

Mack T-13 Taskforce

Tuesday July 18, 2012
10:30 a.m. – 2:30 p.m. Eastern Time
Dial-in number:
888-272-5498
Access Code:
4069278

Mack T-13 Taskforce Panel Meeting Notes

The conference meeting convened at 10:30 a.m. Eastern time, with Mike Alessi as the Mack T-13 Taskforce Chair, Addison Schweitzer as the Mack T-13 Taskforce Secretary.

Membership / Attendance

Mike Alessi

Allison Athey, Zack Bishop, Bob Campbell, Jeff Clark, Riccardo Conti, Ken Goshorn, Jim Matasic, Jim Moritz, Sean Moyer, Elisa Santos, Addison Schweitzer, Greg Shank, Andy Broff, Mike Alessi, Steve Kennedy, Mark Cooper, Scott Richards, Bob Salgueiro, Jim Gutzwiller, and Tom Wingfield.

Test Scope and Objectives

Mike Alessi

Scope

This Task Force is responsible for development of the Mack T-13 engine test. It is accountable to the Mack Test Surveillance Panel, the ASTM Heavy Duty Engine Oil Classification Panel, and subsequently to ASTM Sub-Committee B0.02.

The Task Force will strive to achieve its objectives via close cooperation and interaction with the test sponsor, participating test laboratories, and other ASTM functions (including Task Force Sub-Groups, the Test Monitoring Center, and the designated Central Parts Distributor).

Objectives

1. Evaluate preliminary test configuration and operational conditions and develop accordingly.
2. Expedite test procedure consistent with PC-11 timeline.
3. Identify and evaluate key performance criteria.
4. Demonstrate discrimination with respect to key performance criteria.
5. Optimize test procedure for maximum test precision and reliability.
6. Monitor PC-11 matrix execution.
7. Monitor/assist statistical evaluation of matrix data.
8. Recommend HDEOCP endorsement of T-13 test, key performance criteria and associated limits.
9. Complete ASTM ballots for test standard approval.
10. Complete ASTM ballots of Mack T-13 research report.

Specific Activities

1. Develop Primary Test Parameters

- a. Cylinder Liner Wear
 - b. Top Ring Weight Loss
 - c. Oil Consumption
 - d. Lead content of EOT lubricant
2. Evaluate and Compare Range of Secondary Test Parameters
- a. Lubricant Oxidation
 - b. Top Ring Side Wear
 - c. Bearing Weight Loss

Action Item:

Soot and liner measurement verification by TMC is to be completed for Mack T-13 Test Development among all test labs (Round Robin).

Timeline

Mike Alessi

The PC-11 Timeline demanded that test installation across all labs currently be taking place. At this time next year the test labs need to have test engines installed and run-in as a precursor to matrix testing. According to Allison Athey and Greg Shank, a Mack T-13 engine is to be delivered to the second independent lab next week. Following the completion of the third quarter a discussion between both independent labs will be scheduled to discuss test development and the attempt to establish a test procedure by the second quarter of 2013 according to Greg Shank. Matrix testing is to begin the fourth quarter of 2013 through the first and second quarter of 2014. The Mack T-13 test cut-off period is July through September 2013 where the decision will be made to establish the Mack T-13 as a PC-11 category test.

Engine Stand Setup

Riccardo Conti

Mack MP8 505M US10 with following parts:
 No-Brake Camshaft P/N 21219818 with "Dummy" Control Solenoid Valve
 No-Brake Roller implied according to Ken Goshorn
 Front Bowl Steel Oil Pan P/N 21144321
 US07 Oil Filter Housing P/N 21183257
 Engine Diagnostic and Control
 Control Box provided by Volvo
 Volvo VCADS Premium Tech Tool Version 2.39.43

Initial Cycle and Results

Riccardo Conti

400-h High-Torque Single Phase with:
 3500 PSIG Peak Cylinder Pressure
 ~9% Over fueling
 EGR fraction controlled by ECU
 Forced Oil Additions every 50-h
 22.8 kg (~28 quarts) Oil Charge
 Consistent EGR control between tests
 EGR Fraction
 Test 1 =22.9, Test 2 = 22.9
 SD Test 1 =0.53, SD Test 2 = 0.43
 But variability of EGR gas out temperature
 Linear soot profile most likely affected by oil consumption difference between tests
 Initial cycle used for 2 tests
 Commercial CJ-4 10W-30
 TMC 821 (15W-40)

Oils showed signs of oxidation/nitration but minimal liner wear
Some differences in UOA values between SwRI and PTC measurements

Soot
TBN/TAN
IR (due to method difference)

The cylinder liners were cut in half and a bore polish comparison was conducted by SwRI as specified by the CRC Handbook.

Action Item:

Riccardo Conti will provide operational data summaries for Test 1 and Test 2.

Action Item:

Bob Campbell proposed to Greg Shank that sooting take place in a Mack T-11 to verify if increasing soot will induce wear in a Mack T-13 quickly due to PC-11 timeline constraints. Jim Moritz agreed to provide sooted oil (4.000 – 4.600% soot).

*Note: See attachment to review engine operational characteristics as well as final results including chemical analysis data for Test 1 and Test 2 in the PDF file entitled T13 Task Force July 18.

Proposed Cycle

Riccardo Conti

400-h Two Phases with:

Phase I with retarded injection timing targeting 3.5-4.0% soot in 96-h

Phase II with 3700 PSIG Peak Cylinder Pressure

Forced Oil Addition every 48/50-h in Phase II only

EGR Gas Temperature controlled by Test Cell

The hardware was designed for 2900 PSIG peak cylinder pressure according to Riccardo Conti. Ken Goshorn stated that 3500 PSIG peak cylinder pressures are operated daily at Mack-Volvo Powertrain for up to 1000 hours at a time.

*Note: See attachment to review engine operational characteristics for the Proposed New Test Cycle in the PDF file entitled T13 Task Force July 18.

Oil Analysis Scheme

Mike Alessi/Riccardo Conti

Action Item:

Greg Shank is to obtain poorly performing matrix oil from PC-10 development that can be verified by the TMC website to soot and test in a Mack T-13.

Proposed Oil Analysis Scheme:

D445 kv@ 40 (0, 48, 96, 144, 192, 240, 288, 336, & 384 hours)

D445 kv@100 (0, 48, 96, 144, 192, 240, 288, 336, & 384 hours)

D5185 Wear Metals (0, 48, 96, 144, 192, 240, 288, 336, 368, & 384 hours)

TGA Soot (0, 12, 24, 36, 48, 60, 72, 84, 96, 144, 192, 240, 288, 336, 368, & 384 hours)

Fuel Dilution (96, & 384 hours)

PDSC

FTIR (Peak and Area)

TBN

TAN

Wear Measurement Methods**Mike Alessi**

Jim Moritz suggested that more areas could be measured to quantify wear and combine to establish a larger value and thus meaningful wear.

Ken Goshorn suggested looking at surface measurement BOT versus EOT to quantify liner wear.

Critical Hardware (initial)**Mike Alessi**

The Mack T-13 Taskforce agreed to establish an elaborate critical parts list to begin with that could be scaled down upon test development.

Action Item:

Jim Gutzwiller agreed to establish a critical hardware template to keep track of P/N and supplier changes for the Mack T-13.

Jim Moritz stated that Caterpillar manufactures an air to water heat exchanger that could be utilized in the place of the MODINE that is becoming increasingly hard to come by.

Current Hardware is being pulled from production and hardware batches could be established according to Ken Goshorn through Mahle.

Hardware Procurement**Mike Alessi****Action Item:**

Zack Bishop at TEI is to be held responsible for hardware procurement once the critical hardware has been established.

Reference Oils**Mike Alessi**

A new supply of the Mack T-12 reference oil TMC 821 would be needed for backwards compatibility comparison verification. Oil additive companies are asked to evaluate in house finances and be prepared to formulate reference oils.

Greg Shank supported two reference oils one <3.0 HTHS and one reference oil for backwards compatibility.

Topics for next meeting**Mike Alessi**

Final test results from the Mack T-13 utilizing Mack T-11 sooted oil (4.000-4.600% Soot).

Schedule for Next Meeting**Mike Alessi****Action Item:**

Mike Alessi is to send out possible dates for the next meeting.

Meeting Adjourned at 2:30 PM Eastern Standard Time.