

Mack Surveillance Panel

Tuesday February 5, 2013
9:00 a.m. – 10:30 a.m. Eastern Time
Dial-in number:
877-344-4239
Passcode:
923364#

Mack Surveillance Panel Meeting Notes

The teleconference convened at 9:00 a.m. Eastern time, with Mark Cooper as Surveillance Panel Chair.

Membership / Attendance

Mark Cooper

Jim Moritz, Jim Matasic, Bob Campbell, Jeff Clark, Sean Moyer, Jim Gutzwiller, Elisa Santos, Addison Schweitzer, Scott Richards, Mark Cooper, Mark Sutherland, Zack Bishop, Rich Schafer, Chuck Anderson, Blair Jenness, Riccardo Conti, Allison Rajakumar, Greg Shank, Allison Athey, and Chris Cauley.

Status and Availability of T-12 and T-11 Tests

T-12 Parts and Related Issues with TUXO Hardware

Group

The discussion began with the last teleconference's action item for TEI to source liners with a smoother Ra to send to Federal Mogul. The Surveillance Panel was looking for shallower cross hatching and smother Ra patterns from the parts that were sent according to the conclusions drawn during the last meeting. Rick Schafer issued a spreadsheet to the Panel containing the analyzed parameters. The "Check Out Sheet Data" tab of the spreadsheet represents the liner cross-hatching inspection results and only separates the liners by date (2005-2012) and not by batch letter. Rick stated that these inspection checks represented the inspection records when the parts were produced for this particular part number. At one time, this part number was continuously produced by Federal Mogul up to 2007 according to Rick. It was noted that the data within the spreadsheet included inspection data ranging from 48 to 58 degrees with respect to cross-hatching of the liners since 3/16/2005. The "Return Parts Review" tab displays the two liners from Lubrizol (T12 180002 & 180003) that ran low OC on the recent industry required reference on TUXO hardware and the liner labeled T12 180027 represented an unused Batch T liner from Lubrizol. The performance of the two Batch T liners on the recent industry reference were significant due to the lower oil consumption values, because the oil consumption used to lie ~60 g/hr, now resides ~100 g/hr on the same reference oil 822. Rick Schafer's analysis of the cross-hatch angle of the Batch T liners reflected 58 degrees consistently. According to Rick, the majority of cross hatching on liners are 45 degrees plus or minus 5 degrees on modern Heavy Duty Diesel Engines. Bob Campbell suggested that Federal Mogul and Surveillance Panel come to an agreement on tightened specifications on cross-hatch angle. Rick Schafer agreed that tighter specifications on cross-hatching could be met. Previous honing of liner 509GC471 was completed via Nagel Hone (Wc787), but now is completed by Barnes Hone (Wc785). According to Federal Mogul, years 2008 to present honing of liner 509GC471 are completed utilizing the Barnes process, while years 2006-2008 could have been done using either the Barnes or Nagel Hone.

Details on the Federal Mogul honing process are outlined below:

Federal Mogul honing process for 509GC471

Wc787 (Nagel Hone)

Abrasives

- Roughing stones – CBN 150 grit
- Finishing stones – Vit 320 grit

Features

- Work Holding
 - § Dual zone bladder fixture
 - § Top load
- Roughing
 - § Mechanical expansion
 - § 2 separate feed speeds (micron/sec)
 - § 2 separate pressures (torque)
 - § Through the spindle air sizing (mechanical only = part to size)
- Finishing
 - § Hydraulic expansion
 - § 2 separate expansion pressures (high / low)
 - § 2 separate stroke counts (high / low)
- Stroke
 - § Both rough and finish hydraulically controlled
 - § Mechanical and hydraulic are independent
- Misc
 - § PLC controlled with AB
 - § Automated process

Wc785 Barnes Hone

Abrasives

- Rough / Finish stones – Vit 150 grit

Features

- Work Holding
 - § Dual zone bladder fixture
 - § Top load
- Expansion system (dual expansion – capable of plateau honing)
 - § Roughing – hydraulic (single)
 - § Finishing – hydraulic (single)
- Sizing system
 - § Plug gage
 - § Expansion is at high pressure until plug gage drops in bore and contacts switch to low pressure
- Stroke
 - § Single setting for stroke (rough and finish)
- Misc
 - § Mechanical settings
 - § Manual process

Additional Surface Characterization by Federal Mogul

Rick Schafer/Group

Bob Campbell stressed that R_a was not enough to quantify specifications on liner batches. Jim Matasic suggested 40-50 degrees (45 +/- 5 degrees) as a possible

target for future cross-hatching on liner batches. Jim Matasic questioned Federal Mogul on how tight the specification could be driven (was +or- 2 degrees possible?), Rick answered that +or- 5 degrees would be easily accomplished but would require additional setup time. Rick additionally mentioned that variation in measurement could be up to +or-20 minutes through his experience. After much discussion 45 +or-2.5 degrees was agreed upon and could be accomplished according to Rick Schafer at Federal Mogul. Mark Cooper questioned Rick if different stones could be used on the Barnes Hone method. Federal Mogul agreed that different stones could be utilized in the Barnes honing method. Jim Moritz mentioned that last week the Batch R liner had a greater R_{vk} value which could possibly show evidence in the differences in honing techniques. Mark Cooper asked the Panel if all that they should be concentrating on is cross-hatch angle and R_a values or if more should be taken into account prior to manufacturing new liners. Bob Campbell stressed the need for tighter specifications on liner batches. Federal Mogul agreed that there are many different ways to achieve R_a with different results. Federal Mogul stressed that R_{pk} , R_{vk} , R_{mr2} are what is used today on modern Heavy Duty Diesel Engines and better quantify the surface roughness. Rick Schafer agreed to look back at inspection records to ascertain if further surface roughness parameters were quantified in past manufacturing for reference. Generally speaking, the finer the surface finish, the higher the cylinder liner wear due to less retention of lubricating oil. Most hones today are plateau finished not peak finished as the liners used in the Mack test types. The best starting place agreed by the Surveillance Panel was to manufacture a new Batch of liners that were as best represented to Batch R liners. Zack Bishop of TEI mentioned that he still possessed 2 Batch R liners. Bob Campbell questioned when TEI would have received the Batch R liner to compare the inspection dates in the spreadsheet supplied by Federal Mogul; Zack stated the 2006-2007 timeframe. Bob Campbell suggested that there is history that top rings impact the wear and the cross hatching and surface finish impact the oil consumption. Bob Campbell questioned if the Federal Mogul data goes back prior to 2005 for reference purposes with respect to cross hatching. Jim Moritz stated that if Federal Mogul locates additional data there needs to be an additional teleconference to discuss the next batch liners further. Federal Mogul stressed that there is a high repeatability on measurement if a small liner batch is requested to be followed by a larger liner batch. A small batch would be considered to be ~250 liners according to Federal Mogul. Greg Shank stressed that the small batch of 250 liners be started now due to time constraints.

Action Item:

Rich Schafer of Federal Mogul is to go through the inspection archives and attempt to locate further data. Federal Mogul is to provide an update on its findings by tomorrow (2/6/2013).

Action Item:

Greg Shank requested an estimated time on the manufacturing process of the 250 liner batch from Federal Mogul with tighter specifications on cross hatch (45 +or-2.5 degrees suggested) and surface roughness parameters (R_a , R_{pk} , R_{vk} , R_{mr2}) to be determined on the Mack Surveillance Panel Meeting on 2/7/2013.

Action Item:

Zack Bishop was to take as an action item to measure the remaining two Batch R liners, as well as the one Batch R liner sent off for metallurgical analysis by Lubrizol.

T-11 Reference Tests on “Tweaked” Reference Oil 822**Group**

The “tweaked” reference oil 822 for the Mack T-11 was received by all industry test labs. SwRI agreed to start referencing this week, Afton’s reference test was at 96 hours, Lubrizol’s reference test was at 105 hours, and Intertek was to start referencing at anytime. Lubrizol’s current oil consumption was ~28 g/hr with ~400 total hours on the engine build, while Afton’s current oil consumption was ~50 g/hr with ~700 total hours on the engine build.

Next Meeting**Mark Cooper**

The next proposed Mack Surveillance Panel Meeting was decided to be held on February 7th 2013 at 10:30 AM EST.

Meeting Adjourned at 10:25 a.m. Eastern time.