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Subject: ERA22FA418

Contact: Lycoming Materials Examination Report

The Chief of the NTSB Materials Laboratory reviewed and concurred with the Lycoming Materials Examination Report. The following is an extract, in part, from that report:

Oil sump

The part number of the oil sump is 56A21692-03-85, meaning it is a certified factory rebuilt part. As noted in the Appendix A report, during teardown it was discovered that the sump was filled with debris consisting of pieces of connecting rod, connecting rod bolt, and crankcase, and cracks were found at the oil pressure return plug hole. The threaded oil pressure return plug hole contained a helicoil insert. Installation of a helicoil insert is an authorized factory repair.

The oil sump arrived in the lab charred and covered with soot. Before any lab investigative work was completed, the oil sump was sent to Core Teardown to be thoroughly cleaned and disassembled. Once the oil sump was returned to the lab in a clean condition, some immediate observations were made from looking at the outer surface of the sump:

1. There is one area (a bit larger than a quadrant) of the sump that sustained more damage than the other three. This area contains the threaded oil pressure return plug hole.
2. There are signs of melting of and heat damage to the sump.
 - a. There are areas that have a raised, textured, globular appearance, indicating that they were locally melted and then re-solidified. Those areas also show discoloration (lighter gray than the surrounding surfaces) and surface cracking.
 - b. Even after a thorough cleaning in Core Teardown, areas of the sump surface are still charred and blackened.
3. The sump's appearance at the oil pressure return plug hole indicates the damage in that area was caused by impact.

- a. The three surfaces that meet at the rounded corner are not flat. There are areas that are slumped and areas that are bulged.
- b. The hole is slightly out of round and cracked in multiple locations, and those cracks have large crack-opening displacement.
- c. The surface also shows flow lines, which may be resultant from either impact or heat damage.