

NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Materials Laboratory Division
Washington, D.C. 20594



December 9, 2019

MATERIALS LABORATORY FACTUAL REPORT

Report No. 19-075

A. ACCIDENT INFORMATION

Place : Oxford, Mississippi
Date : July 6, 2019
Vehicle : Cessna 172, N994CP
NTSB No. : CEN19FA212
Investigator : Ed Malinowski, AS-CEN

B. COMPONENTS EXAMINED

Number 4 cylinder and piston assemblies.

C. DETAILS OF THE EXAMINATION

An overall view of the submitted components is shown in figure 1. The components were generally discolored with deposits on the surface consistent with fire damage. A piece of the exhaust riser remained attached to the cylinder assembly as shown in figure 1. The exhaust riser was deformed, and a gap was present where the riser attached to the cylinder head.

The interior of the cylinder is shown in figure 2. Tan deposits were observed on the interior surfaces consistent with combustion deposits. Oxidation and combustion patterns on the exhaust valves had a uniform appearance around the circumference consistent with normal valve operation. The exhaust valve was slightly open with a gap between the valve head and the valve seat. A gray deposit was observed within the gap on the upper side of the exhaust valve.

The exhaust valve was disassembled from the cylinder assembly, and a photograph of the removed exhaust valve is shown in figure 1. Dull gray deposits with smooth surface features were observed around the valve stem and on the valve head and had an appearance consistent with previously molten aluminum alloy. The overall geometry of the deposit was consistent with flow over the lower side of the valve stem, accumulating on the upper surfaces of the exhaust port and valve seat. At the accident scene, the engine was reportedly found inverted, and portions of the fuselage were melted, deformed, and discolored by fire.

Matthew R. Fox, Ph.D.
Senior Materials Engineer

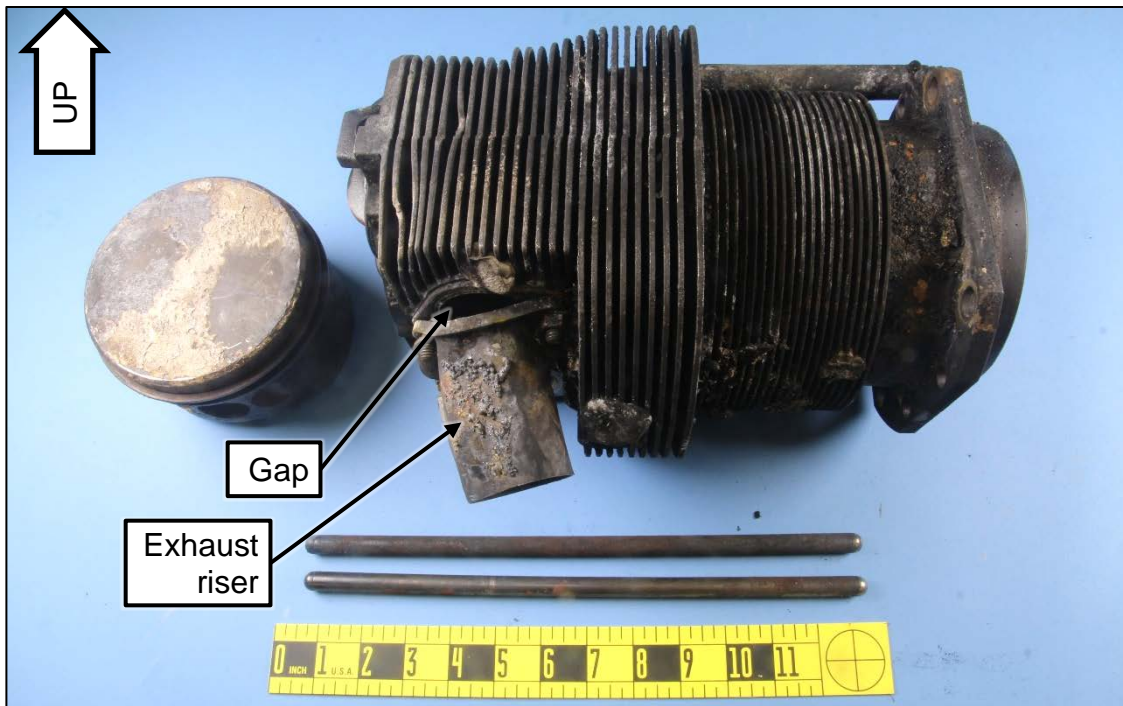


Figure 1. Overall view of the submitted components.



Figure 2. Interior surfaces of the cylinder head. The location of a gray metallic deposit between the exhaust valve head and seat is noted.

Figure 3. Overall view of the exhaust valve after removal from the assembly. The portion of the deposit visible as indicated in figure 2 is noted.

