

NATIONAL TRANSPORTATION SAFETY BOARD

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



January 10, 2022

MATERIALS LABORATORY FACTUAL REPORT

Report No. 22-001

A. ACCIDENT INFORMATION

Place : Puyallup, Washington
Date : November 22, 2021
Vehicle : Cessna R182, N7592Y
NTSB No. : WPR22LA047
Investigator : Eric Gutierrez, ASI-WPR

B. COMPONENTS EXAMINED

Left main landing pivot assembly, fractured in two pieces.

C. DETAILS OF THE EXAMINATION

A left main landing gear pivot assembly, fractured in two pieces as shown in figure 1, was submitted to the NTSB Materials Laboratory for examination. The pivot had fractured near the forward inboard location where a splined shaft extended off the main body of the pivot. Both fracture faces are shown in figures 2a and 2b, for the body-side and splined-shaft-side, respectively. Most of the fracture exhibited circumferentially oriented shear marks and smearing in the clockwise direction, consistent with a shear overstress fracture in clockwise torsion.

The splined shaft contained a machined hole that was internal to the shaft. Adjacent to this hole, there was a region where the fracture was inclined at 45° to the longitudinal axis and the fracture features were comparatively flat. The splined-shaft piece was submerged in an acetone-filled beaker and cleaned in a sonicating bath. The fracture adjacent to the internal hole was then examined in a scanning electron microscope (SEM), as shown in figures 3a and 3b. The examination revealed dimple featured. The observations were consistent with a tensile overstress fracture in clockwise torsion.

Donald Kramer, Ph.D.
Sr. Materials Engineer



Figure 1: Left main landing gear pivot assembly in two pieces, as received.

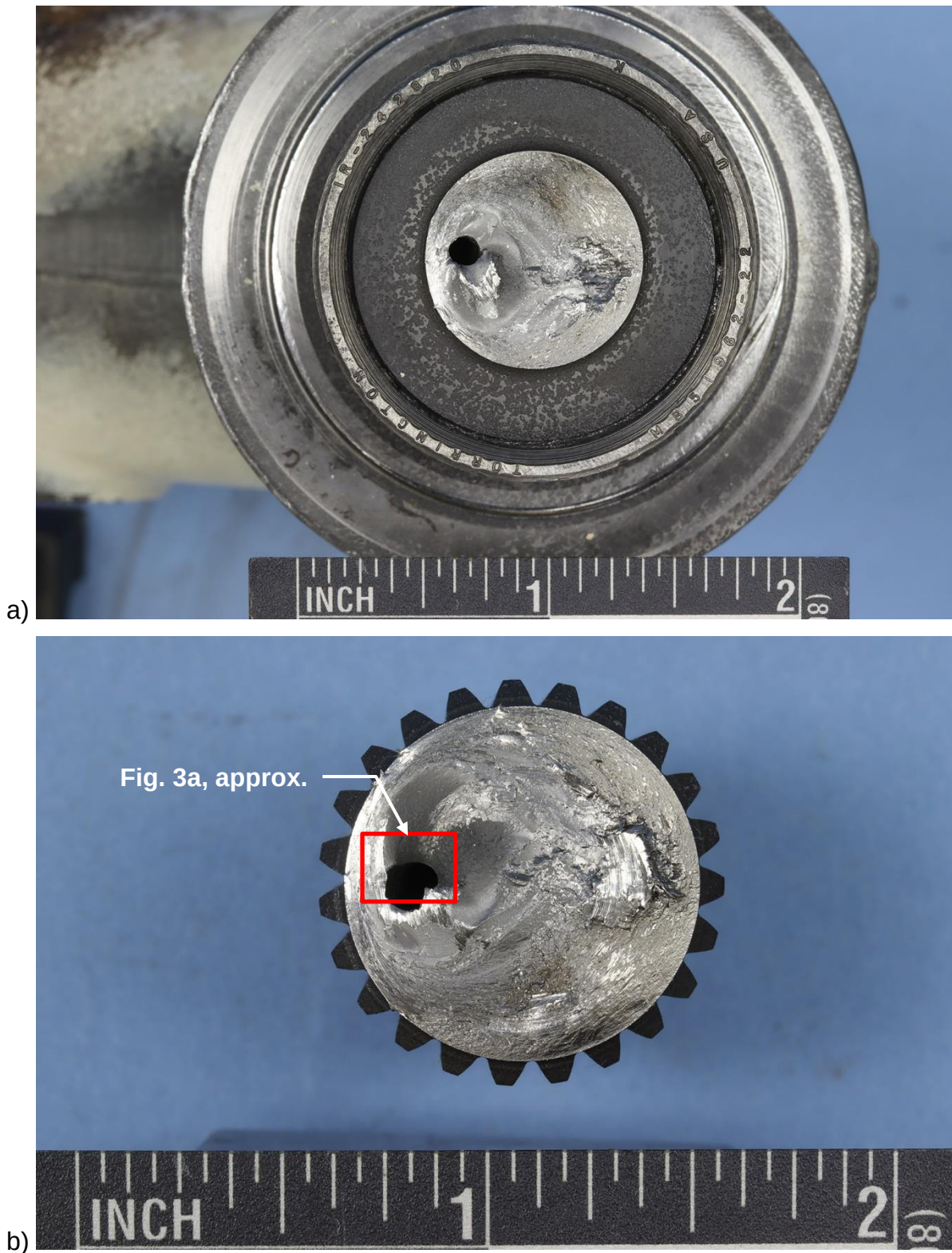


Figure 2: Images of the fracture surfaces: a) fracture face adjacent to main body of the pivot and b) fracture face adjacent to the splined shaft.

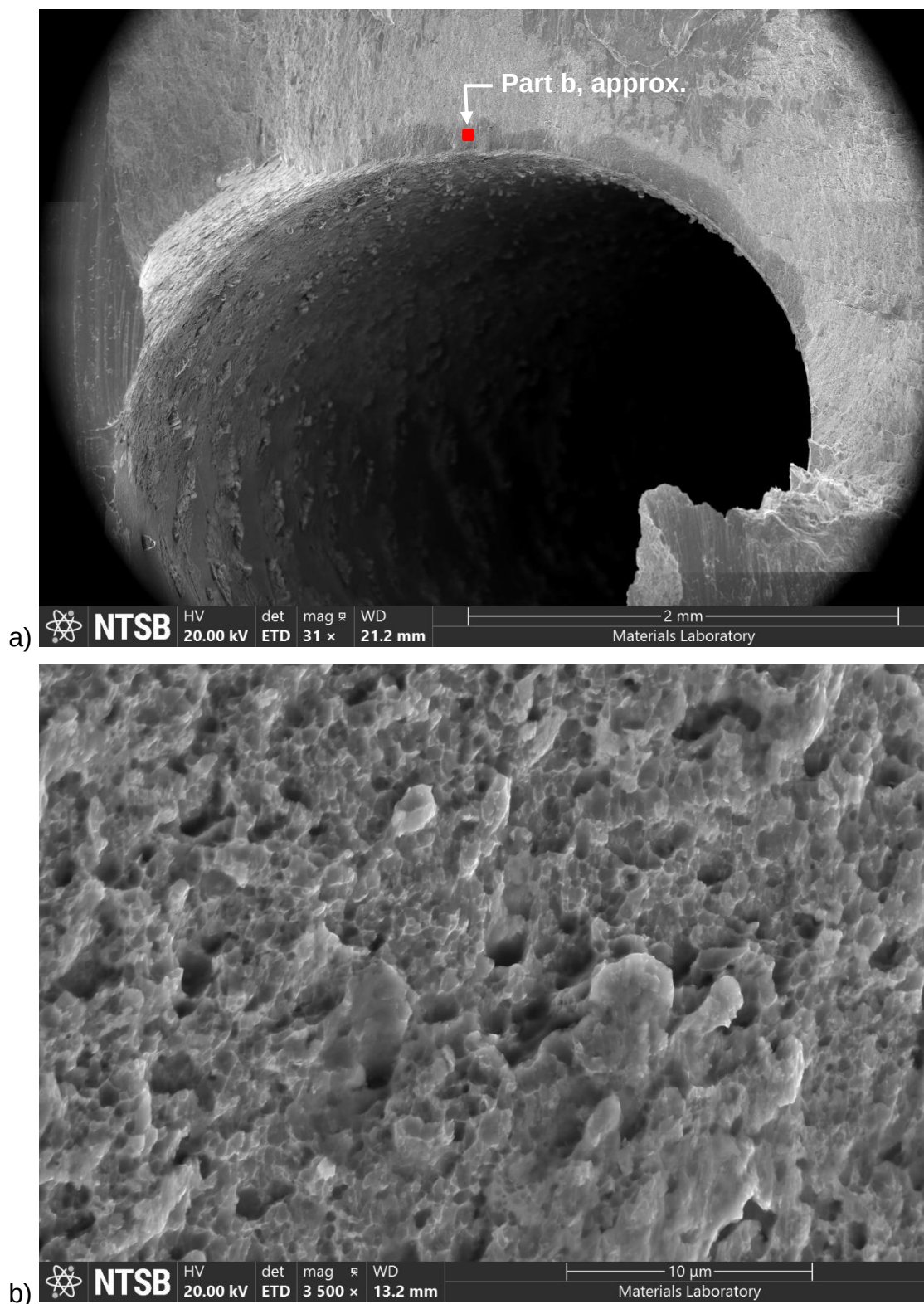


Figure 3: Scanning electron microscope images at the hole internal to the shaft: a) overview image at the edge of the hole with the 45° inclined fracture and b) high magnification image near the edge of the hole showing fine dimples, consistent with overstress.