockers vs Inserted Rockers

## CWL Correlation



# Proposed Matrix

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- Test in Stages
- Use Decision Points
- Use a range of oils
  - TMC 1004, TMC 1005, TMC 830-2, and “Excellent” oil to be based upon commercial technology (CI-4)
  - Covers M11 HST and M11 EGR range
- Stage 1
  - First four tests will test two poor oils and two excellent oils in four labs. Cummins will provide funding for parts and fuel for these tests.

# Proposed Matrix

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- Is there discrimination?
  - No? Stop the matrix
- Is the discrimination similar to the M11 EGR?
  - No? Stop the matrix
- Stage 2
  - 2 borderline oils and 2 good oils in four labs. Cummins will provide parts for these tests.
- Is the correlation similar to the M11 EGR?
  - No? Stop the matrix
  - Somewhat? Run the reference oil twice in each lab
  - Yes? Run the reference oil once in each lab

# Matrix Summary

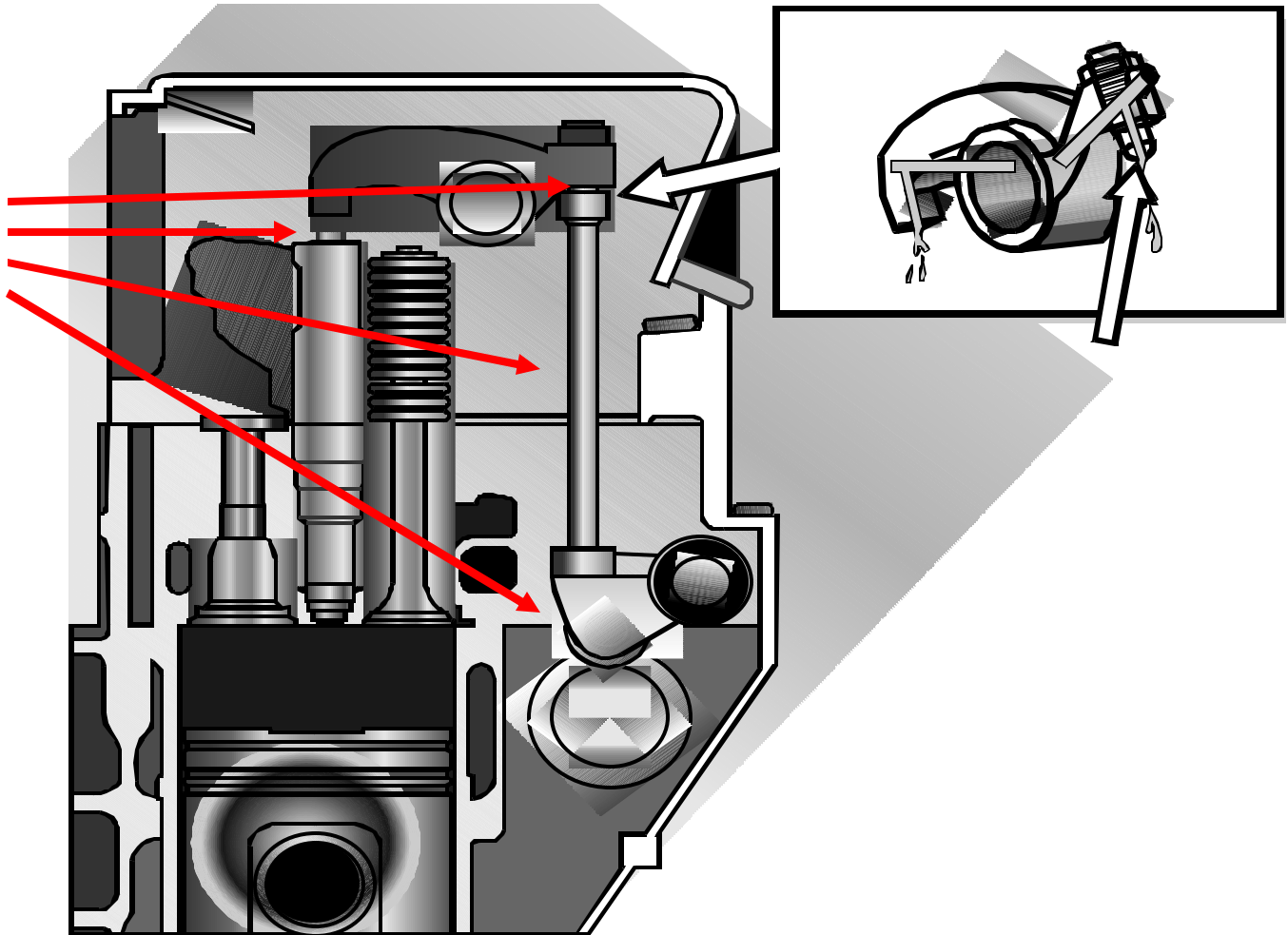
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- Minimum number of tests for a successful matrix: 12 tests
- Maximum number of tests for a successful matrix: 16 tests
- Minimum number of tests for comfort: 4

# Injector Adjusting Screw Wear (PC 10)

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ISM engine test will also insure good oil performance for other valve train components. This parameter will only be added for PC10 requirements.



\*Drawing courtesy of Jim McGeehan, ChevronTexaco (SAE 1999-01-1525)

# Injector adjusting screw weight loss

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**CH4/SJ Oil**

**21 mg wear**

**CG-4/SJ Oil**

**64 mg wear**

**CG-4/SJ Oil**

**145 mg wear**

\*Photo and data courtesy of Jim McGeehan, ChevronTexaco (SAE 1999-01-1525)