



## Committee D-2 ON PETROLEUM PRODUCTS AND LUBRICANTS

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February 8, 2000

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### **Unconfirmed Minutes of the ASTM Mack T10 Task Force**

**Held in San Antonio, Texas  
on November 16, 1999**

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#### **1. Call to Order**

- 1.1 An agenda is shown as Attachment 1.
- 1.2 The attendance list is shown as Attachment 2.
- 1.3 The task force would like to thank SwRI for hosting the meeting.

#### **2. Minutes from the September 9, 1999 Meeting**

- 2.1 The minutes from the September 9, 1999 meeting were approved with no corrections.

### 3. Test Sponsor Update

3.1 Greg Shank presented iron and soot plots from four different tests using EGR. The plots are shown as Attachment 3.

3.2 Greg Shank presented the operating conditions shown in Attachment 4.

3.3 Greg Shank indicated the TMC has agreed to provide Oil 1005-1 for T10 test development.

3.4 Greg Shank indicated that he would like to see some discrimination data by early January 2000 if possible.

3.5 Greg Shank noted that the specification for oil temperature in Stage 2 may change. Mack is concerned about oxidation protection and wants better oxidation protection in PC9

3.6 Scott Richards asked whether we want to measure oil sump temperature. Greg Shank indicated oil sump temperature should also be measured.

3.7 Scott Richards noted that labs need to make sure that they change injection timing to 18° BTDC in Stage 2. Note timing is variable in Stage 1 and fixed in Stage 2.

### 4. Discrimination Matrix Planning

4.1 Greg Shank reiterated he was requesting each lab which has received an engine to run Oil 1005-1 and other oils to verify the test can provide discrimination.

4.2 Mark Cooper asked how comfortable is the group about running Initial discrimination testing with conditions that may not be final.

4.3 Brian Lawrence asked to the group to list parameters which could still change.

- Oil gallery temperature
- Injection timing in Stage 2
- Power in Stage 2
- Soot levels

4.4 Greg Shank noted that he was releasing the conditions knowing that some parameters were not final. However Greg noted that he was comfortable with this during the initial discrimination testing as long as the oil pairs within a lab are run using the same operating conditions.

### 5. Operations and Hardware Issues

5.1 Brian Lawrence turned the meeting over to Jim Collum to discuss the Operations and Hardware issues. The following decisions were made:

- a) Set EGR bypass throttles to "full" bypass during engine start-up and cool down
- b) Run the break-in with EGR to make sure the EGR system is working properly
- c) Run fuel rate control during Stage 1 and Stage 2
- d) Measure specific humidity level and dewpoint temperature

- e) Measure EGR temperature at the front, rear coolers and just upstream of the venturi
- f) Changing the oil filter because of high filter delta P is acceptable; however oil cannot be added to replenish the oil lost during the filter change
- g) Measure oil filter delta P across the oil cooler separately
- h) Measure piston deposits using 1P deposit rating system without weighting factors

## 5.2 Piston Deposit Measurements

5.2.1 Jim Collum noted that Greg Shank had indicated a concern about a higher level of piston undercrown deposits. Labs will measure piston deposits using the 1P piston deposit rating system without weighting factors. Piston deposit measurement will be added to the T10 Scope and Objectives.

## 5.3 Liner Wear Measurement

5.3.1 Discussion ensued concerning the liner wear profile measurement. Jim Collum noted that the Talysurf software only allows removal of 1 scratch while the PDI can remove multiple scratches. Brian Lawrence asked whether the procedure can be written to stay "must use a device that can remove multiple scratches?" Jeff Clark said, "Onay." Jeff Clark and Scott Richards noted that scratches may not be an issue at T10 wear levels.

## 5.4 Spare Parts Supply

5.4.1 The next discussion topic was the need for some amount of spare parts that are not available through the dealers. Ken Goshorn suggested having the labs discuss with TEI the number of spare parts required. Scott Richards noted that the inventory quantity needs to be based on the lead time required for each part. Brian Lawrence suggested that Jim Collum and Scott Richards should work with Gary Tietze to establish inventory levels.

## 6. Lab Visitation

6.1 Jeff Clark noted that because of the upcoming holiday season the lab visitation probably cannot take place until mid January. The lab visitation group had originally wanted to watch a stage transition at each lab. However Mark Cooper commented that staged transitions are really not an issue in this test because there is only one stage transition. The lab visitation group should look through the proposed checklist and plan to finalize the checklist at the December 6 meeting. The first lab visitation will probably occur at a dependent lab.

## 7. Oil Samples for Analysis by the T10 Chemical Analysis Sub Panel

7.1 Greg Shank indicated that Mack would like to have test sponsors provide oil samples to the T10 Chemical Analysis Sub Panel to help develop new chem lab techniques. Samples should be sent to Joe Franklin who will distribute the samples to members of the sub panel. Oils can be coded by the TMC if required by the sponsor. One gallon of new oil and one gallon of the EOT sample should be sent to Joe Franklin. Jeff Clark indicated that the TMC would be willing to distribute blind samples if necessary.

7.2 Brian Lawrence noted that the current intermediate sample size will not be large enough for distribution and suggested that Mack work with Joe Franklin and the labs to define the

priority of parameters need techniques developed. Greg Shank indicated that Mack is most interested TAN, TBN and oxidation techniques.

## **8. Timeline**

8.1 Jim Collum presented a timeline as shown in Attachment 5. As usual there was considerable discussion concerning the timeline. Issues included installation of test stands and supply of EGR Hardware.

## **9. Next Meeting**

9.1 The next meeting was scheduled for December 6 in Reno, Nevada.

## **10. Adjournment**

Attachment 1

# Mack T-10 Task Force Meeting

Date: Tuesday, November 16, 1999  
Time: 9:00AM - 1:00PM  
(Lunch provided courtesy of SwRI)  
Location: Building 138, Southwest Research Institute,  
San Antonio, Tx

## Agenda

- |  |                                   |
|--|-----------------------------------|
| 1. Membership  | Mark Cooper                       |
| 2. Minutes - September 9 meeting   | Mark Cooper                       |
| 3. TF Scope & Objectives - Review  | Brian Lawrence                    |
| 4. Timeline Update   | Jim Collum (for Brent Shoffner)   |
| 5. Draft Test Procedure  | Greg Shank/Ken Goshorn/Jeff Clark |
| 6. Discrimination Matrix Planning  | Greg Shank/Jeff Clark             |
| 7. O&H Sub-Group Report/issues<br>- Elimination of EGR valve<br>- Humidity control | Jim Collum                        |
| 8. Chemical Analysis Sub-Group Report  | Joe Franklin                      |
| 9. Lab Visitation Team   | Jeff Clark                        |
| 10. CPD issues (if any)  | Gary Tietze                       |
| 11. Next Meeting/Adjournment   |                                   |

**NB:** Will presenters kindly remember to bring a copy of their material on a 3.5" floppy disk, for inclusion in the minutes (MS Word preferred, Powerpoint or Excel acceptable). Thank you.

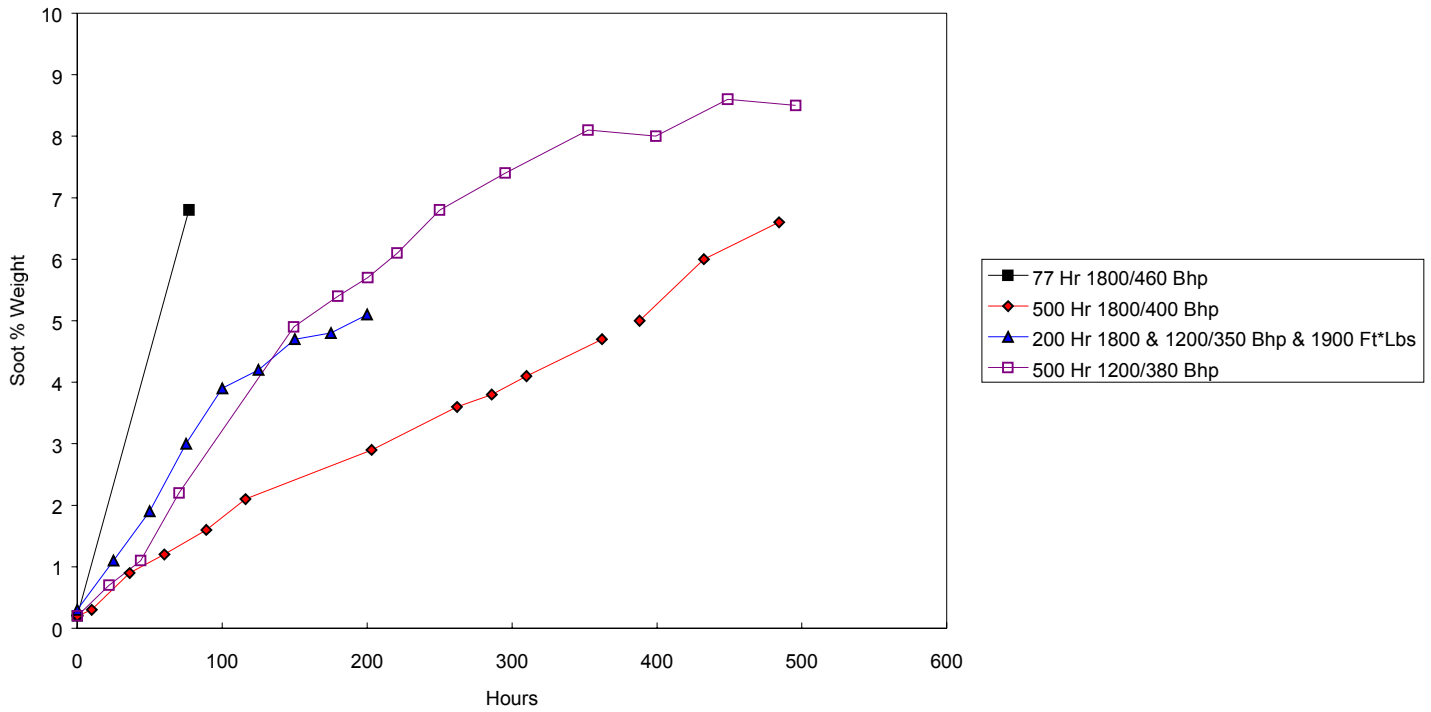
Secretary: Mark Cooper/Oronite 210-731-5606	Chairman: Brian Lawrence/Infineum 210-732-8123
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**Attachment 2**  
**Attendance Roster**

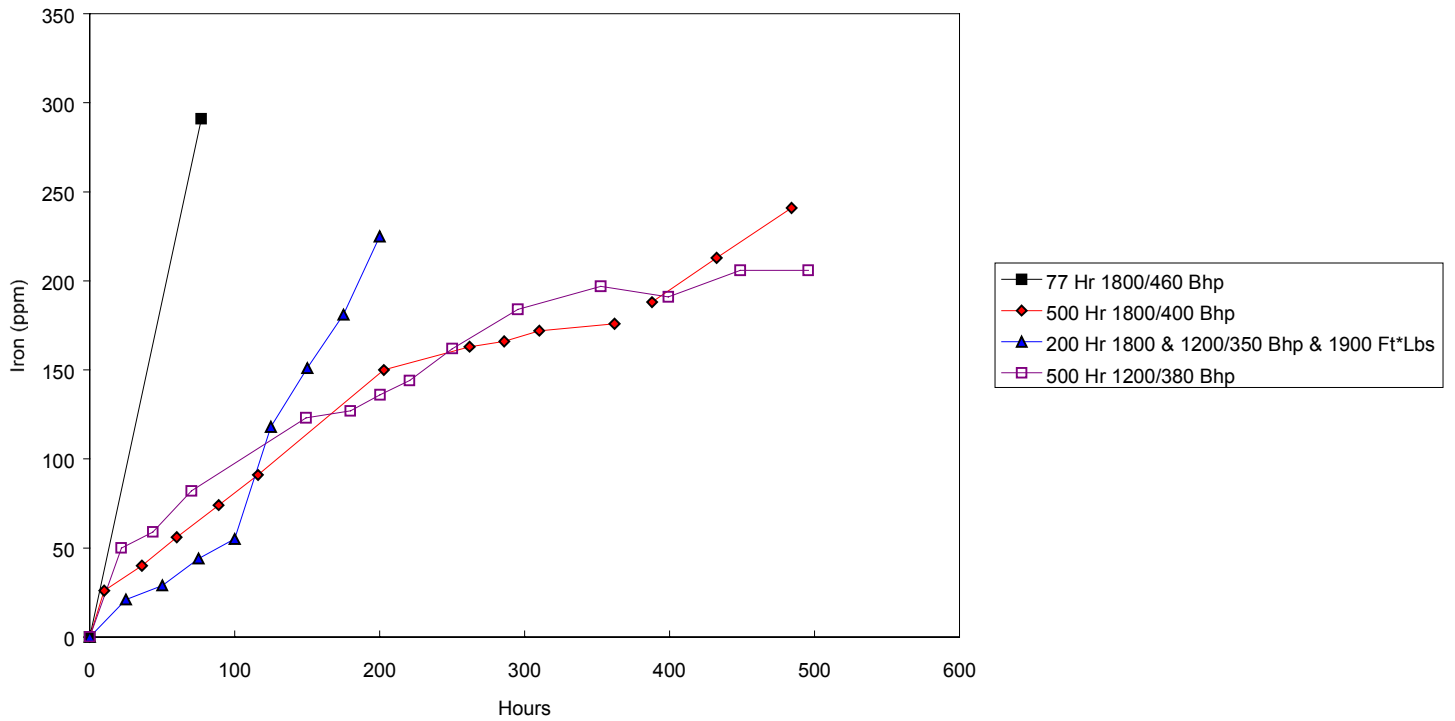
<b>Name</b>	<b>Company</b>
Brian Lawrence	Infineum
Mark Cooper	Oronite
Jim Wells	SwRI
Mark Stevens	Infineum
Bob Campbell	Ethyl
Riccardo Conti	Mobil
Ken Goshorn	Mack
Jim Collum	EG&G
Greg Shank	Mack
Scott Richards	SwRI
Gary Tietze	TEI
Jeff Clark	TMC
Andy Broff	SwRI
Wayne Cave	consultant
Aimin Huang	Equilon
Larry Bendele	SwRI
Manual Guzman	Cummins
John Knight	TEI
Gil Clark	Specified Chemicals
Bill Larch	Lubrizol
Rob Galbraith	Imperial

Attachment 3

MACK T-10



MACK T-10



Attachment 4

TABLE 3  
BREAK-IN OPERATING CONDITIONS

Conditions	New or Rebuild Break-In	
Time, min	30	30
Speed, r/min	1200	1800
Load, Torque, $N\cdot m$ (lbf·ft) <sup>A</sup> ± 1% <sup>B</sup>	1731 (1277)	1384 (1021)

A: At 98.3 kPa (29 in. Hg) and 29.5 °C (85 °F) dry air.

B: When engine performance falls outside these limits, corrective action should be taken.

TABLE 4  
TEST CONDITIONS

Parameters	Limits	
	Phase I	Phase II
Time, h	75	225 <sup>A</sup>
Injection Timing, °BTDC	variable	18
<b>CONTROLLED PARAMETERS<sup>B</sup></b>		
Speed, r/min	1800	1200
Fuel Flow, kg/h (lb/h)	59.2 (130.5)	63.5 (140.0)
O <sub>2</sub> Level, %	8.1	6.1
Inlet Manifold Temp., °C (°F)	66 (150)	66 (150)
Coolant Out Temp., °C (°F)	66 (150)	85 (185)
Fuel In Temp., °C (°F)	40 (104)	40 (104)
Oil Gallery Temp., °C (°F)	88 (190)	104 (220)
Intake Air Temp., °C (°F)	25 (77)	25 (77)
Inlet Air Restriction, kPa (in. H <sub>2</sub> O)	3.5 – 4.0 (14 - 16)	3.5 - 4.0 (14 - 16)
Exhaust Back Pressure, kPa (in. H <sub>2</sub> O)	2.7 – 3.5 (11 - 14)	2.7 – 3.5 (11 - 14)
Crankcase Pressure, kPa (in. H <sub>2</sub> O)	0.25 – 0.75 (1 - 3)	0.25 – 0.75 (1 - 3)
Coolant System Pressure, kPa (psi)	97 – 109 (14 - 16)	97 – 109 (14 - 16)
<b>UNCONTROLLED PARAMETERS</b>		
Power, kW (bhp)	~257 (~345)	~324 (~434)
Torque, $N\cdot m$ (lbf·ft) <sup>C</sup>	Record	Record
Exhaust Temp., °C (°F)	Record	Record
Pre-turbine	Record	Record
Tailpipe	Record	Record
Inlet Manifold Pressure, kPa (in. Hg)	Range to be determined	Range to be determined
Oil Sump Temp., °C (°F)	Record	Record
Main Gallery Oil Pressure, kPa (psi)	Record <sup>C</sup>	Record <sup>C</sup>
Intercooler ΔP, kPa (psi)	Not to exceed 13.6 (2)	Not to exceed 13.6 (2)
Oil Filter ΔP, kPa (psi)	Not to exceed 138 (20) <sup>D</sup>	Not to exceed 138 (20) <sup>D</sup>

A: Valve lash checks may be added.

B: All control parameters shall be targeted at the mean when a mean is indicated. All other control parameters shall be within the range specified

C: Note pressures are typical of SAE 15W40 oils; other oil grades may show different results.

D: If oil filter ΔP exceeds 138 kPa (20 psi), change the two full flow filters.



Attachment 5

