

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



WPR23LA270

MATERIALS LABORATORY

Factual Report 24-066

September 17, 2024

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A. ACCIDENT INFORMATION

Location: Palm Springs, California
Date: July 11, 2023
Vehicle: Sling Aircraft LSA, N294JY
Investigator: Elliott Simpson (AS-WPR)

B. COMPONENTS EXAMINED

Landing gear strut

C. EXAMINATION PARTICIPANTS

Specialist Adrienne Lamm
National Transportation Safety Board
Washington, D.C.

D. DETAILS OF THE EXAMINATION

The subject landing gear strut was submitted after the left wheel experienced a failure during take-off roll out. The landing gear strut was subsequently disassembled from the aircraft and submitted to the NTSB Materials Laboratory for examination, as shown in the lower image of Figure 1.

The manufacturing identification information embedded in it is shown in the upper image of Figure 1. Per the identification information the strut was manufactured in February of 2022.

Cracking parallel to the lamina was visible on both sides of the strut, with more extensive cracking observed on the left side. Figures 2-6 show the left side had multiple cracks, with one crack that extended all the way through the strut upwards from the end and caused a gap between the lower and upper halves of the strut. The longest crack on the left side extended from the end, through the center of the forward face, through the brake line slot on the aft face, and past the bolt sleeve into the flat center portion of the strut. Additionally, one of the cracks extending up from the end on the left side branched onto the inner surface, as shown in Figure 7.

The right side of the strut is shown in Figures 2 and 4. There was one distinct crack extending through the center of the forward face near the end, though it did not appear to extend all the way to the end. On the aft face, the crack extended from the brake line slot towards the end, but again did not appear to extend all the way to the end.

The left end was sectioned from the strut using a reciprocating saw with a carbide blade. The end was wrapped in masking tape and continuous vacuum

suction was applied to prevent contamination of the fracture surfaces by particles resulting from sectioning. The sectioned end piece is shown in Figure 8.

Following sectioning, the lower and upper halves of the piece were almost entirely separated, apart from a 0.5-inch-wide strip of laminate near the forward face containing several layers of fiber that bridged between the two halves. The bridging strip of material can be seen within the gap between separated halves shown in Figure 9. The strip was mechanically fractured in the laboratory and the exposed fracture surfaces of the two strut halves are shown in Figure 10.

Flattened features were observed throughout the fracture surfaces. Embedded dirt/debris (indicated by the white arrows in Figures 11-13) was also visible on the fracture surfaces in several areas adjacent to flattened features. A large shiny area consistent with a void, outlined by a red dotted line in Figure 11, was observed adjacent to the forward face. Several other areas had interconnecting networks of shiny voids surrounding disbonded material. Some of these networks of voids are encircled by yellow dotted lines in Figures 11-13. Entrapped contaminants were also observed in several locations within the strut matrix, including a blue speck indicated by the red arrow in Figure 12 and a few pieces of red fiber indicated by the red arrows in Figure 13.

Submitted by:

Adrienne V. Lamm
Materials Engineer

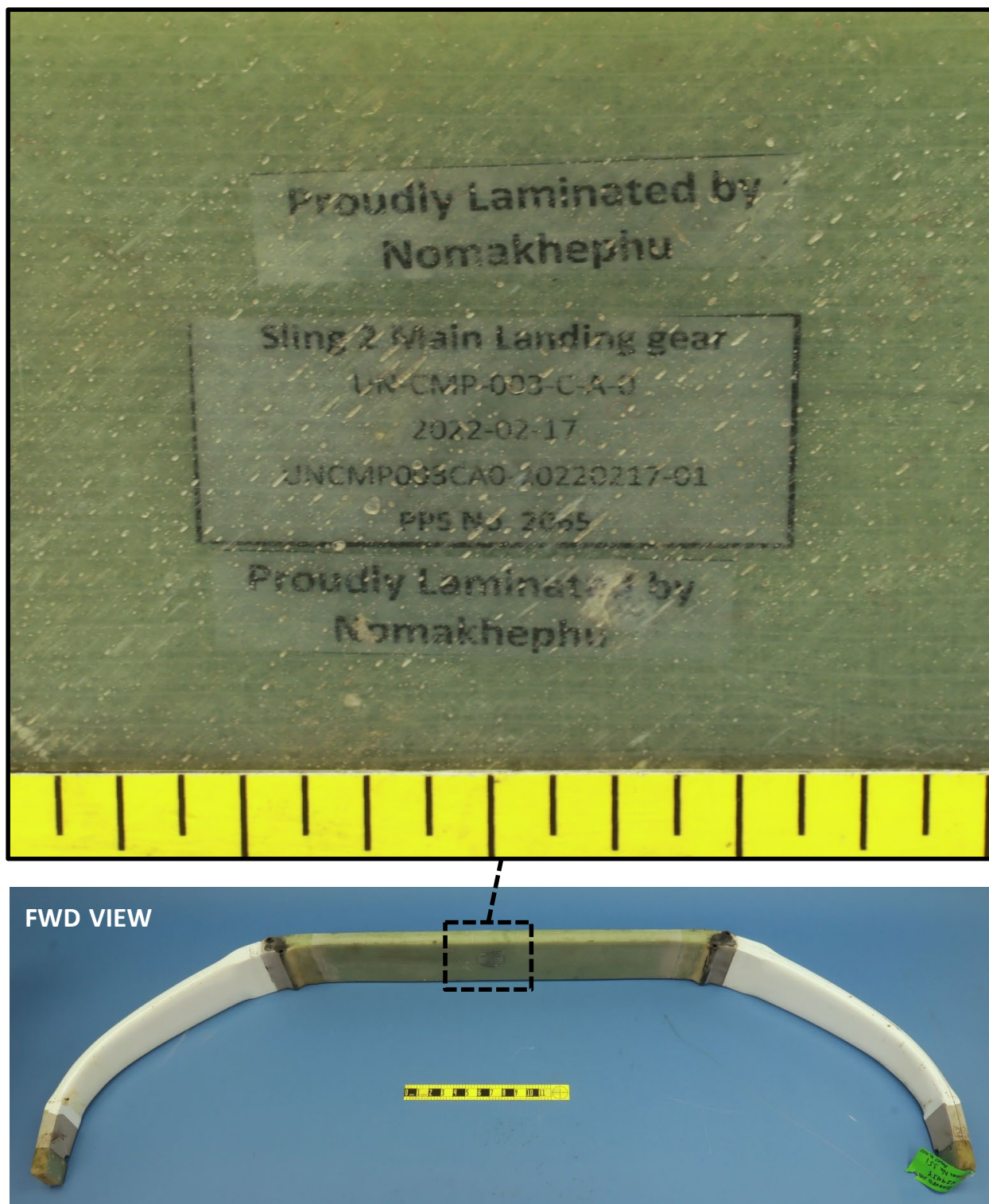


Figure 1. (Bottom) Overall photo showing the landing gear strut as viewed from the forward side. (Top) Close-up photo showing the embedded manufacturing information.

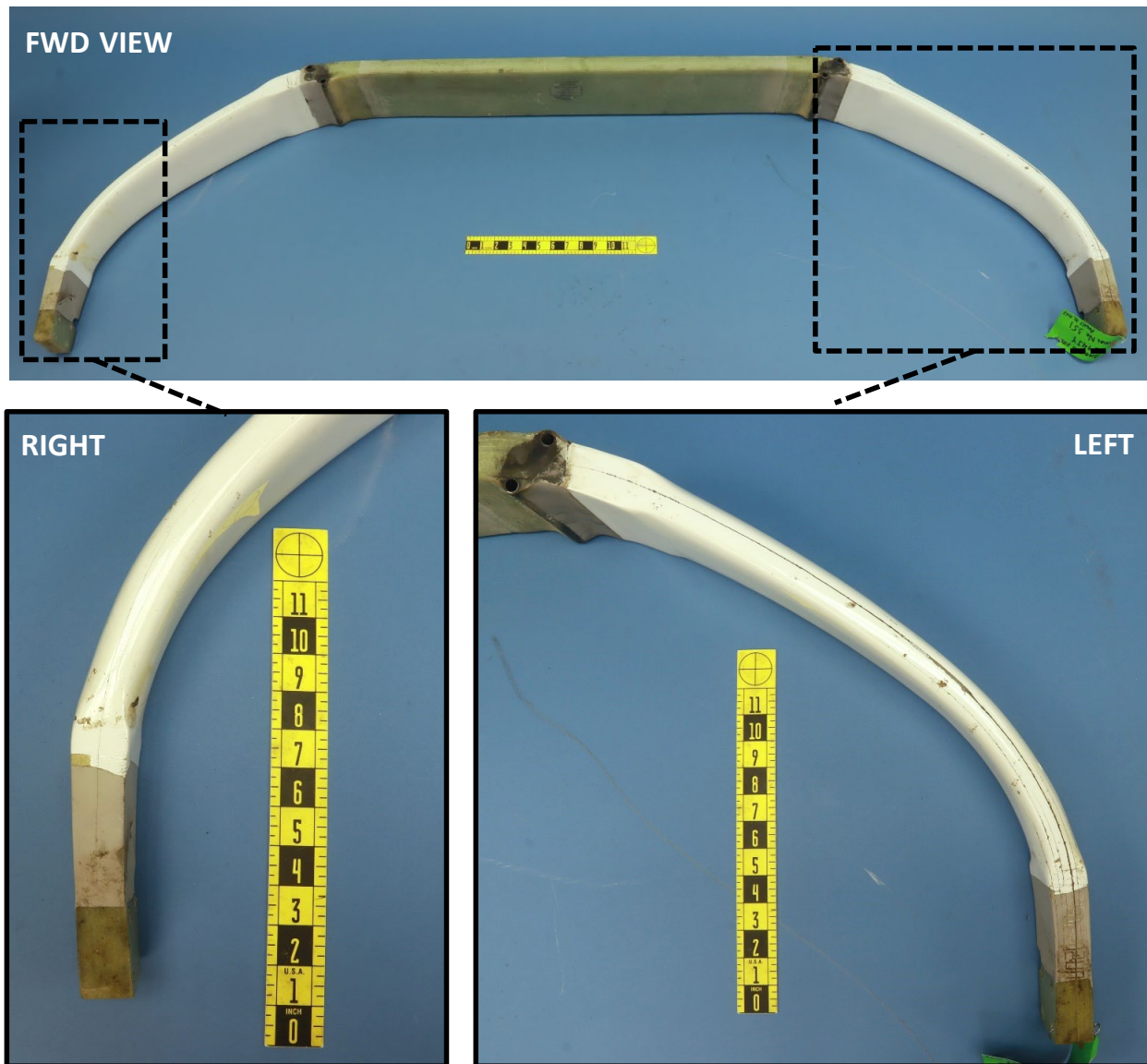


Figure 2. (Top) Overall photo showing the landing gear strut as viewed from the forward side. (Bottom) Close-up photos showing cracks in the right and left sides of the strut.

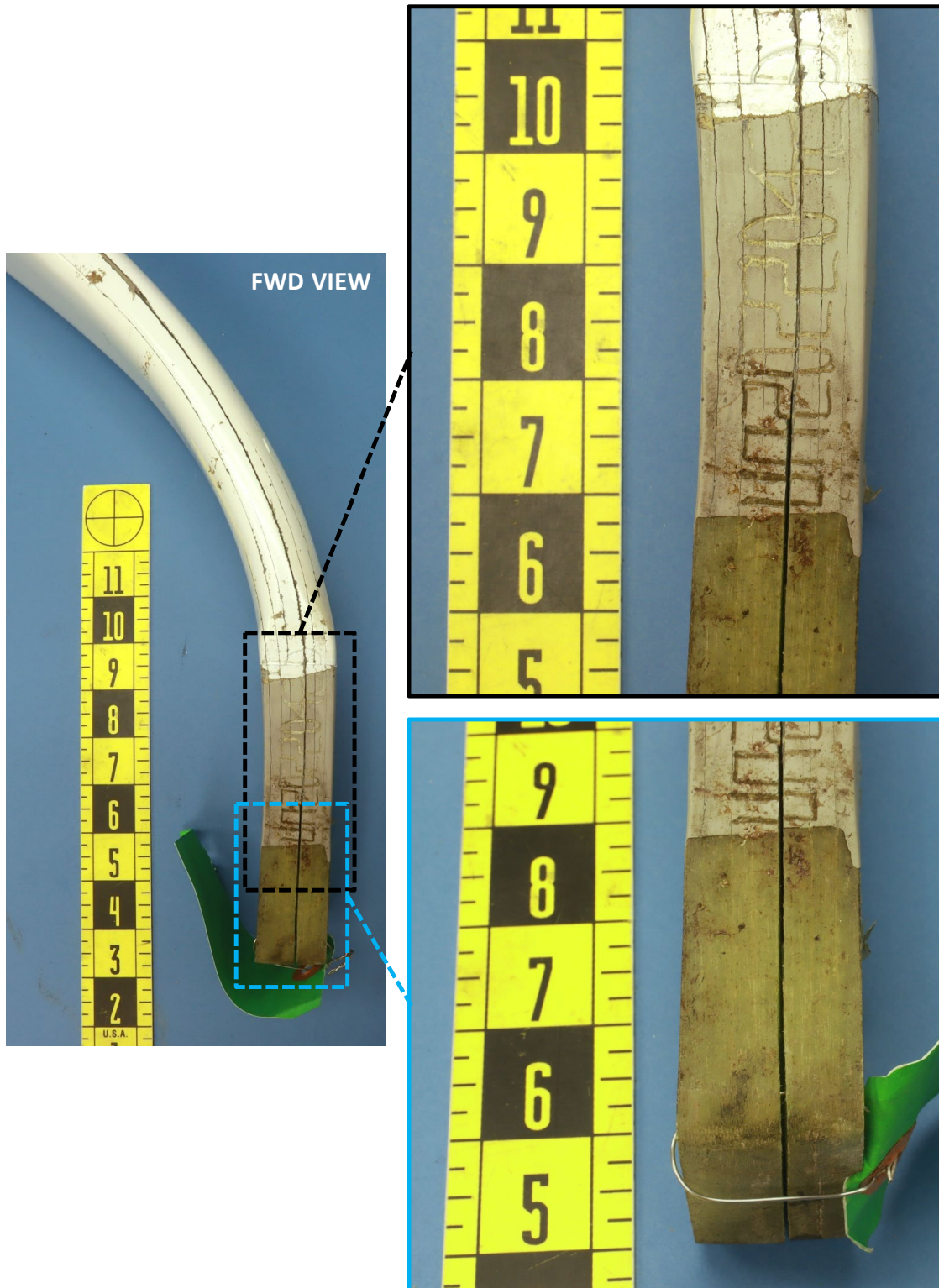


Figure 3. Close-up photos showing cracks in the left side end of the strut as viewed from the forward side.

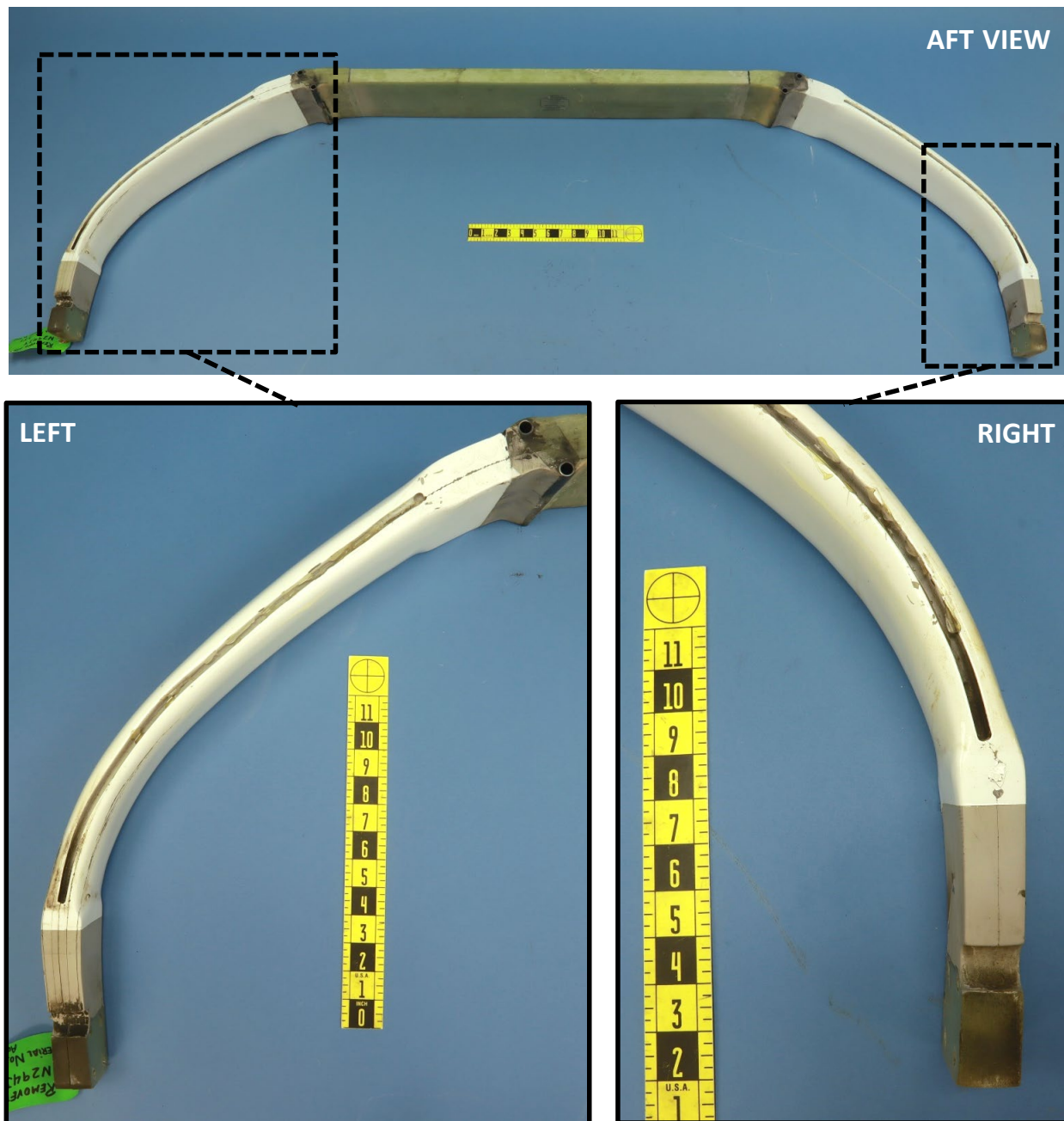


Figure 4. (Top) Overall photo showing the landing gear strut as viewed from the aft side. (Bottom) Close-up photos showing cracks in the left and right sides of the strut.

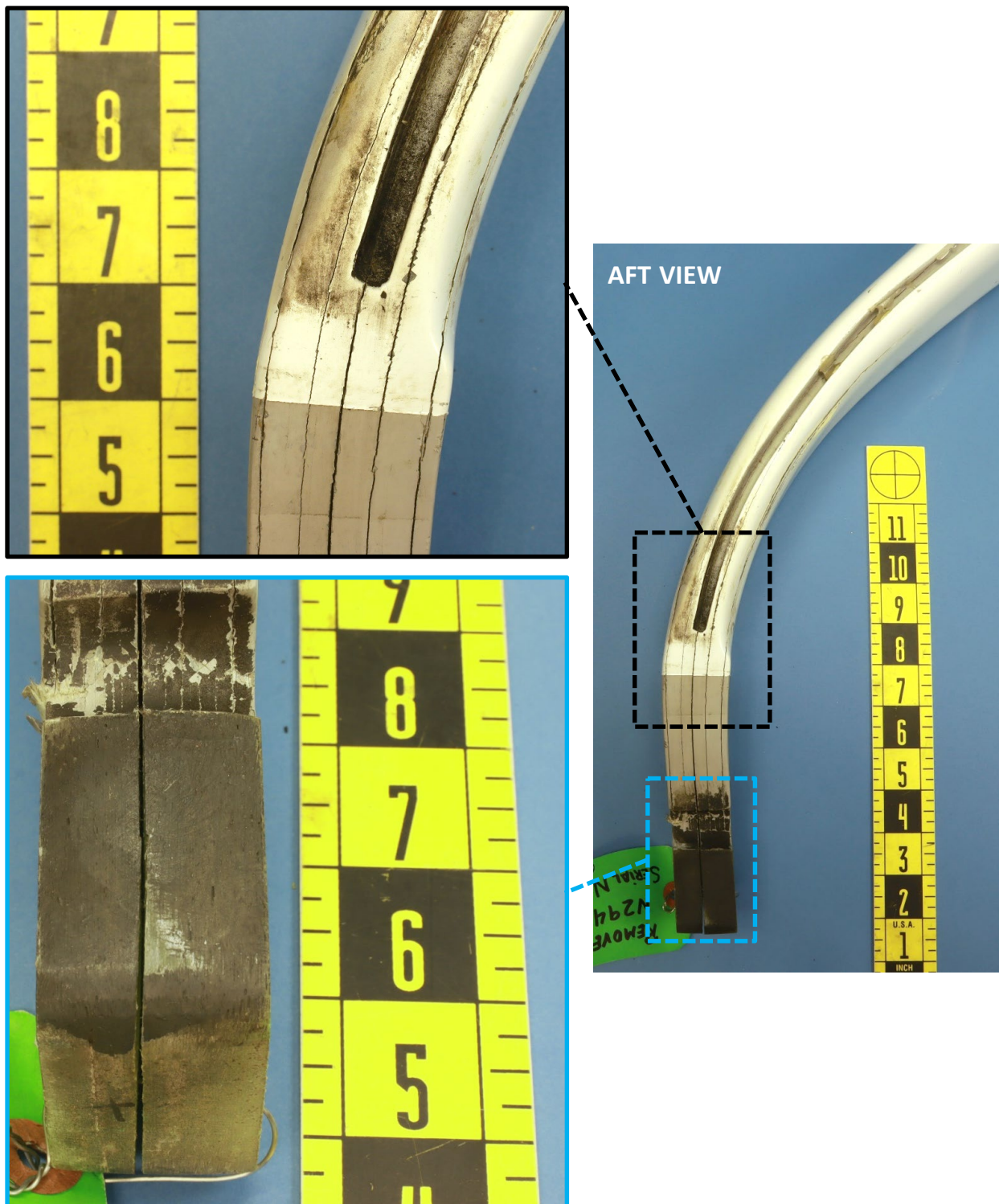


Figure 5. Close-up photos showing cracks in the left side strut end as viewed from the aft side.

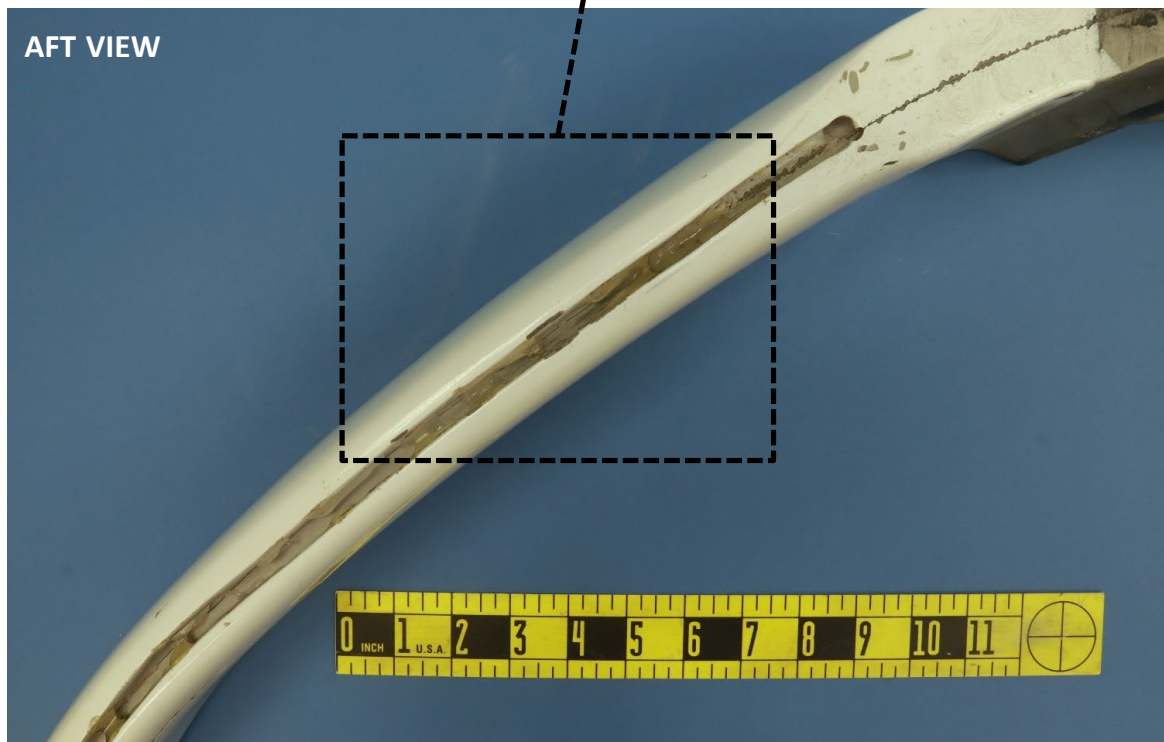
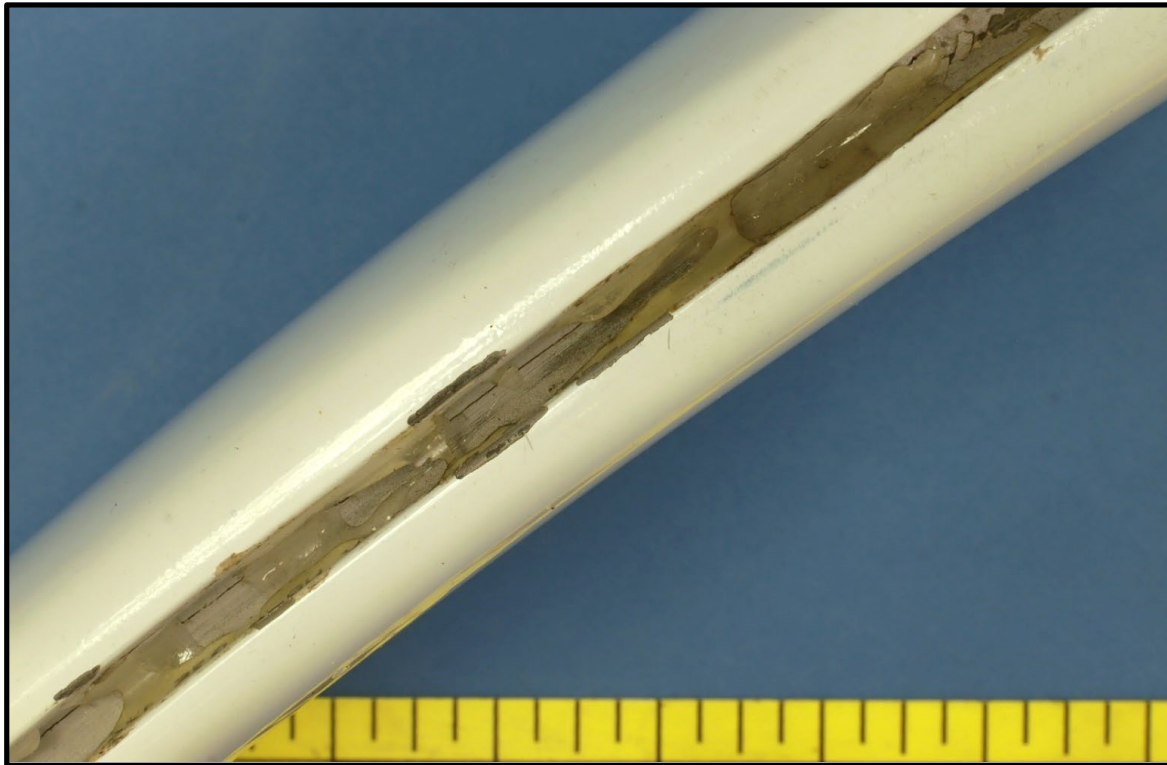


Figure 6. Close-up photos showing cracks within the aft brake line slot on the left side of the strut.

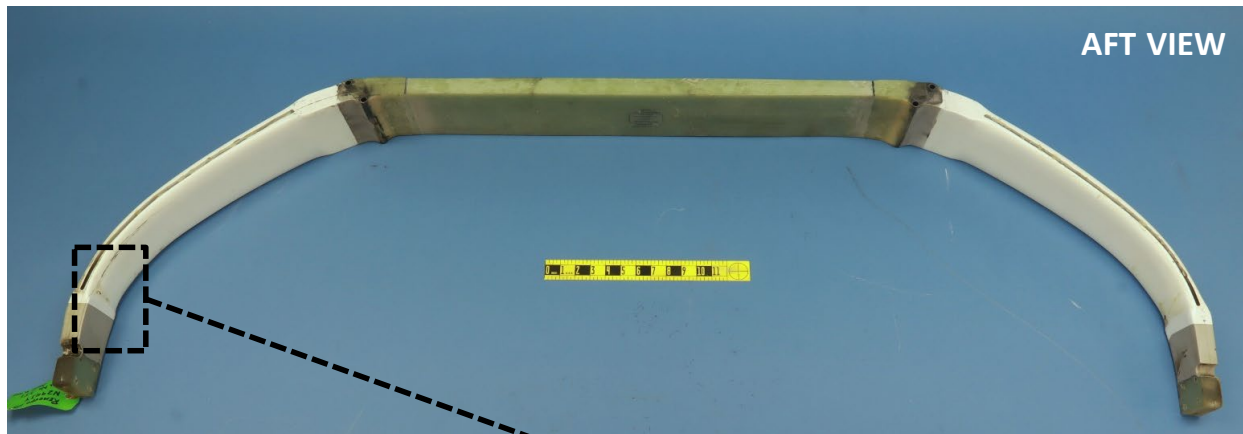


Figure 7. (Top) Overall photo showing the landing gear strut as viewed from the aft side. (Bottom) Close-up photo showing cracks branching onto the inner surface of the strut on the left side.

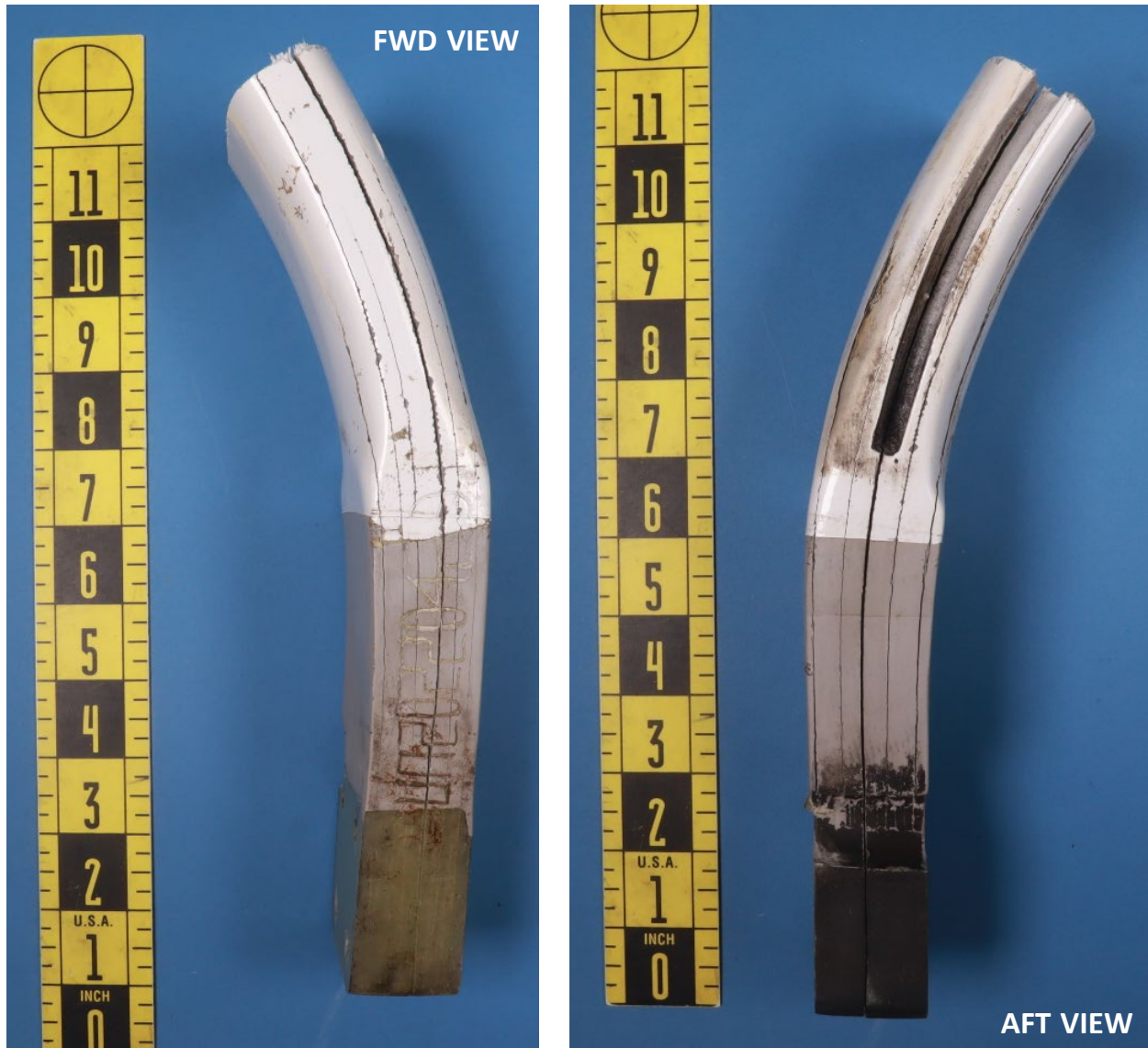


Figure 8. Overall photos of the left side end of the strut after sectioning, as viewed from the forward and aft sides (left and right, respectively).

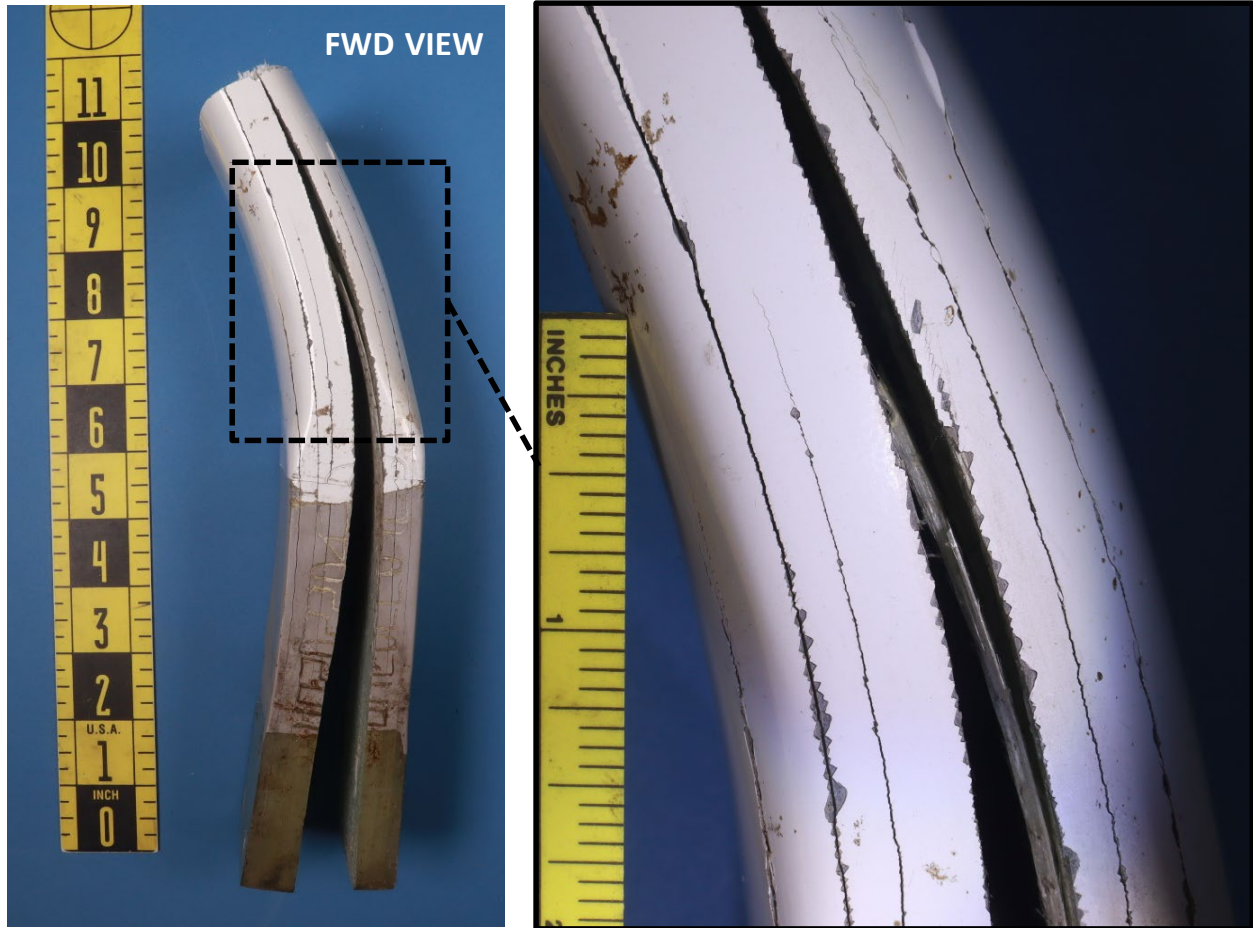


Figure 9. Overall (left) and close-up (right) photos of the sectioned left side end of the strut, as viewed from the forward side. The only portion of material that remained adhered to both halves of the mating fracture surfaces on the strut is visible within the gap shown on the right.

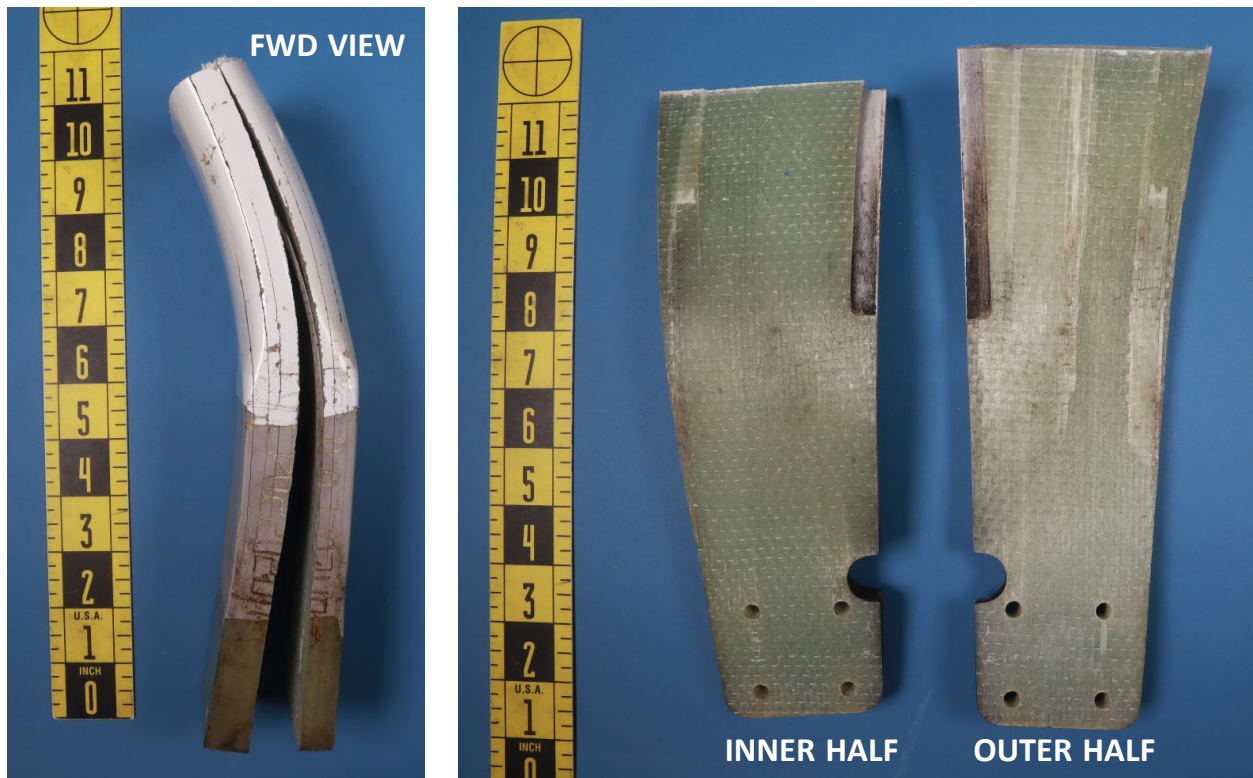


Figure 10. Overall photos of the sectioned left side end of the strut before and after (left and right, respectively) the portion of adhering material between the mating fracture surfaces was mechanically separated in the laboratory.

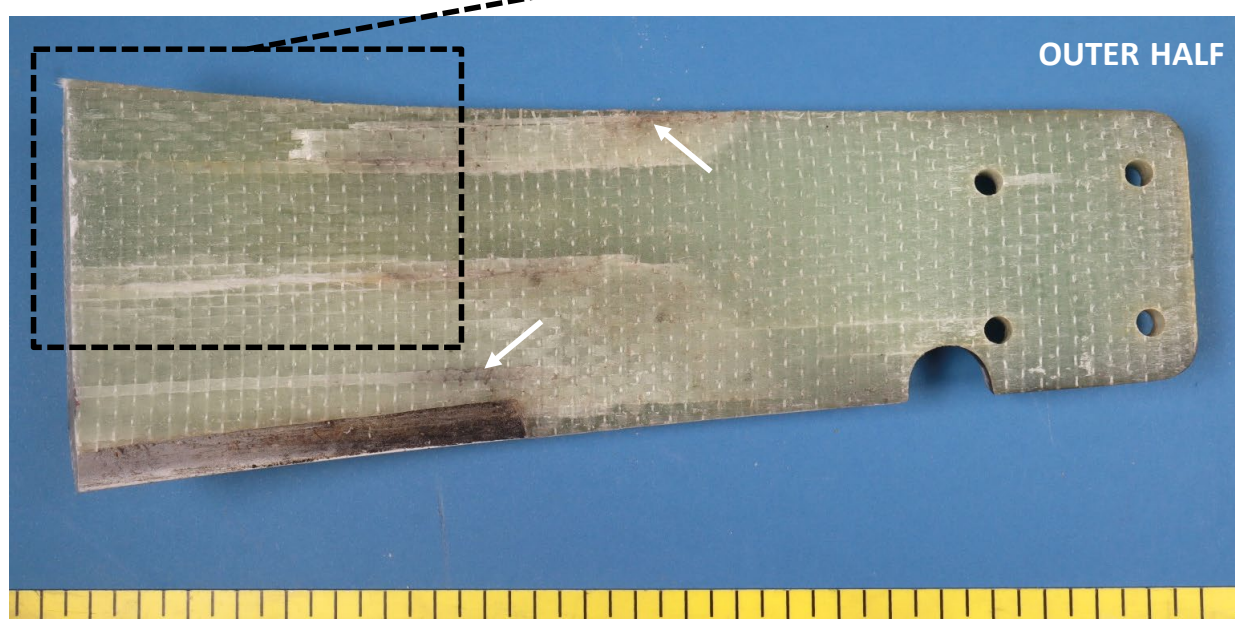
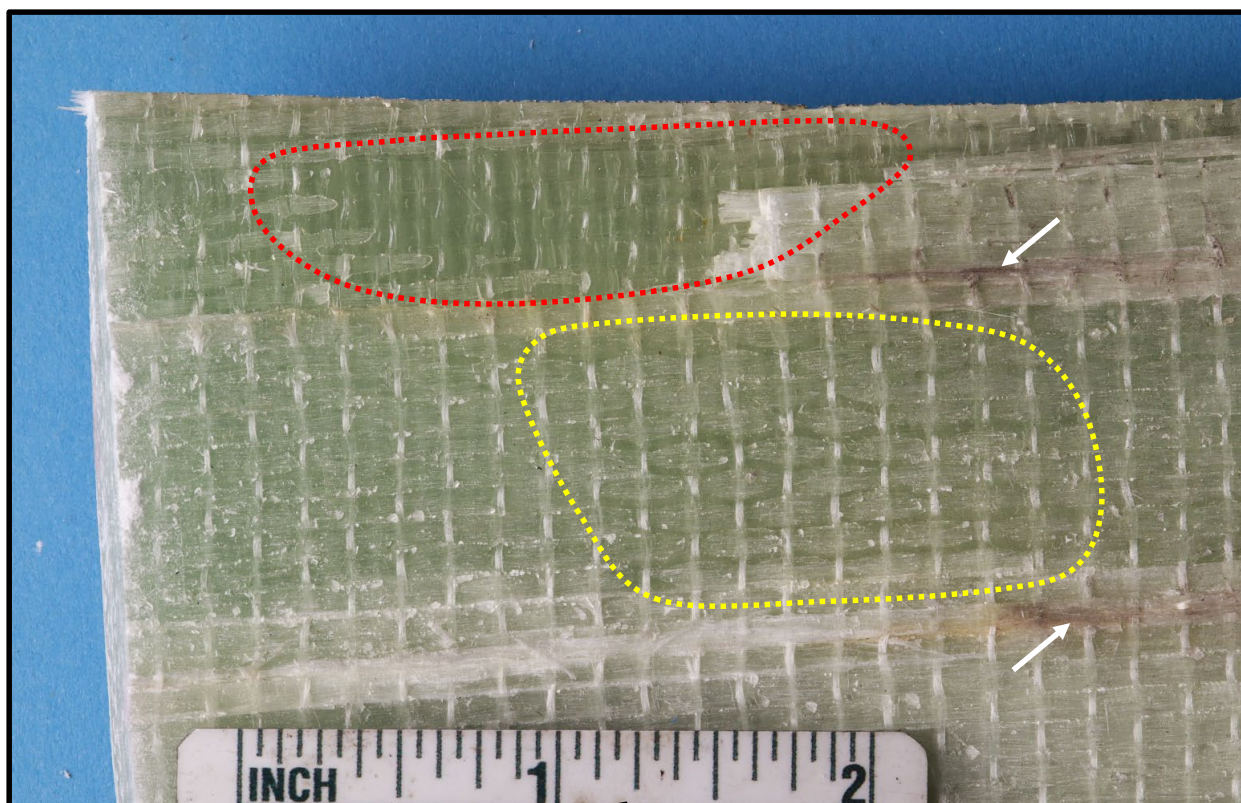


Figure 11. Overall (bottom) and close-up (top) photos of the fracture surface on the upper half of the sectioned left side strut end. The white arrows point to areas with embedded dirt/debris. The red and yellow dotted lines encircle a large shiny area and a network of shiny areas, respectively.

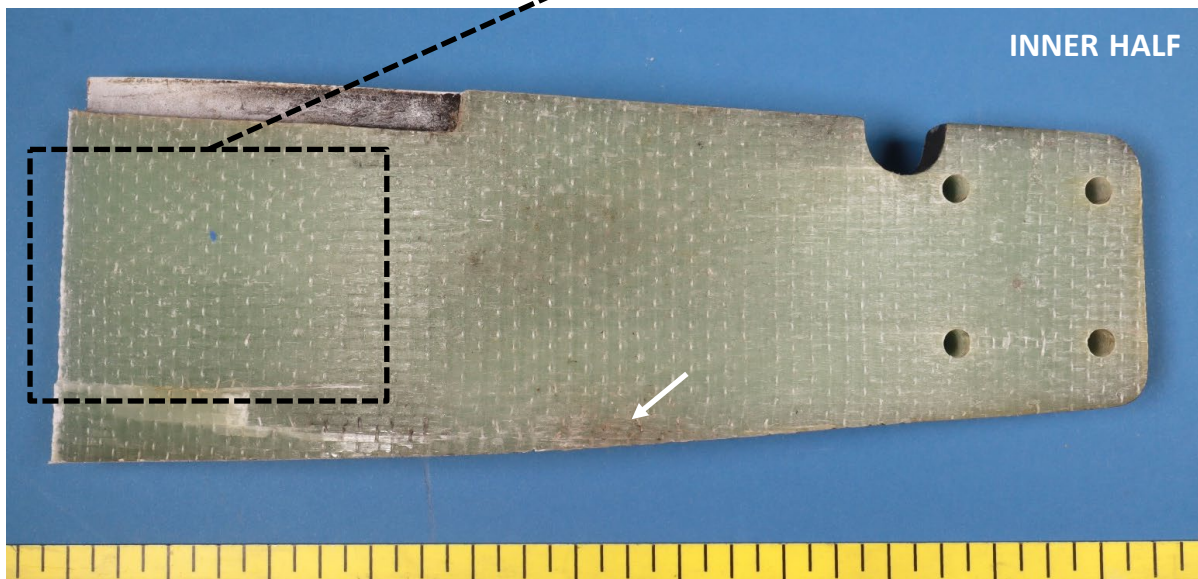
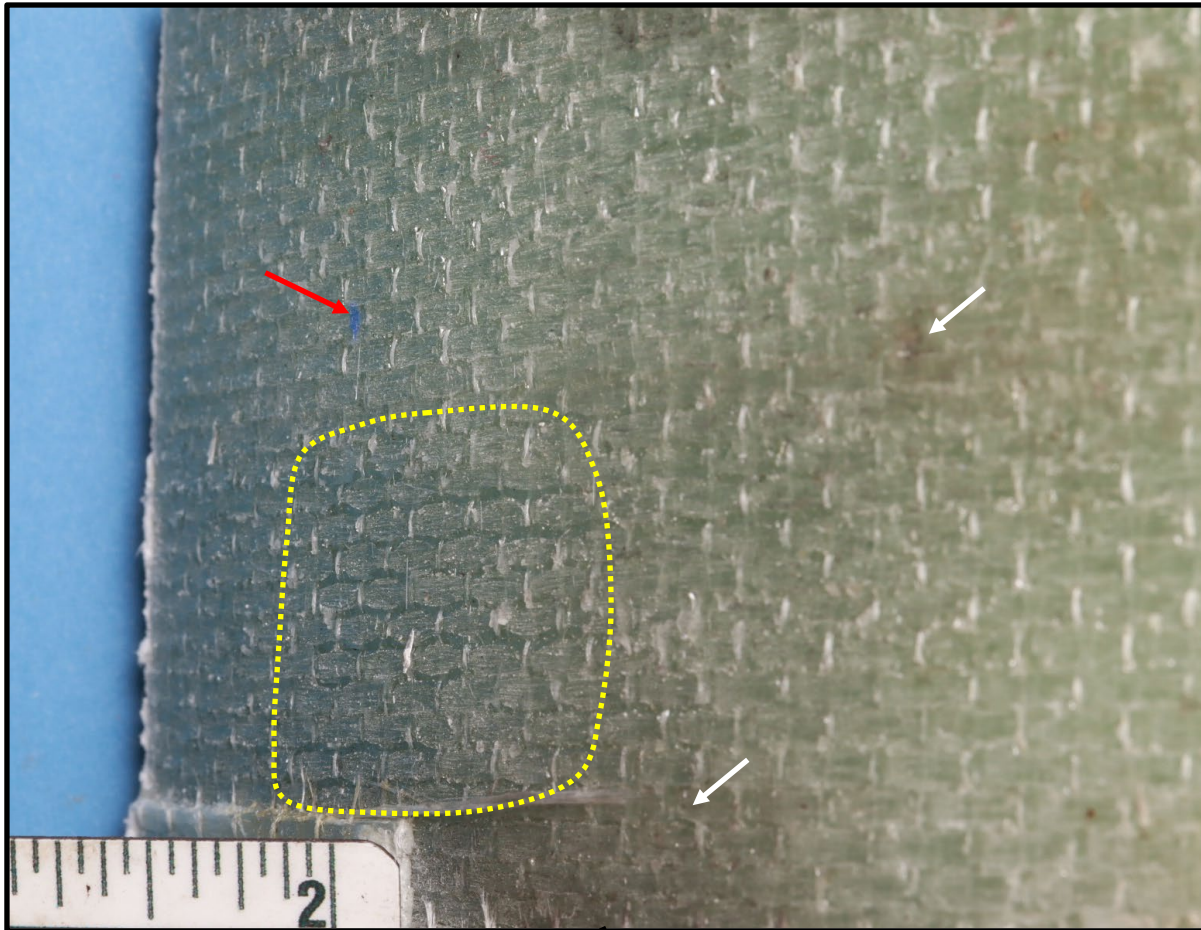


Figure 12. Overall (bottom) and close-up (top) photos of the fracture surface on the lower half of the sectioned left side strut end. The white arrows point to areas with embedded dirt/debris. The red arrow points to an entrapped blue speck of material. The yellow dotted line encircles a network of shiny areas.

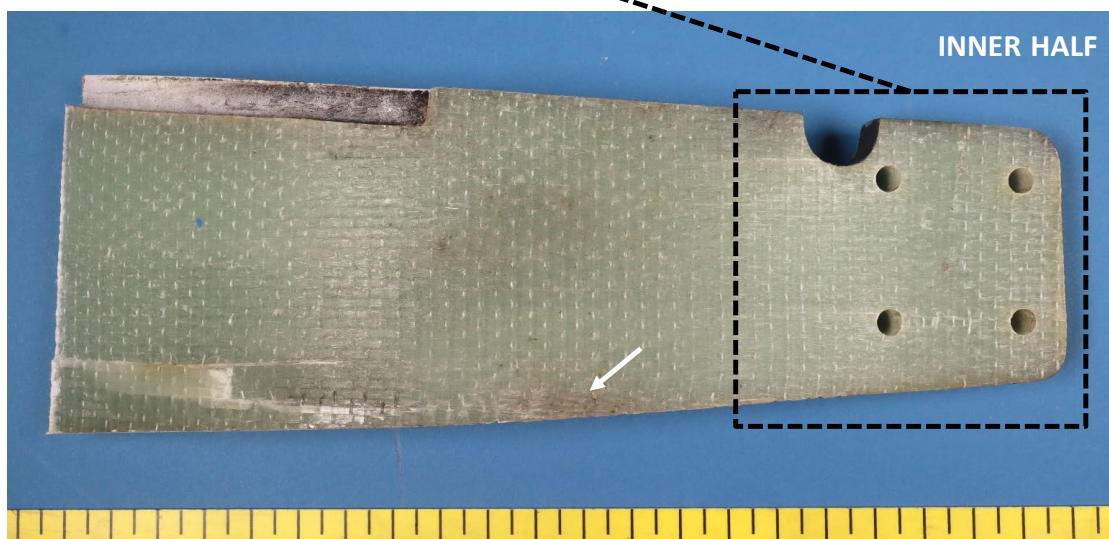
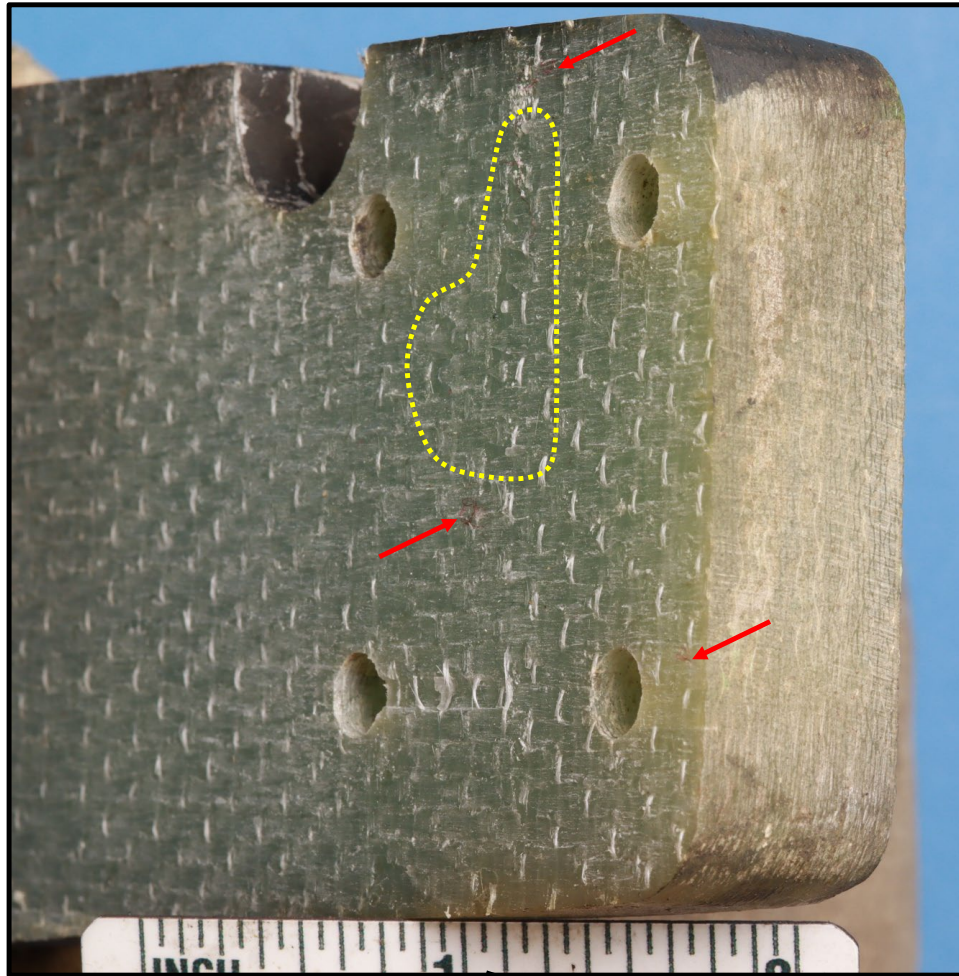


Figure 13. Overall (bottom) and close-up (top) photos of the fracture surface on the lower half of the sectioned left side strut end. The white arrows point to areas with embedded dirt/debris. The red arrows point to entrapped red fibers. The yellow dotted line encircles a network of shiny areas.