

NATIONAL TRANSPORTATION SAFETY BOARD

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



August 12, 2016

MATERIALS LABORATORY FACTUAL REPORT

Report No. 16-070

A. ACCIDENT INFORMATION

Place : Mount Airy, Maryland
Date : September 19, 2015
Vehicle : Cessna 150M, N714CW
NTSB No. : ERA15LA368
Investigator : Aaron McCarter, AS-ERA

B. COMPONENTS EXAMINED

Fractured #4 cylinder, fractured piston with wrist pin.

C. DETAILS OF THE EXAMINATION

Figure 1 shows a photograph of the as-received pieces of the #4 cylinder, fractured piston, and wrist pin. The #4 cylinder fractured at the barrel portion, and the piston fractured into many pieces. The wrist pin was intact, showed no evidence of a crack, and was partially inserted into the piston pin.

The outer surface of the barrel in the general area of the fracture contained cooling fins. The cooling fins and relief radii between the fins in the area of the fracture exhibited evidence of minor corrosion. The upper fracture face of the cylinder was brush cleaned with Alconox, a commercial detergent. Bench binocular microscope examination of the upper fracture face revealed a dark thumbnail mark typical of a fatigue crack emanated from the outer surface of the barrel, in the area indicated by arrow "O" in figures 2 through 3, on the side of the head that contained the exhaust valve (side containing the smaller diameter valve). The fatigue crack originated from a corrosion pit on the outer surface in the areas indicated by arrow "O" in figure 4. Fatigue crack propagation was through the thickness of the barrel and extended laterally approximately 2.5 inches to each side of the fatigue origin area. Fatigue propagation was in the general direction indicated by unmarked arrows in figure 2 and terminated in the areas indicated by dashed lines in figure 2. The fracture features outside of the fatigue region, and those in the piston exhibited a rough texture on a slant plane typical of overstress separation.

Frank Zakar
Senior Metallurgist



Figure 1. As-received pieces of the #4 cylinder (right side of page), fragments of the piston and piston pin that was partially inserted into the fractured piston (left side of page). The cylinder fractured in the barrel portion in the area indicated by an arrow.

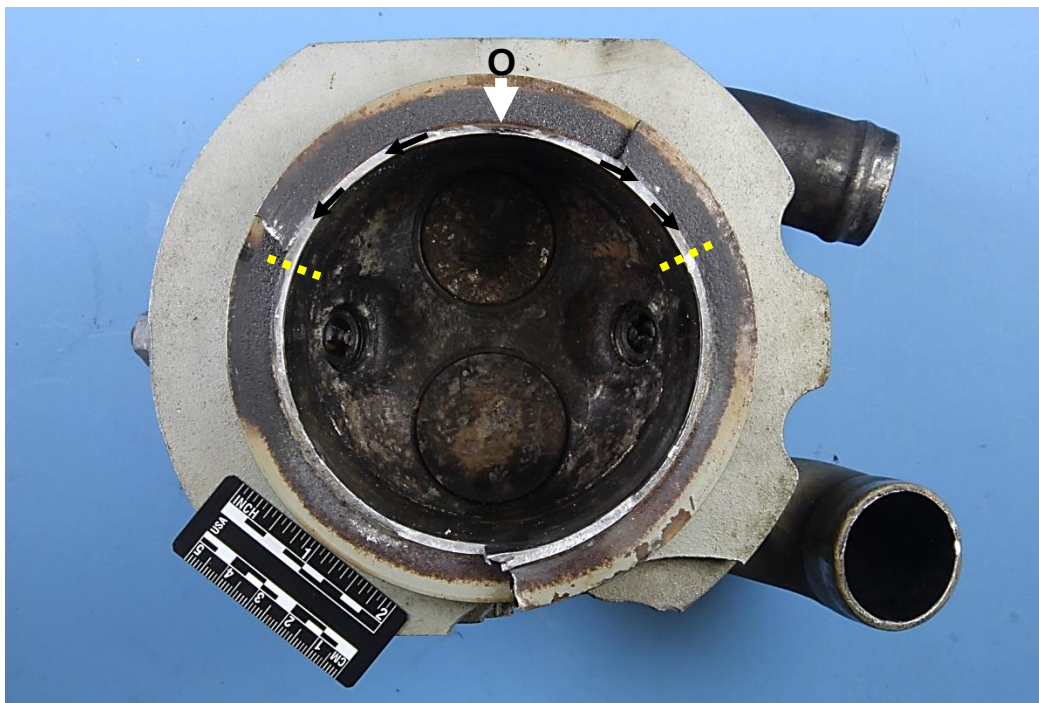


Figure 2. View looking at the upper fracture face of the barrel. The barrel contained a fatigue crack that emanated from the outer surface in the are indicated by arrow "O". The fatigue crack propagated in the general direction indicated by arrows and terminated in the areas indicated by dashed lines.

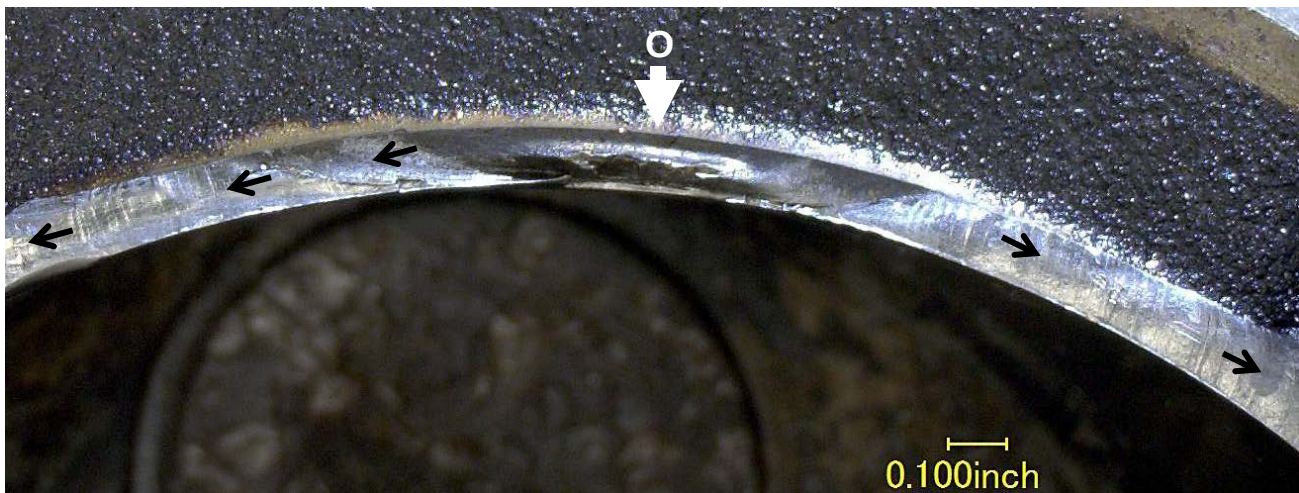


Figure 3. Close-up photograph of the fatigue origin area indicated by arrow "O" in figure 2.

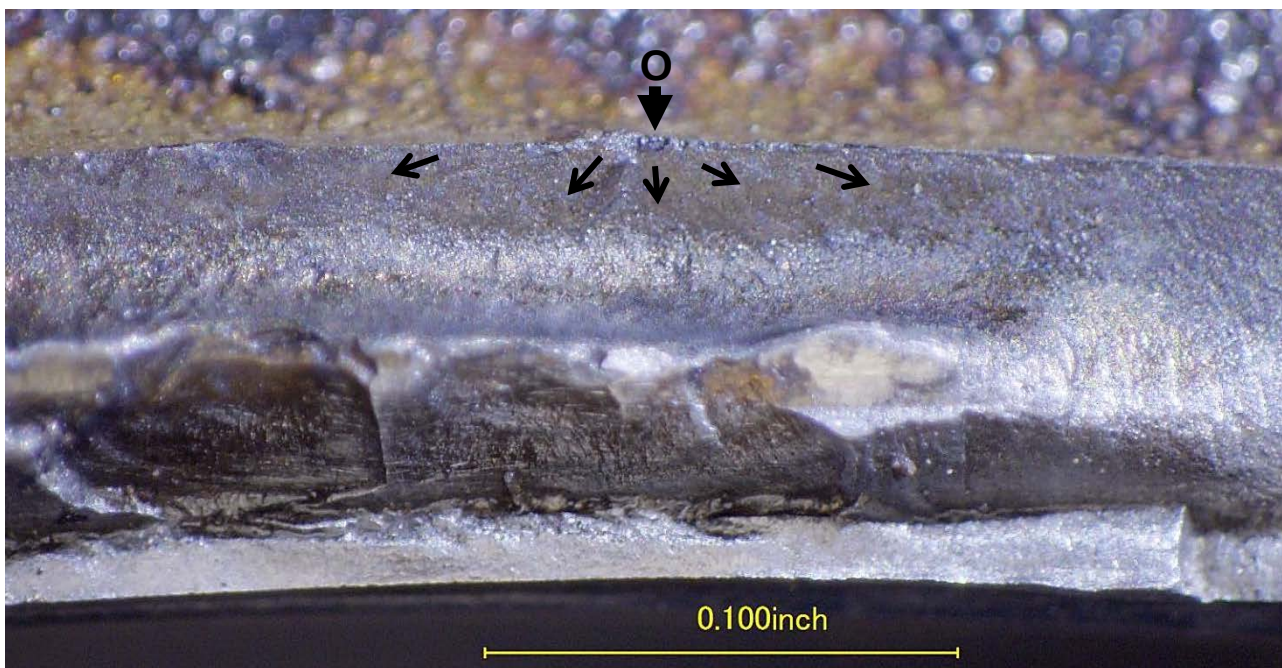


Figure 4. The fatigue crack emanated from a corrosion pit on the outer surface of the barrel in the area indicated by arrow "O" in figures 3 and 4.