

NATIONAL TRANSPORTATION SAFETY BOARD

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



5/6/2016

MATERIALS LABORATORY FACTUAL REPORT

Report No. 16-024

A. ACCIDENT INFORMATION

Place : Port Townsend, WA
Date : September 28, 2015
Vehicle : Cessna 150F, N8529G
NTSB No. : WPR15FA268
Investigator : Tom Little

B. COMPONENTS EXAMINED

4 crankshaft gear bolts (PN: 22532), 1 crankshaft gear dowel pin (PN: 653012) and 1 crankshaft gear (PN:656072 / SN: N12HA044).

C. DETAILS OF THE EXAMINATION

The four crankshaft gear bolts all exhibited fractures in their threaded portion (figure 1). These bolts are labeled 1 – 4 in figure 1. Bolts #3 and #4 remained safety wired to each other and did not exhibit gross plastic deformation (figure 2). These two bolts both exhibited flat fractures and crack arrest marks consistent with fatigue fractures (figures 3,4). Bolts #1 and #2 exhibited gross plastic deformation in the shank portion. Bolt #1 had broken free of the safety wire and bolt #2 had a portion of safety wire still attached. Both of these two bolts exhibited fractures consistent with overstress. Hardness measurements (average of 4 measurements) of bolts #3 and #4 resulted in a measured hardness of 28.5 HRC and 23.6 HRC respectively.

The bolt holes in the crankshaft gear had become elongated. The effect was more pronounced on the side facing the bolt heads. The two bolt holes surrounding the dowel pin hole appeared more elongated than the other two bolt holes (figure 5). The crankshaft gear exhibited polishing wear at the interface with the bolt heads. This polishing wear was evident at all of the bolt holes and resembled the pattern of the bolt heads. The crankshaft gear teeth appeared to be well formed and did not exhibit any irregularities or uneven wear.

The crankshaft gear dowel pin was fractured and partially missing (figure 6). The portion that was submitted to the laboratory contained a flat fracture surface. Examination of the fracture surface using a stereo microscope revealed crack arrest marks and ratchet marks consistent with a fatigue fracture (figure 7). There were 3

prominent ratchet marks indicating a fatigue fracture with multiple origins. Examination of the body of the dowel pin revealed wear marks on one side (figure 8)

Joseph Panagiotou
Fire Protection Engineer



Figure 1: Crankshaft gear bolts.



Figure 2: Two gear bolts without plastic deformation and exhibiting flat fracture surfaces.

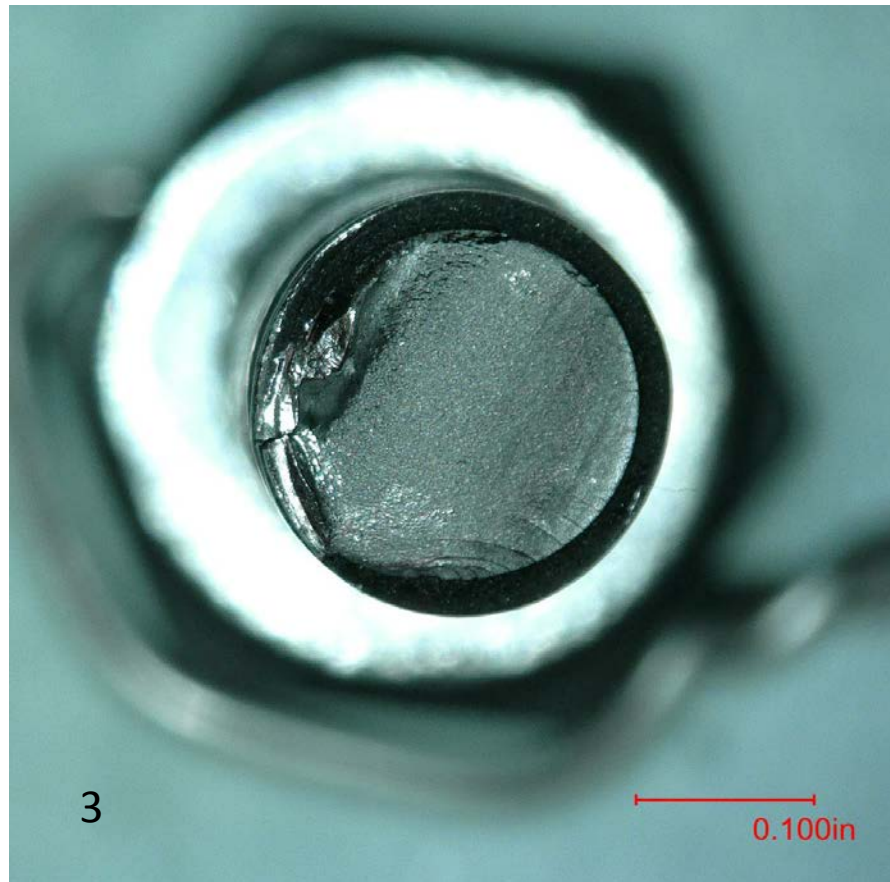


Figure 3: Crankshaft gear bolt fracture surface (bolt #3).

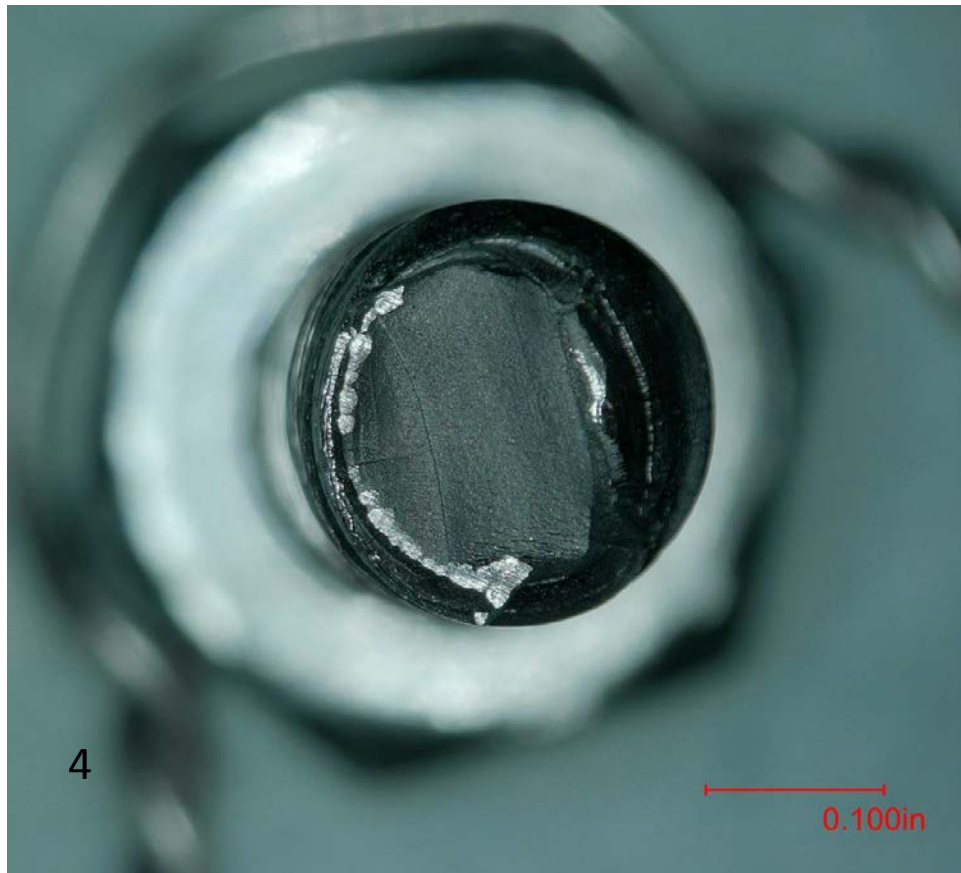


Figure 4: Crankshaft gear bolt fracture surface (bolt #4).

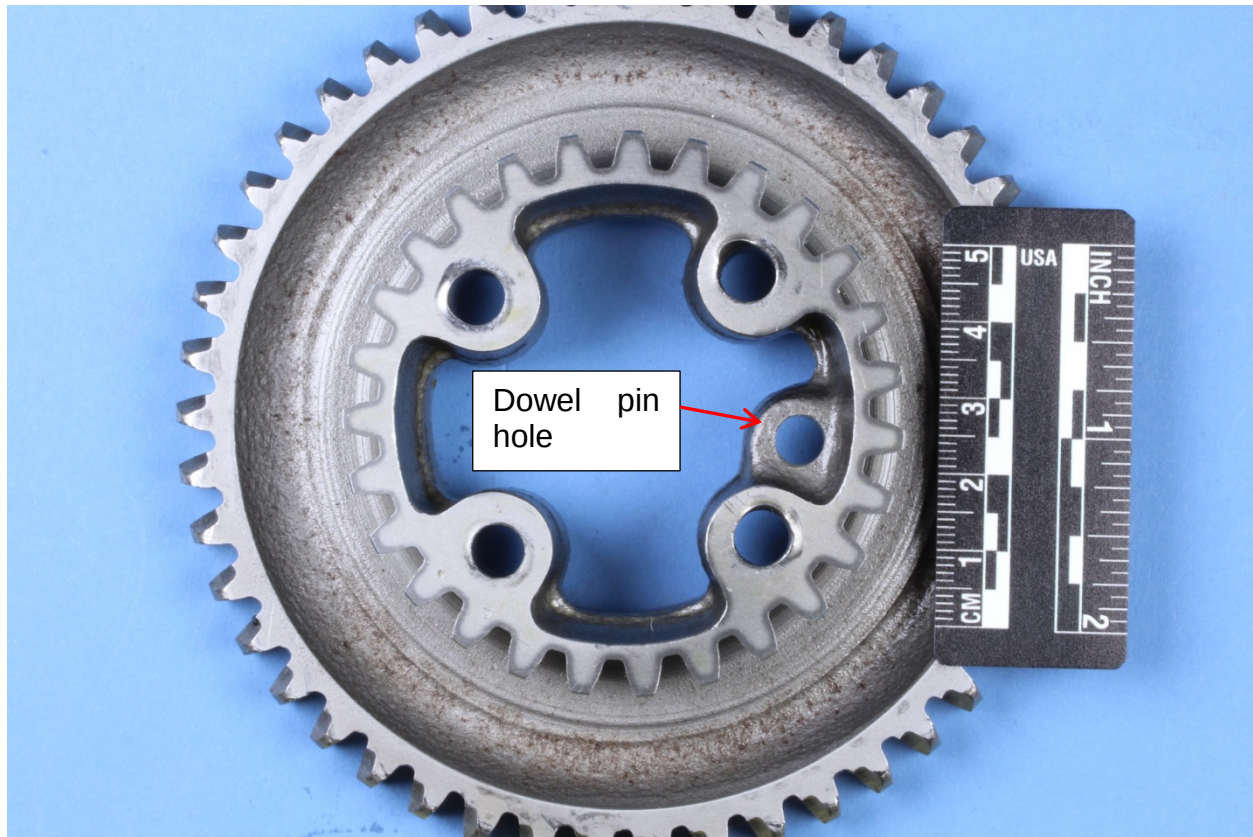


Figure 5: Crankshaft gear (bolt head side).



Figure 6: Portion of the crankshaft gear dowel pin.

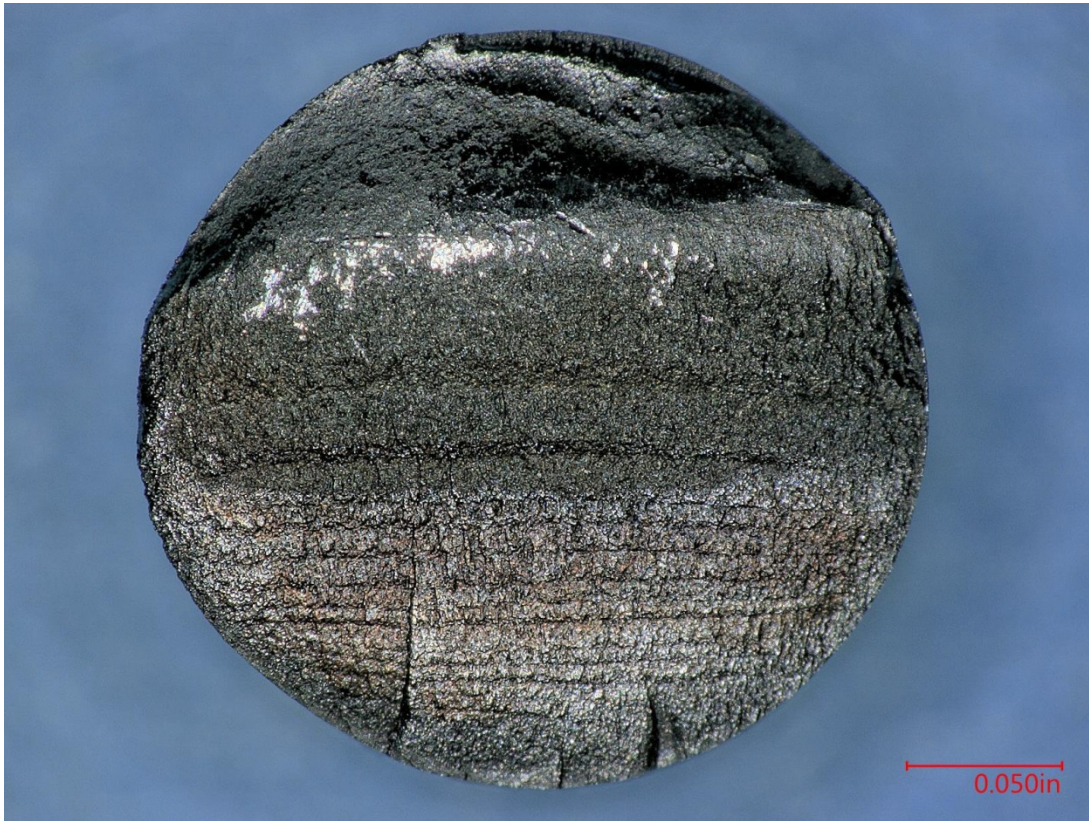


Figure 7: Crack arrest marks and ratchet marks on dowel pin fracture surface.

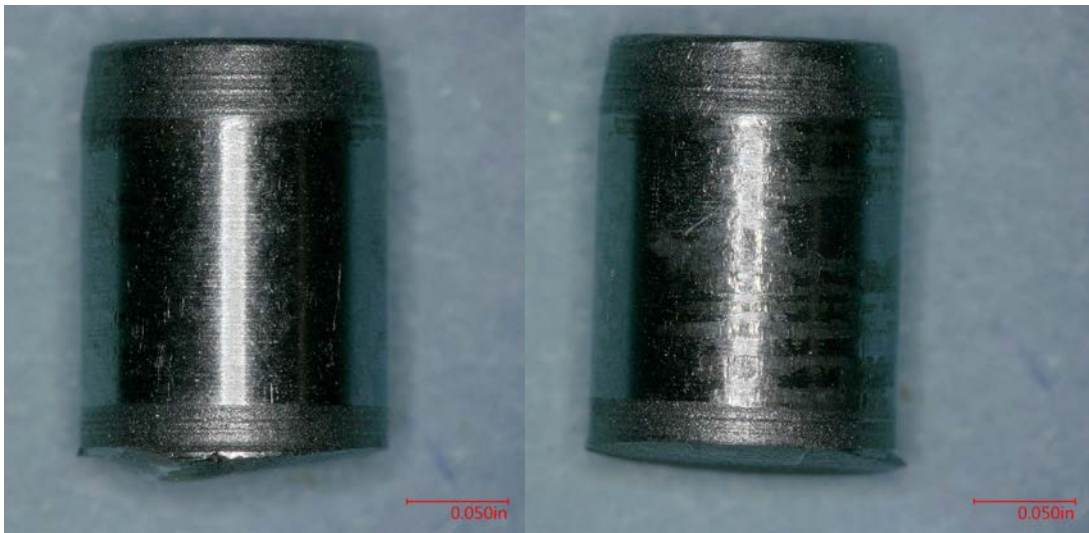


Figure 8: Opposing sides of crankshaft dowel pin body.