



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

September 28, 2021

EXAMINATION SUMMARY

ERA21LA188

A. ACCIDENT

Location: Dover, North Carolina
Date: April 15, 2021
Time: 1605 EDT
Airplane: Cessna A188, N731TB

B. INVESTIGATION PARTICIPANTS

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C. SUMMARY

On April 15, 2021, at 1605 eastern daylight time, a Cessna A188B, N731TB, was substantially damaged when it was involved in an accident near Dover, North Carolina. The pilot was not injured. The airplane was operated as a Title 14 Code of Federal Regulations Part 91 personal flight.

According to the pilot, he fueled the airplane prior to the flight at a private airport. The purpose of the accident flight was for the pilot to familiarize himself with the airplane and to practice maneuvers in advance of the spraying season. The agricultural airplane's hopper was empty, there was no intent to spray chemicals. A few minutes after takeoff, at an altitude of about 300 ft, he heard a "loud pop", and the engine lost all power. He looked at the engine gauges and noticed that there was "no fuel flow". As the propeller windmilled, he unsuccessfully attempted to restart the engine, then elected to perform a forced landing to a nearby corn field. He described that the landing was "hard".

1.0 Engine

Engine: Continental IO-550 (Engine data plate was removed); S/N Unknown.

Cockpit tach time was 1144.3 hours.

The engine was examined at the facilities of AMF Aviation, LLC, Springfield, Tennessee on September 28, 2021. The engine remained attached to the airframe with no discernible impact damage to the engine, engine mount, firewall, or propeller.

Mild manual pressure was applied to the propeller to determine if the engine would rotate. The propeller could be moved about 2-3° in both directions before it would bind up. No attempt was made to force the propeller to rotate. No oil leaks were observed, and there was no engine case rupture. The engine contained an ample supply of oil. The oil was dark and black in color.

The engine was removed from the airframe for disassembly.

The oil filter was cut open for examination. Silver-colored metallic particulates, consistent with bearing material, were found throughout the filter's paper element.

The top spark plugs were removed for examination. The electrodes were normal in color and exhibited light wear when compared to a Champion Check-A-Plug chart.

The ignition harness was undamaged.

The left and right magnetos were removed for examination. The impulse coupling on each magneto snapped when rotated by hand; rotation was smooth with no binding noted.

The propeller governor was unremarkable, except for metal particulates in the oil screen.

The engine-driven fuel pump was removed for examination. The drive gear and coupling were undamaged. The pump internal components moved freely when rotated by hand.

The oil pump was removed for examination. The unit pumped oil when rotated manually. The pump internal components moved freely when rotated by hand.

The starter and alternator were unremarkable. The drive belt was intact and tight.

The fuel control, fuel injector nozzles, and fuel manifold valve were normal in appearance.

The cylinders were removed for examination. There was a significant amount of surface rust inside the cylinders; presumably from outdoor storage since the accident. The intake and exhaust valves, springs, and guides were normal in appearance. The underside of the nos. 1, 2, 3, and 4 pistons exhibited impact damage from contact with internal components. The no. 2 cylinder intake valve pushrod was not positioned against the rocker arm. There was impact damage to the lip of the cylinder skirt.

The engine case was disassembled to provide access to the crankshaft and camshaft. It was noted that the casting around the no. 2 cylinder intake valve hydraulic tappet and tappet guide was broken away and found in the oil sump. There was impact damage inside the case at this location.

Disassembly of the case revealed that the no. 2 main bearing had spun, smearing metal into the oil ports on the bearing bore and deforming the bore. Numerous fragments of bearing material were found in the oil sump and inside the case, adjacent to the nos. 1 and 2 cylinders. The remaining main bearings were well lubricated and were normal in appearance.

The crankshaft was fractured between main journal #2 and rod journal #2 (see Figure 1, below). There were visible signatures of heat distress near the fracture surfaces. All connecting rods remained attached to their journals on the crankshaft and they rotated freely.

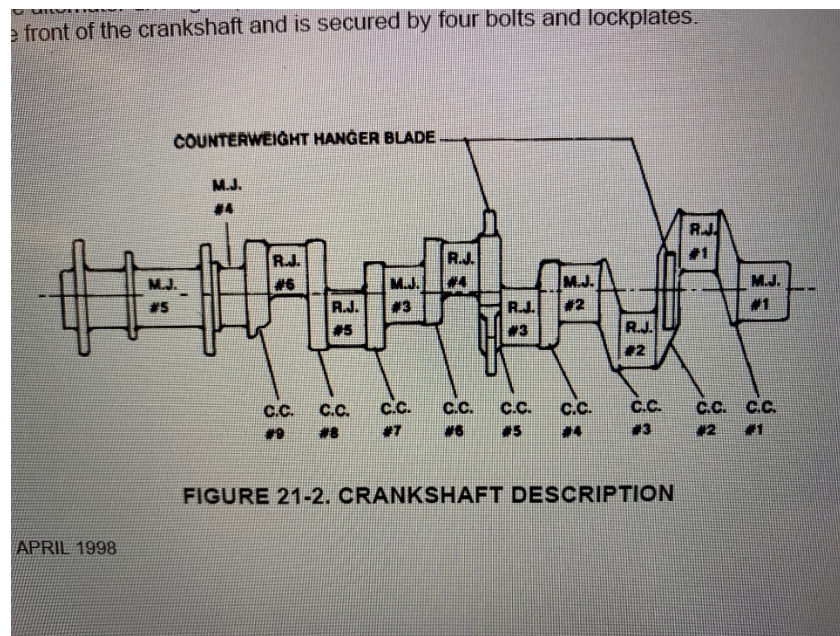


Figure 1 – Crankshaft Numbering (Example)

2.0 Propeller

Propeller: Hartzell Model HC-C3YF-1RF

The three-bladed, constant-speed Hartzell propeller remained securely attached to the engine. The propeller blades exhibited no damage with no bending or chordwise scratching noted.



Photo 1 – Aft Fuselage, Right Side



Photo 2 – Fuselage, Left Side



Photo 3 – Propeller and Engine, Cowling Removed



Photo 4 – Engine Oil Filter, Opened for Examination



Photo 5 – Silver-colored Metallic Particulates in Oil Filter Element



Photo 6 – Engine Starter Adapter Drive Gear



Photo 7 – Engine Starter Adapter



Photo 8 – Top Spark Plugs, Removed for Examination



Photo 9 – Engine-driven Fuel Pump



Photo 10 – Cylinder #1



Photo 11 – Cylinder #2

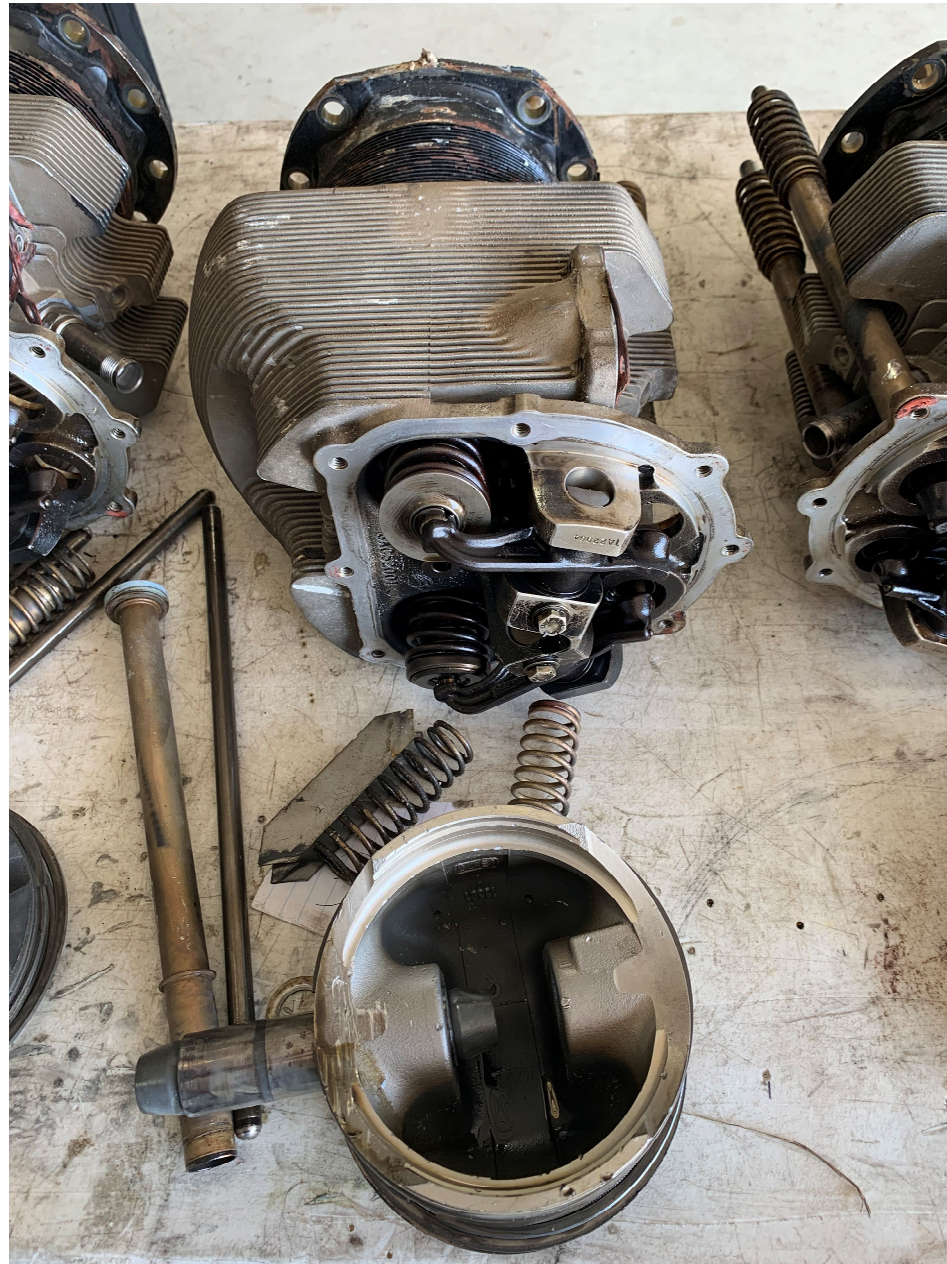


Photo 12 - Cylinder #3



Photo 13 - Cylinder #4



Photo 14 - Cylinder #5

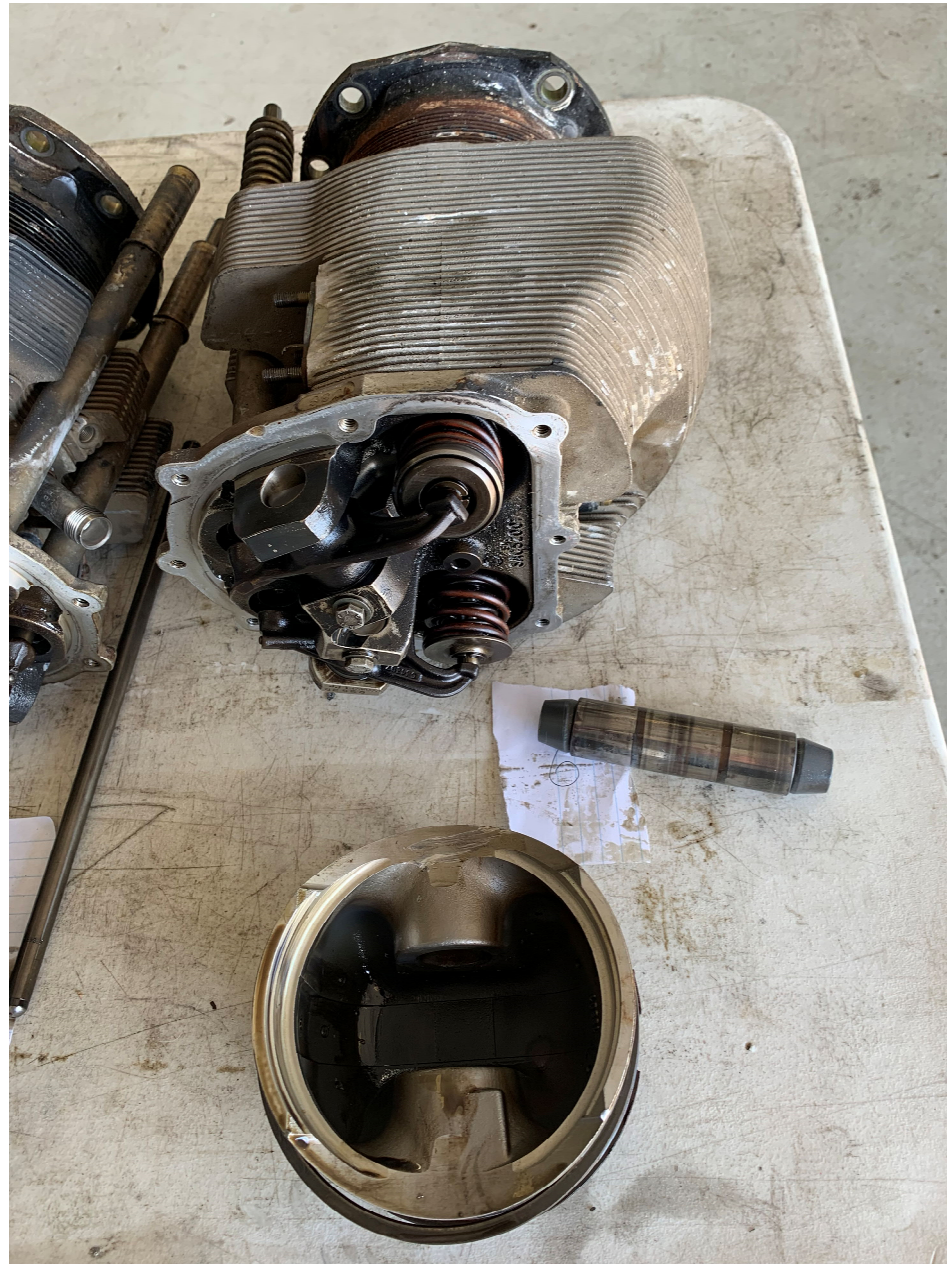


Photo 15 - Cylinder #6



Photo 16 – Bearing Material Found in Oil Sump



Photo 17 – Bearing Material Found Inside Engine Case

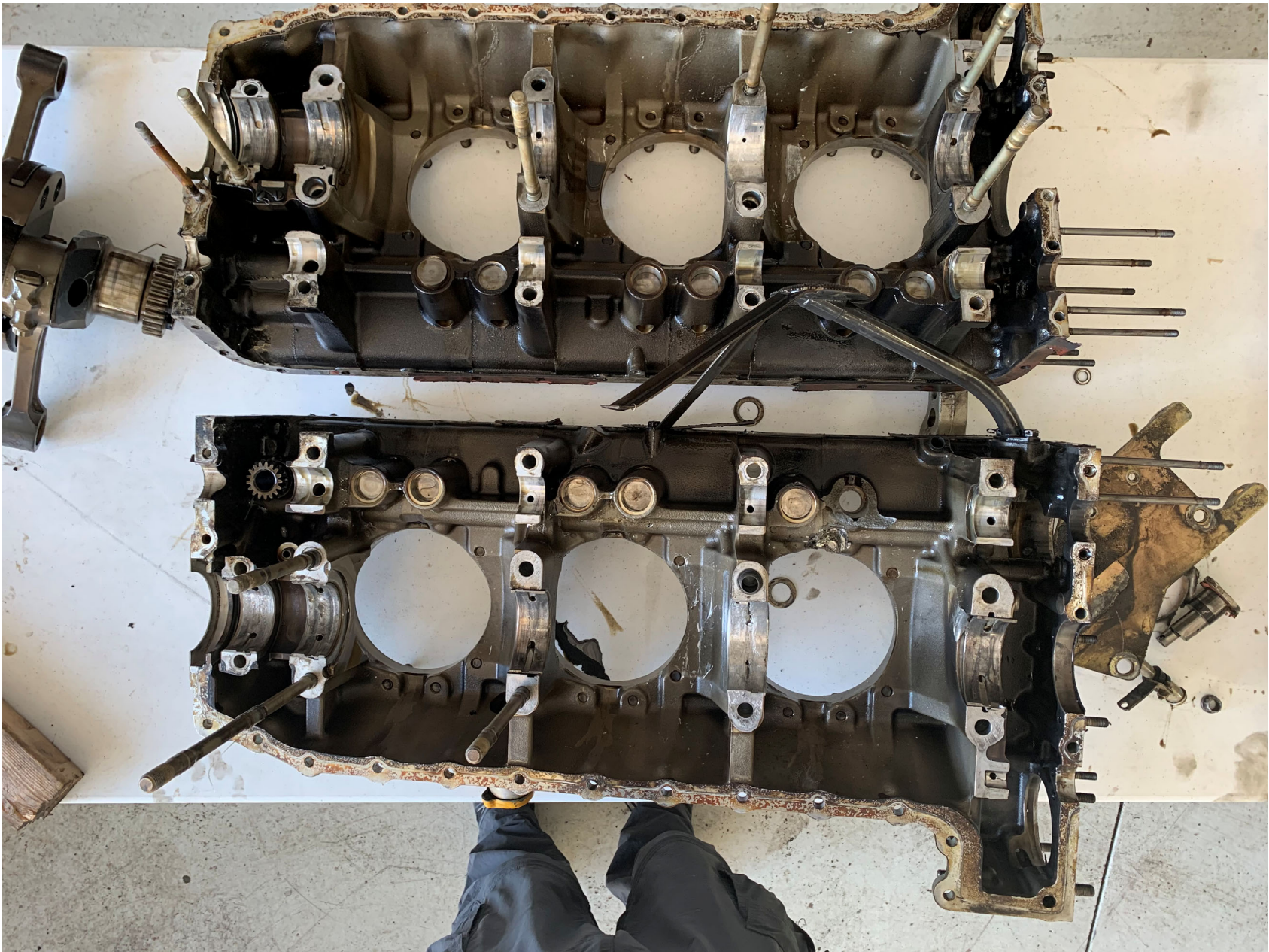


Photo 18 – Engine Case, Split for Examination

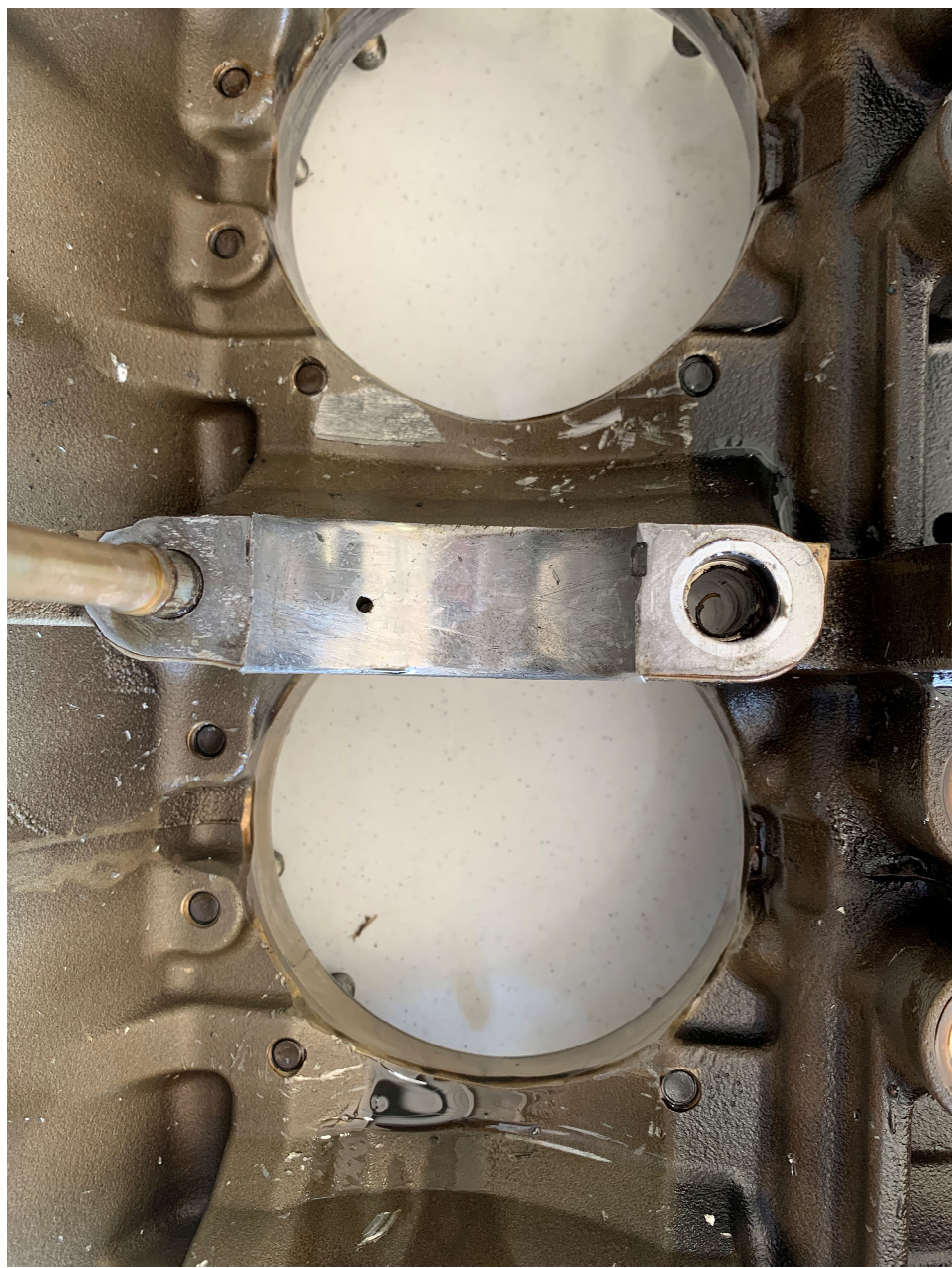


Photo 19 - #2 Main Bearing



Photo 20 - #2 Main Bearing



Photo 21 – #2 Connecting Rod (Foreground) with Fractured Crankshaft



Photo 22 - #2 Connecting Rod (Foreground) with Fractured Crankshaft



Photo 23 - #2 Connecting Rod (Foreground) with Fractured Crankshaft



Photo 24- Separated Casting with #2 Cyl Intake Valve Tappet



Photo 25 – Camshaft and Gears



Photo 26 - Crankshaft



Photo 27 – Crankshaft with Fracture Surface