

Jeff Clark

From: Goshorn Kenneth [kenneth.goshorn@volvo.com]
Sent: Wednesday, December 22, 2010 12:18 PM
To: Fetterman, Pat; Allison Rajakumar; rajakumar@lubrizol.com; a.budd@isp-institute.com; Bill Buscher (E-mail); Bill Larch; Boese, Doyle; Brad Carter; Campbell, Bob; Cathy Devlin; charlie.passut@aftonchemical.com; Chris Castanian; Dan Pridemore; Dick Patrick (E-mail); Greg Miiller; Shank Greg; Hind Abi-Akar; Gutzwiller, James; James Matasic (E-mail); Jeff Clark; Jesse Hamilton; jecarter@dow.com; Jim McGeehan; jim.moritz@intertek.com; Jim Rutherford; Jim Wells; JingChun Xie; joe.franklin@intertek.com; John Haegelin; Keith Selby; Kevin Carabell; Marc Peters; Mark Cooper; Matt Urbanak (E-mail); Mike Alessi; Norbert Nann (E-mail); Riccardo Conti; Rich Grundza; Ron Buck; Ryan Johnson; Scott Harold; Scott Richards (E-mail); Shawn Whitacre; Steve Kennedy; Tom Wingfield; Victor Kersey; WenTong Lu; Wim Van Dam; Zack Bishop
Cc: ronald.brock@us.mahle.com; eric.garzelloni@us.mahle.com; Blaylock Herbert
Subject: RE: Unconfirmed minutes of our December 21, 2010 teleconference.

To All:

Here are some additional things I learned yesterday about E7 connecting rods in a phone call to Herb Blaylock at our Mack Reman Center in Middletown, PA.

The MRC number, signifying month and year, is etched on every rod which passes through Reman. It could be a new rod, or it could be a reworked rod. Some new rods are in fact sold in Reman boxes in order to maintain an adequate the supply in the field, as true reworked rods are dependent upon availability of cores coming in.

When a core rod comes in, it's torqued and checked for size in the big end bore. There is a very slight allowance over the machined OE size shown on the rod drawing, to allow for cap removal and reinstallation. If it's within those limits, the big end bore is lightly honed to clean it up, with minimal material removal. It then receives a new small end bushing, has that bushing burnished with the same bar and process as was originally used when we machined them in Hagerstown, and is final bored, marked with the MRC number, and shipped as a remanned rod.

If the big end bore exceeds those limits, the cap gets .005" faced off of the grooved side parting face, and .005" likewise faced off of the opposite side grooved parting face of the rod. The original groove depth was already sufficient to accommodate the .005" increased tongue insertion depth. This has the effect of moving the cap .005" closer to the rod body along the axis perpendicular to the rod parting face. The rod parting face is at 55 degrees from the rod centerline axis. Therefore, a trig. calc. indicates a bore to bore centerline length reduction of .004". The big end bore is then bored back to OE size. If you think about it, this means the maximum material removal during this boring process is perpendicular to the parting face, whereas the minimum material removal would be at the parting face. A very well centered setup for the boring step is critical. The rod is then marked with a single dimple on the cap thrust face. The small end bushing is replaced and rebored as above, and it goes back into the system as a remanned rod.

Rods within Reman are graded as to the measured bore to bore centerline length, based off of the original maximum length of 10.439" (new spec. is 10.4375" .0015"). Group 1 is up to .005" under 10.439", Group 2 is up to .010" under 10.439", etc. Only Group 1 or Group 2 remanned rods are sold as loose rods through Service. Any more than that, they remain captive within Reman for use in short block assemblies or basic (3/4) engine assemblies, where they're matched to re-decked blocks.

In answer to the question from yesterday's tele about whether Reman could rework a specific group of rods and return them to their original owner, it could be physically possible to do so. However, there is not currently a process for doing that. It would require first of all a decision by management to pursue such an approach, then would require new procedures internally to manage the parts as a group, as this falls outside their normal process which deals with each individual rod as a separate core.

When Herb checked the Service Parts system on Tuesday afternoon, the screen showed 91 new rods,

P/N 367GC4267M, in the Baltimore Parts Distribution Center, but none in any of the other PDCs. It shows a list price of \$773.80. At the same time, there are 492 remanned rods scattered throughout the system, 108 in the Baltimore PDC, 96 in the Chicago PDC, and the remainder in various dealer locations throughout the U.S. It shows a list price of \$223.22. (Seems fairly obvious why you've been using remanned rods in place of new rods.)

I trust this helps give all of us a better understanding of just what a remanufactured connecting rod consists of. It also answers the question of whether new rods are available for test. Yes, they are, at least in limited quantities at the present. More could be made available in time, but as you see, there is a major cost difference.

Ken Goshorn

From: Fetterman, Pat [mailto:Glen.Fetterman@Infineum.com]

Sent: Tuesday, December 21, 2010 3:56 PM

To: Allison Rajakumar; rajakumar@lubrizol.com; a.budd@isp-institute.com; Bill Buscher (E-mail); Bill Larch; Boese, Doyle; Brad Carter; Campbell, Bob; Cathy Devlin; charlie.passut@aftonchemical.com; Chris Castanian; Dan Pridemore; Dick Patrick (E-mail); Fetterman, Pat; Greg Miiller; Shank Greg; Hind Abi-Akar; Gutzwiller, James; James Matasic (E-mail); Jeff Clark; Jesse Hamilton; jecarter@dow.com; Jim McGeehan; jim.moritz@intertek.com; Jim Rutherford; Jim Wells; JingChun Xie; joe.franklin@intertek.com; John Haegelin; Keith Selby; Goshorn Kenneth; Kevin Carabell; Marc Peters; Mark Cooper; Matt Urbanak (E-mail); Mike Alessi; Norbert Nann (E-mail); Riccardo Conti; Rich Grundza; Ron Buck; Ryan Johnson; Scott Harold; Scott Richards (E-mail); Shawn Whitacre; Steve Kennedy; Tom Wingfield; Victor Kersey; WenTong Lu; Wim Van Dam; Zack Bishop

Cc: ronald.brock@us.mahle.com; eric.garzelloni@us.mahle.com

Subject: Unconfirmed minutes of our December 21, 2010 teleconference.

Participants –

Zack Bishop; Doyle Boese; Brad Carter; Chris Castanien; Jeff Clark; Mark Cooper; Riccardo Conti; Pat Fetterman; Ken Goshorn; Jim Gutzwiller; Jim Matasic; Jim Moritz; Scott Richards; Andy Ritchie; Greg Shank; Eric Garzelloni; Ron Brock

Discussion –

Before the teleconference Jeff Clark circulated a report from Mahle covering their findings to date regarding the bearing cracking problem in the T-12 test. I've attached Jeff's note above for completeness.

The meeting started with an extensive discussion regarding the sourcing and quality of the connecting rods used in the T-12 test:

0 Early rods were all manufactured in-house by Mack.

0 Tooling has been removed and limited supply of new parts may be available from a third party aftermarket supplier.

0 Rods are now supplied from the Mack re-manufacturing facility in Millertown, PA.

0 Most rods are remaned, but some new rods are used as required to meet demand.

0 Ken Goshorn is not willing to accept that we have a problem with the remaned rods – we may have a problem, but it hasn't been proven.

0 Ken Goshorn does not know if there is a sufficient supply of new rods to allow the use of only new rods in T-12 testing, but he will check and find out.

0 Reman may or may not involve milling and reboring the large end of the rod. All rods have new small end bushings installed, reamed and burnished. Burnishing operation is both difficult to do and vital to rod performance. It is unlikely that another shop can perform rod rebuilds.

0 If the big end of a rod has been milled, 0.0025 in is cut from both the rod and the cap, and the bearing hole is rebored making the big end centerline to small end centerline slightly shorter. Each time a big end is machined, a dimple is drilled into the side of the cap.

0 All open market rods should have no more than one dimple indicating one machining of the big end. Rods with multiple machinings should be restricted to rebuilt engines using decked blocks.

0 Labs are asked to identify any rods on hand.

0 Ken Goshorn will double check the coding used on remaned rods.

Following the rod discussion, the group moved to the Mahle report and a discussion of the bearings. Mark Cooper thanked Mahle for their excellent work and quality report shared with the group. Bearing issues:

0 The current bearings were designed for a peak firing pressure of 2550 psi, but phase 2 of the T-12 test uses up to 3500 psi peak firing pressure.

- 0 Mahle work suggests that rather than conventional bearing fatigue cracking of the overlay, the entire bearing is being subjected to a bending stress which leads to the bearing cracking.
- 0 If Mahle were designing a new bearing for this application, they would recommend a different overlay composition (called C2) which adds indium and aluminum oxide to improve fatigue resistance. However, this overlay would not correct the problem if the entire bearing is bending.
- 0 Rods do bend under loading – are we overloading their design strength?
- 0 Rods have been running under this loading for 5 to 6 years, what's changed?
- 0 Cracks have occurred with both "old" and "new" date coded bearings.
- 0 Lots of discussion regarding desire for "better" quality rods and bearings.
- 0 Test conditions / firing pressure have not changed over the last five years.
- 0 If the group wants to try a different bearing overlay, we're looking at 14 to 16 weeks (or more) from early January for delivery.
- 0 It is unlikely that the HTCBT test can be used to screen for performance (corrosion) differences between bearings.
- 0 TEI still has T-10 rod bearings with an 80/20 lead/tin flashing which could be used, and they will donate parts kits for any tests using them.
- 0 TEI will send samples of the T-10 bearings to Mahle for analysis.
- 0 When any new T-12 tests are run, the test lab should document the "pedigree" of all rods used.
- 0 All labs are to check stored bearings from previous T-12 tests to look for possible cracking which always occurs on the upper bearing just above the oil hole.

Tom Wingfield reported that he thinks Afton is ready to start a T-11 test using the PC-9 HS fuel, but that needs to be confirmed by Bob Campbell.

Our next teleconference is planned for 10:30 am EST on Friday, January 7, 2011.

Respectfully submitted,

Pat

P.S. Happy Holidays to all!!

--

This message was scanned by ESVA and is believed to be clean.

[Click here to report this message as spam.](#)