

NATIONAL TRANSPORTATION SAFETY BOARD

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



October 11, 2016

MATERIALS LABORATORY FACTUAL REPORT

Report No. 16-093

A. ACCIDENT INFORMATION

Place : Toughkenamon, Pennsylvania
Date : June 1, 2016
Vehicle : Aeronca 7AC N83547
NTSB No. : ERA16LA200
Investigator : Todd Gunther

B. COMPONENTS EXAMINED

1. Rear-seat shoulder-harness and rear attach-hardware assembly (P/N H-618-rear, STC No. SA1768GL, Aero Fabricators drawing AF-41).

C. DETAILS OF THE EXAMINATION

Figure 1 shows the submitted rear-seat shoulder-harness and rear attach-hardware assembly. The purpose of the laboratory investigation is to document the accident damage to the attach hardware as identified in Figure 1. For reference, Figure 2 shows post-accident images of the structural tubing arrangement behind the rear seat of the accident airplane (Figure 2a) and the post-accident position of the rear attach hardware on those structural tubes (Figure 2b).

Closer views of the rear attach-hardware are shown in Figures 3 and 4. As observed in Figures 3a and 4, the upper attach bracket exhibits permanent bending deformation of the flat (planar) portion of the bracket from its original shape (e.g. double cantilever bending). The degree of bending from planarity is shown in Figure 4a (each half of the upper bracket is bent approximately 12°). The bending deformation is consistent with the installed bracket assembly being mechanically pulled or slid over the aircraft structural tubes (see Figure 2).

Figure 5 shows the internal surfaces of the disassembled rear attach hardware. Yellow paint transfer is noted along the edges of the upper and lower brackets as indicated in Figure 6. The paint transfer is consistent with the installed bracket assembly being mechanically pulled or slid over the aircraft structural tubes. The associated rear-attach fastening-hardware is also shown in Figure 5. The specification calls for AN365-624 elastic stop nuts for the fastening hardware, rather the submitted evidence included stamped lock-nuts. The specification requires a single AN960-616 washer to be installed under each nut, rather the bolt at the wide end of the attach

hardware had two AN960-616 washers and a unknown washer. The bolt at the narrow end of the attach hardware had an unknown washer.

Paint was removed in an approximately $\frac{1}{2}$ inch diameter area on both sides of the upper and lower brackets to enable thickness and hardness testing. Both brackets are fabricated from steel with a thickness of approximately 0.058 inch and an average hardness of about 79 HRB.

Michael Budinski
Chief, Materials Laboratory Division



Figure 1 As-received rear-seat shoulder-harness and rear attach-hardware assembly.

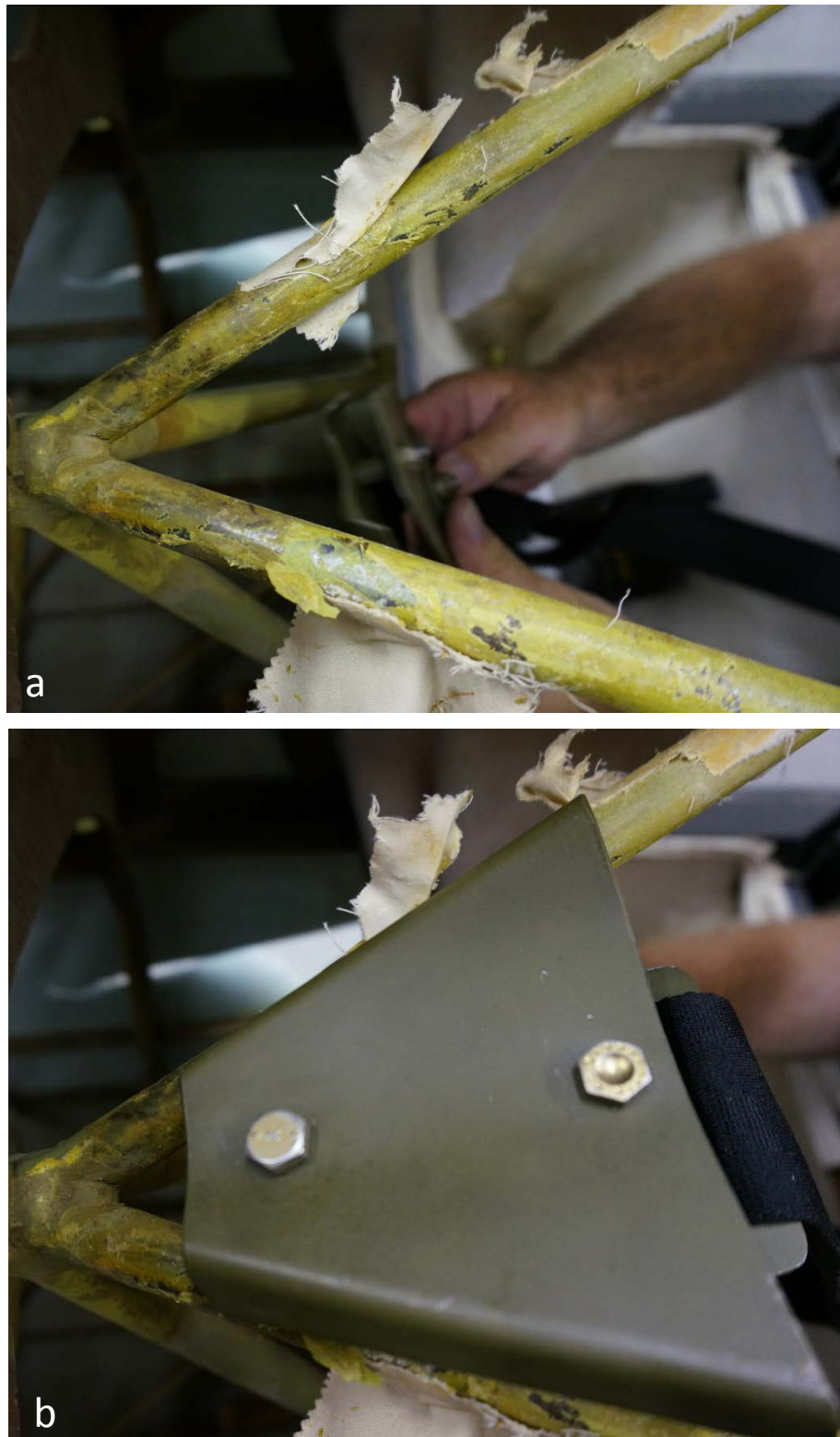


Figure 2 Post-accident images of the structural tubing arrangement behind the rear seat of the accident airplane (View a) and the position of the rear attach hardware on those structural tubes (View b).

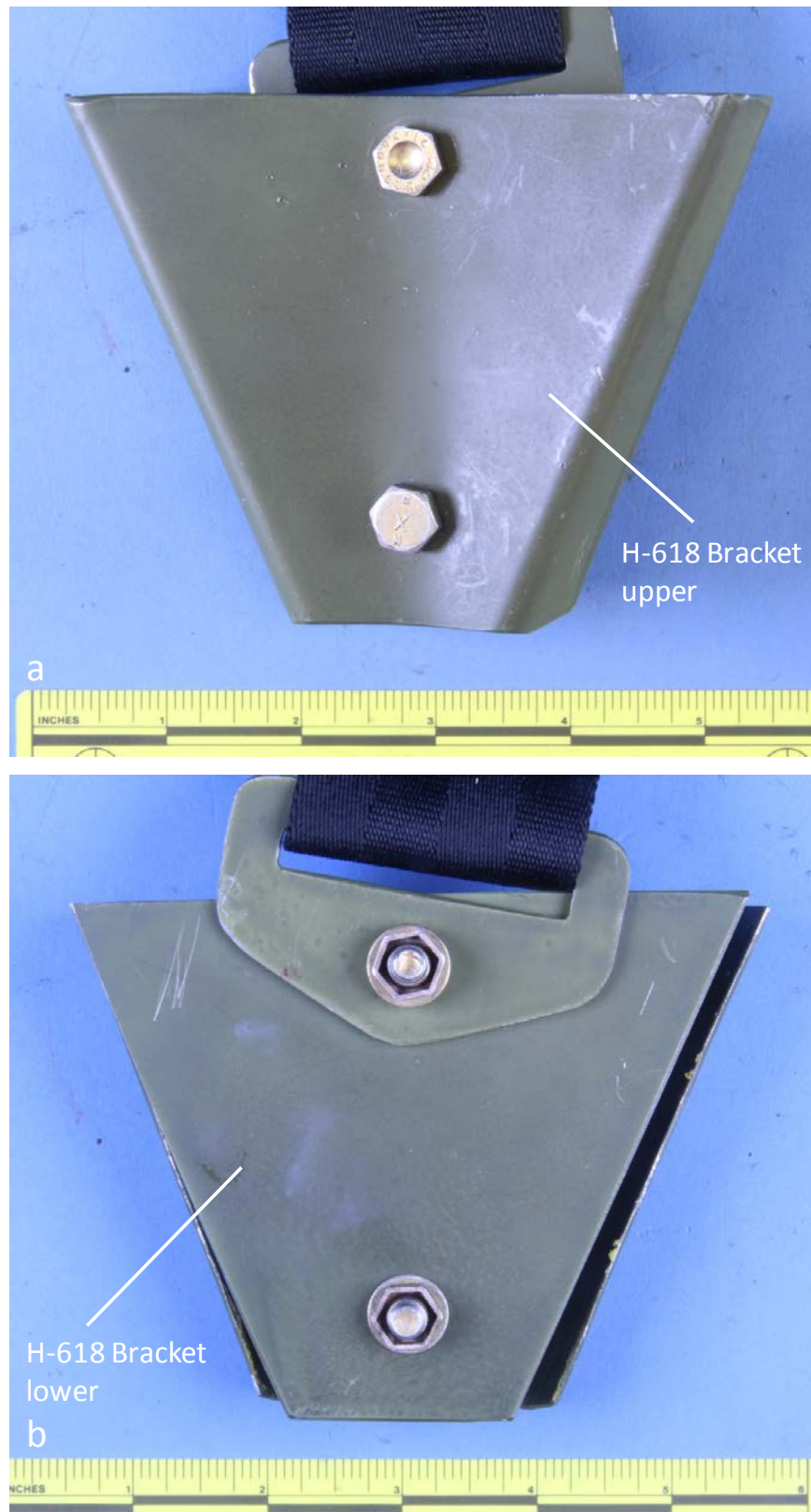


Figure 3 Images of the upper and lower brackets of the as-received rear attach hardware assembly.

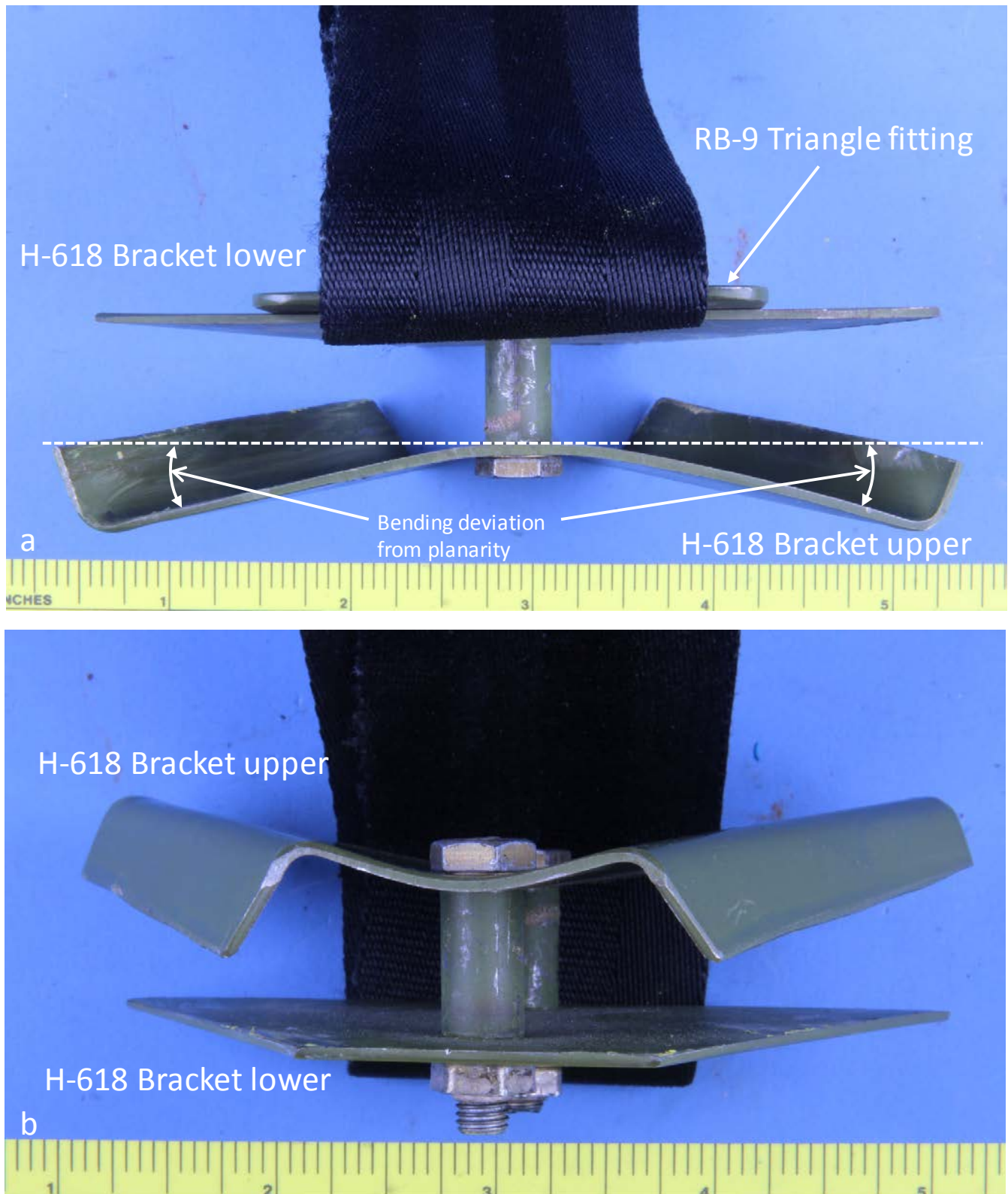


Figure 4 Edge views of the rear attach hardware assembly showing permanent bending deformation in the upper bracket.

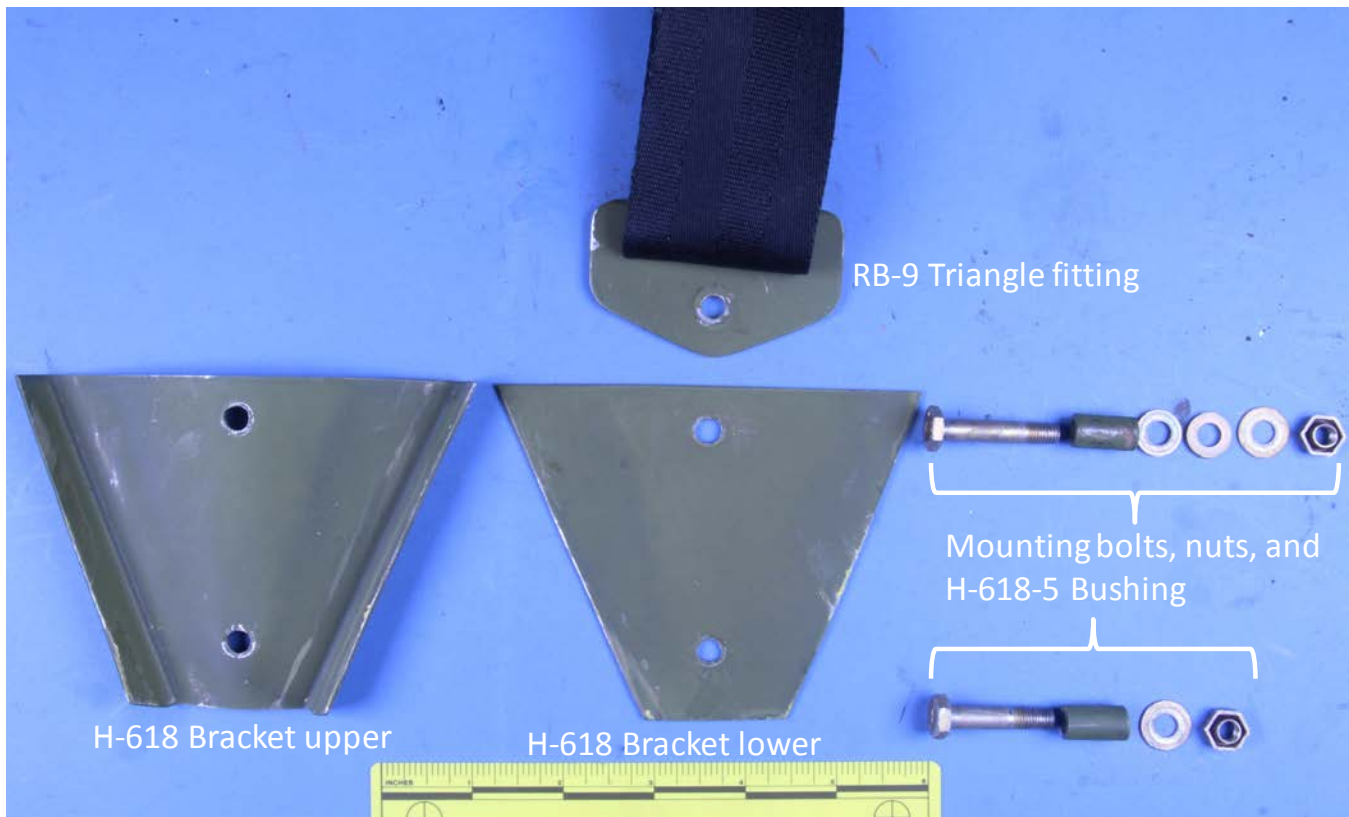


Figure 5 View of the inner surfaces of the disassembled rear attach hardware.

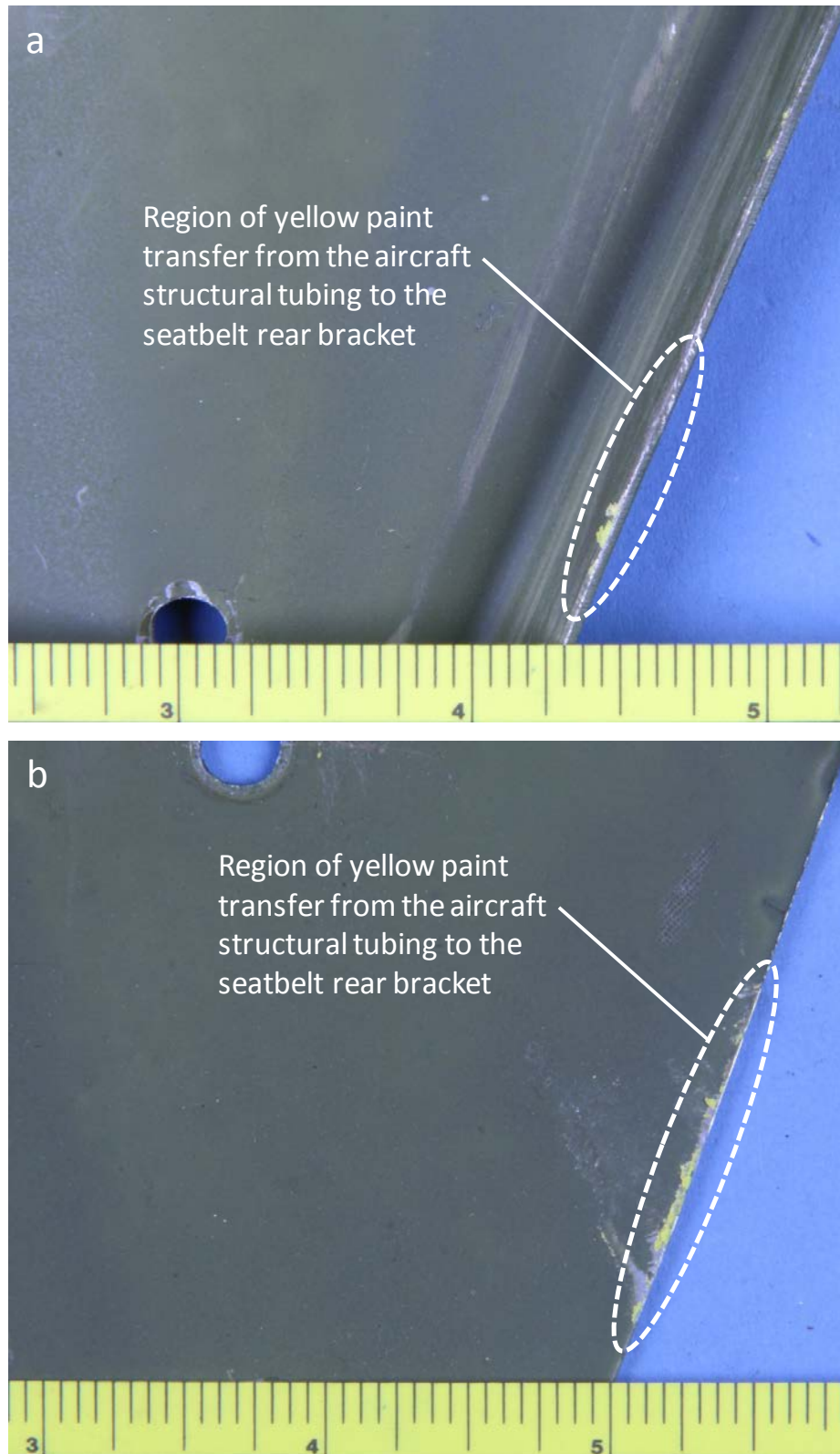


Figure 6 Areas of paint transfer from an airplane structural tube to the upper (View a) and lower (View b) brackets.