

# National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



WPR22LA163

## **MATERIALS LABORATORY**

Factual Report 22-086

**December 12, 2022**

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## **A. ACCIDENT INFORMATION**

Location: Santa Barbara, CA  
Date: April 21, 2021  
Vehicle: Cessna T206H, N20617  
Investigator: Joshua Cawthra

## **B. COMPONENTS EXAMINED**

Nosewheel landing gear trunnion (Figure 1)

## **C. EXAMINATION PARTICIPANTS**

Specialist Joseph Panagiotou  
National Transportation Safety Board  
Washington, DC

## **D. DETAILS OF THE EXAMINATION**

The upper portion of the nose gear shock strut containing the upper and lower trunnions was examined. The braces that link the upper trunnion to the lower trunnion were disconnected and included with their connecting hardware for the examination. Both the left-hand and right-hand braces (Figure 2) did not exhibit any anomalies or signs of deformation. The connecting hardware for these braces was not marked to identify which side the hardware belonged to. Two bolts (Figure 3) exhibited signs of gross plastic deformation consistent with shear overload. The other two bolts exhibited a slight bend (Figure 4).

The upper trunnion exhibited a damaged bolt hole where the right brace would be attached (Figure 5). The damage consisted of deformation and missing material consistent with shear tear out of the attachment bolt in a direction coincident with the long dimension of the brace. The fracture surface was smeared and did not yield any fractographic information. The deformation of the material was consistent with an overstress fracture.

Straight edge scales clamped to the lower trunnion at the brace attachment points revealed plastic deformation of the upper trunnion (Figure 6). The upper portion of the nose gear shock strut was scanned using a Keyence VL 3D scanner to perform alignment and distance measurements between the upper and lower trunnion brace attachment points. The measurements revealed that the angle between the planes of the brace attachment points of the left-hand side was approximately 178 degrees while the angle between the planes of the attachment points of the right-hand side was approximately 173 degrees (Figure 7). The

measurements also revealed that the distance between the bolt hole centers for the left-hand brace attachment points was approximately 6.2 inches while the center-to-center bolt hole distances for the right-hand brace attachment points was approximately 6.5 inches (Figure 8). This deformation to the upper trunnion is consistent with bending overstress.

Submitted by:

Joseph Panagiotou  
Engineer



**Figure 1.** Upper nose gear shock strut with upper and lower trunnions and braces as received.



**Figure 2.** Left and right braces.



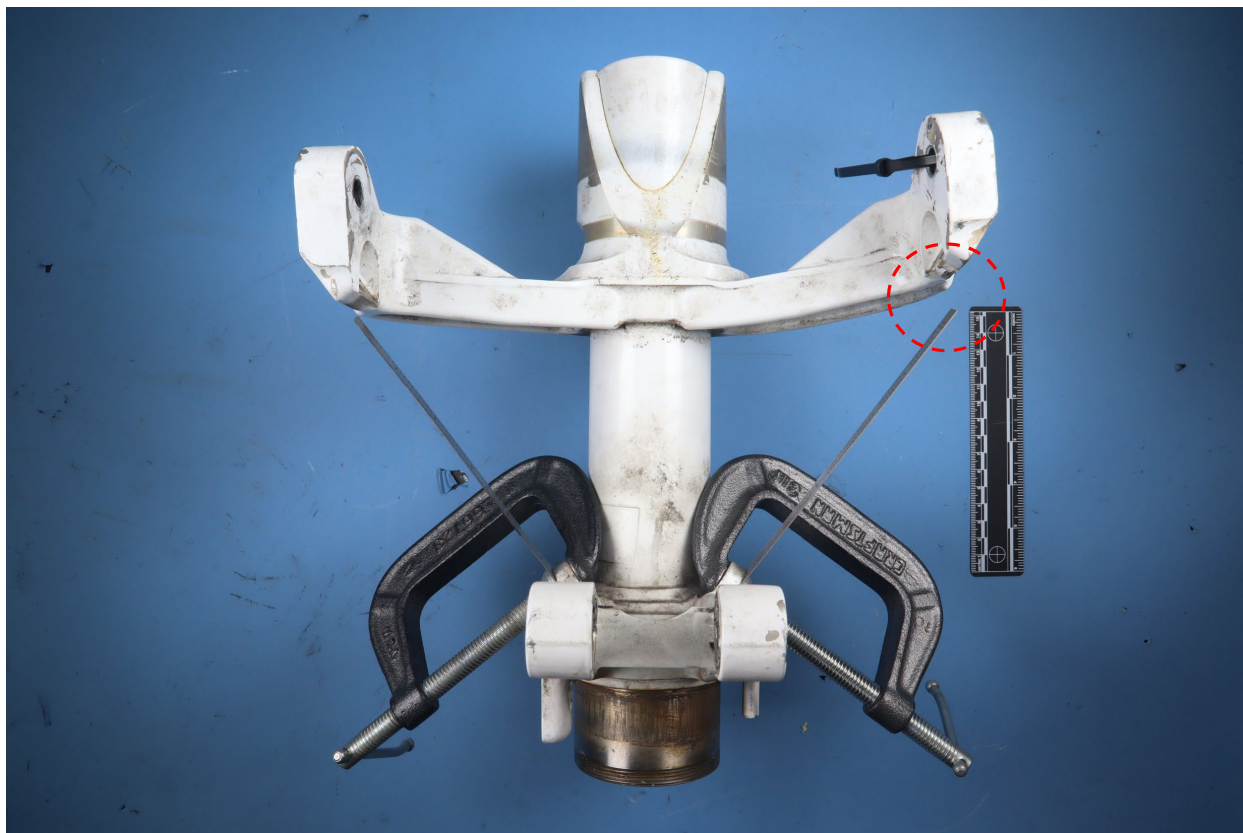
**Figure 3.** Brace attachment hardware exhibiting gross plastic deformation.



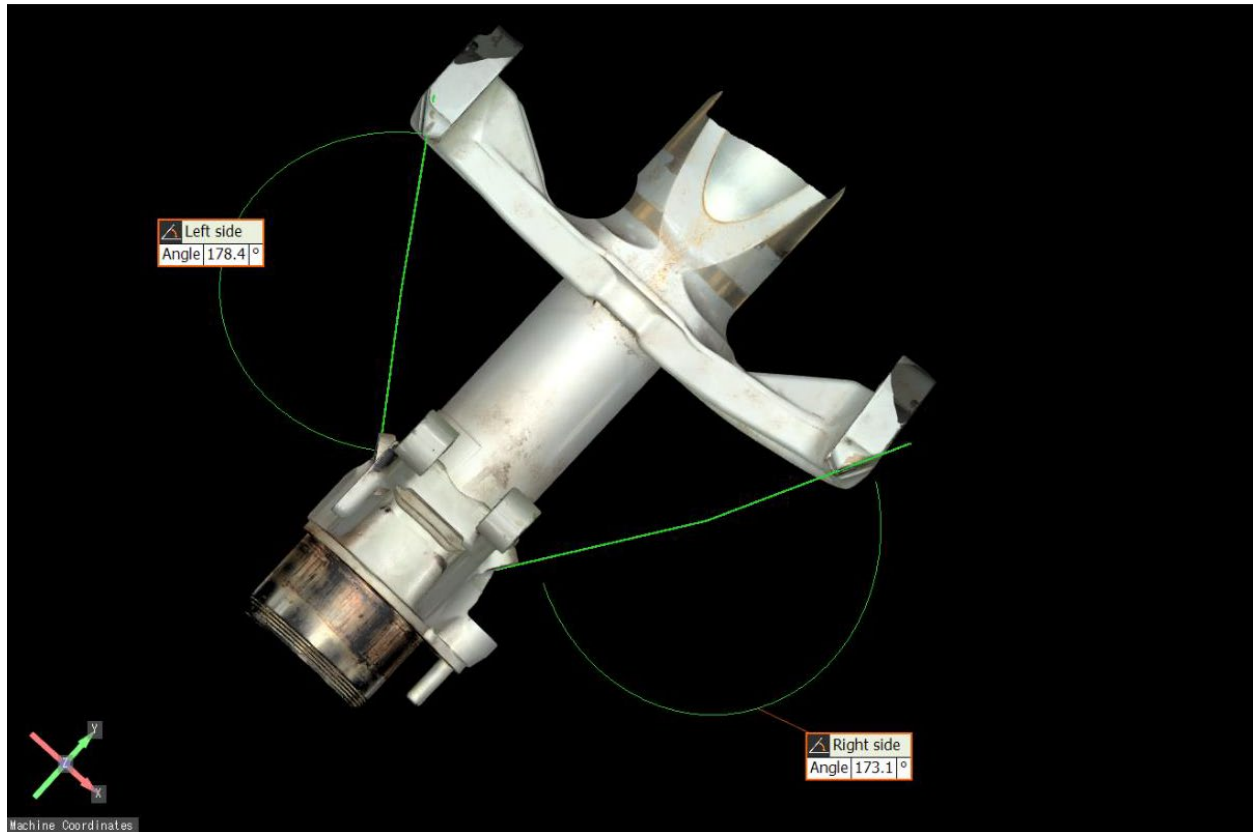
**Figure 4.** Brace attachment hardware exhibiting a slight bend.



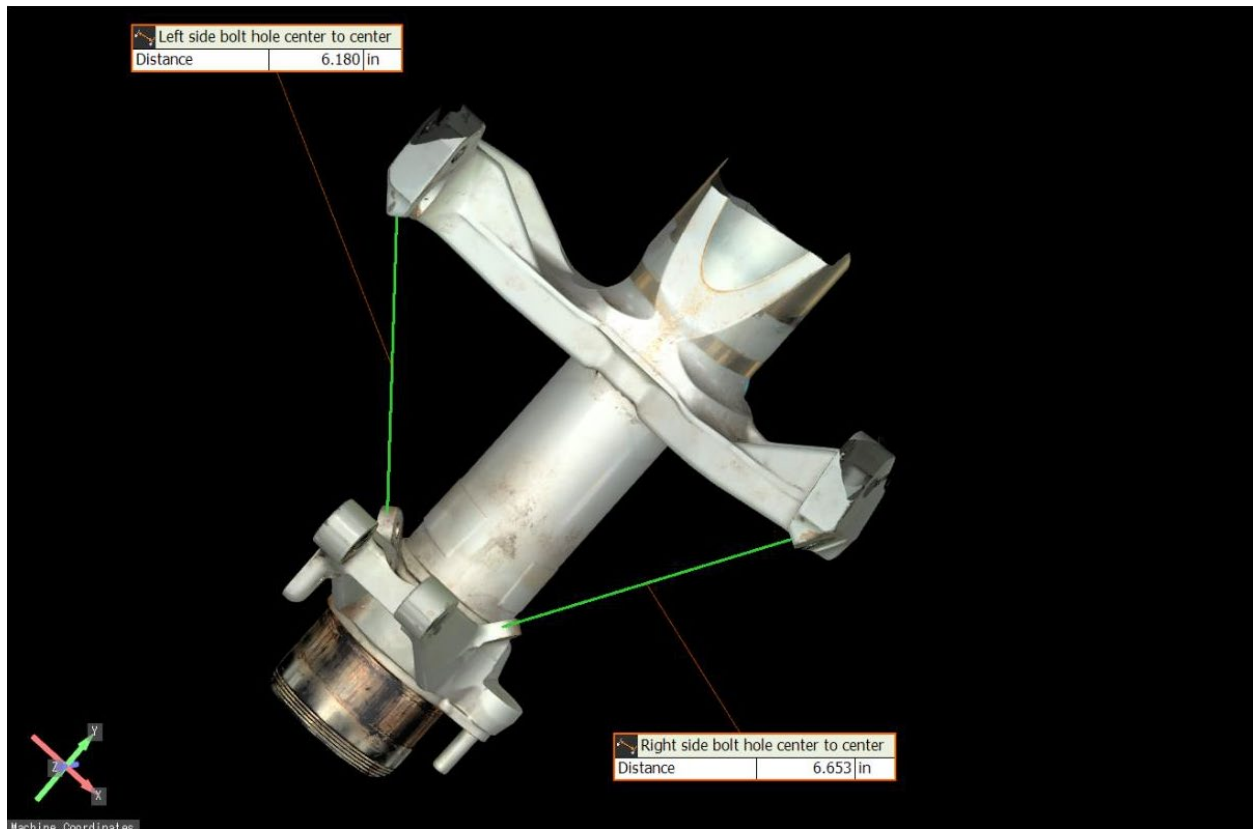
**Figure 5.** Tear out of bolt hole. Red arrow depicts direction of force.



**Figure 6.** Deformation of upper trunnion.



**Figure 7.** Angle between the planes of the brace attachment points.



**Figure 8.** Distance between bolt hole centers.