

NATIONAL TRANSPORTATION SAFETY BOARD

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



October 10, 2018

MATERIALS LABORATORY FACTUAL REPORT

Report No. 18-077

A. ACCIDENT INFORMATION

Place : Mayport, Florida
Date : August 17, 2018
Vehicle : Beech N35
NTSB No. : ERA18LA227
Investigator : Eric Alleyne, AS-ERA

B. COMPONENTS EXAMINED

1. Portion of a fuel transducer, Insight part number 1000-004-3, serial number 3094.
2. Portion of a fuel line with AN fitting.

C. DETAILS OF THE EXAMINATION

The as-received components are shown in Figure 1 with a portion of AN fitting fractured from the portion of fuel transducer. Both pieces exhibited white salt deposits.

Fractographic analysis was conducted on the portion of fuel line with AN fitting. The aluminum fuel line tube within the fitting was fractured just below the top of the AN nut as shown in Figure 2. As-received, the fracture surface and other surfaces of the AN fitting piece were coated with an adherent white salt deposit, consistent with corrosion product. The fracture surface on the AN fitting piece was cleaned in a mild nonionic detergent using a fine natural-bristle brush and ultrasonic energy. The cleaned fracture surface is shown in Figures 3, 4, and 5. The fracture origin area is identified in the images. The macro-fractographic features are consistent with high-stress, low-cycle fatigue crack propagation, initiating at the outside diameter and progressing through the thickness of the aluminum fuel line and partially along its circumference until final overstress fracture.

The fracture surface of the fuel line tube within the AN fitting was also analyzed by field emission scanning electron microscope as shown in in Figure 6. Fine fractographic features, such as fatigue crack striations, were not observable at higher magnifications due to the extent of corrosion on the fracture surface. No injurious defects were observed in the region of crack initiation.

Michael Budinski
Chief, Materials Laboratory Division



Figure 1 Image of the as-received portion of a fuel transducer and a portion of a fuel line with AN fitting.

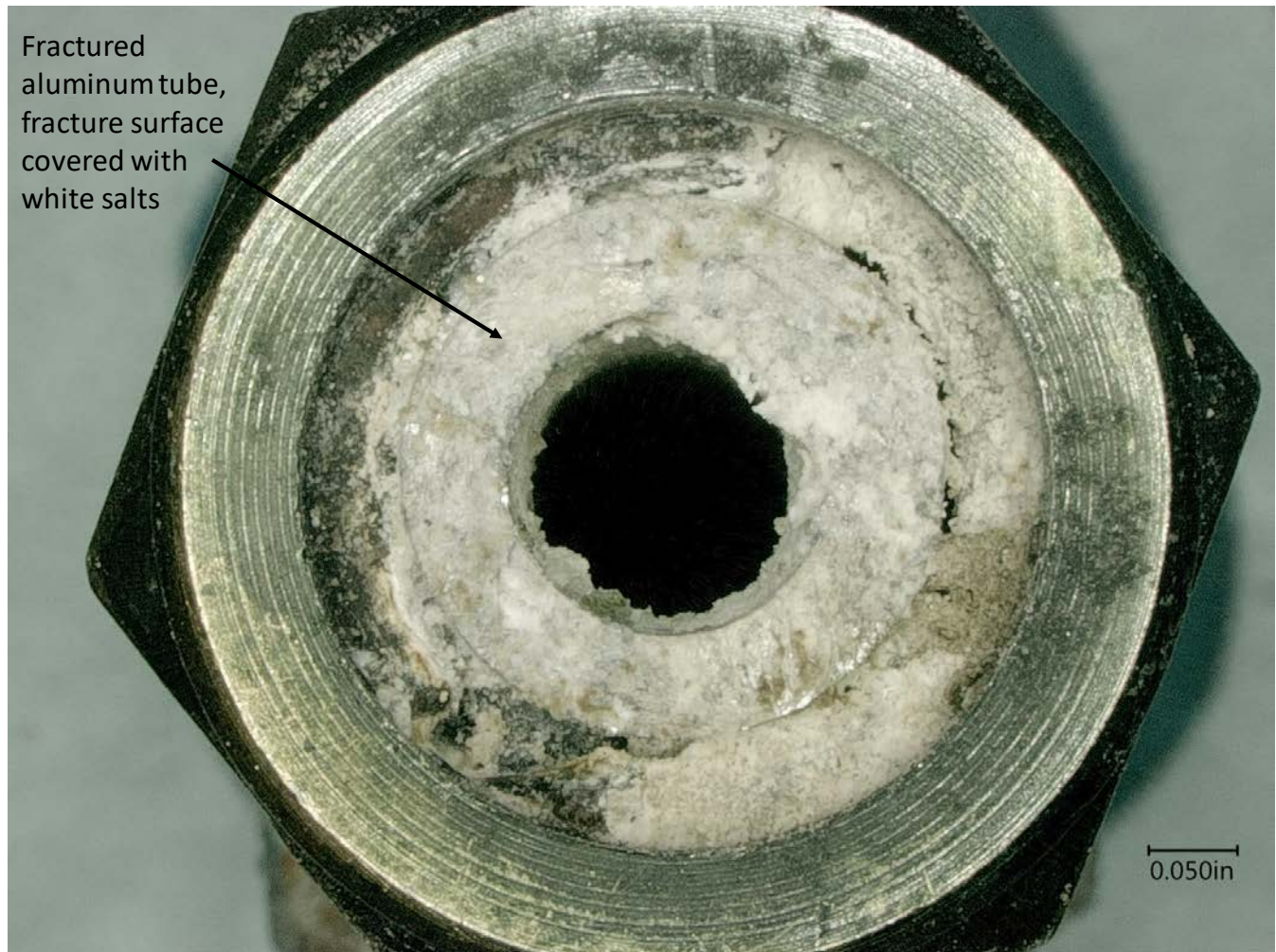


Figure 2 Digital microscope image of the as-received fuel line fracture surface, coated with an adherent white salt deposit.

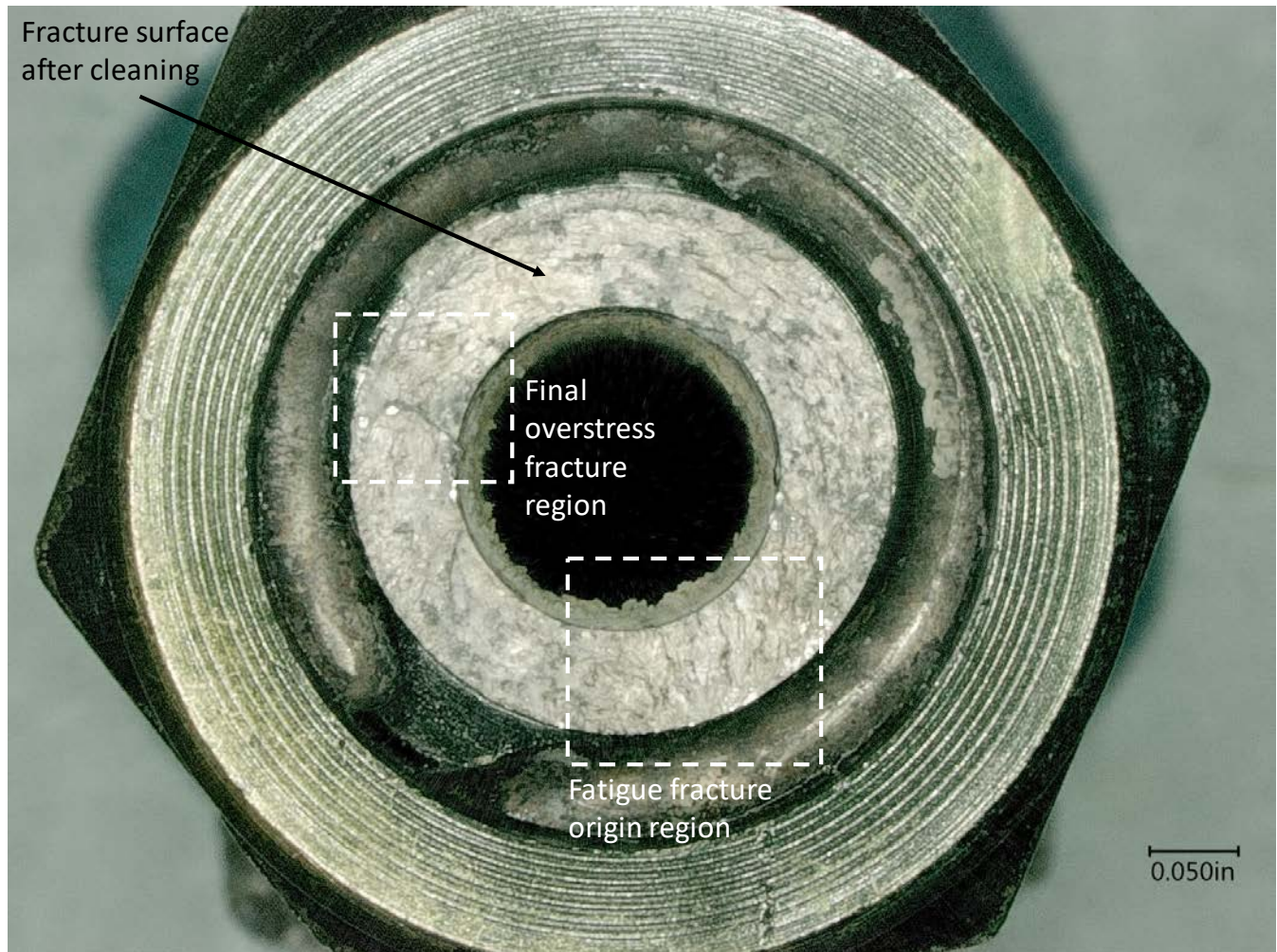


Figure 3 Digital microscope image of the fuel line fracture surface after cleaning. A fracture origin area is identified.

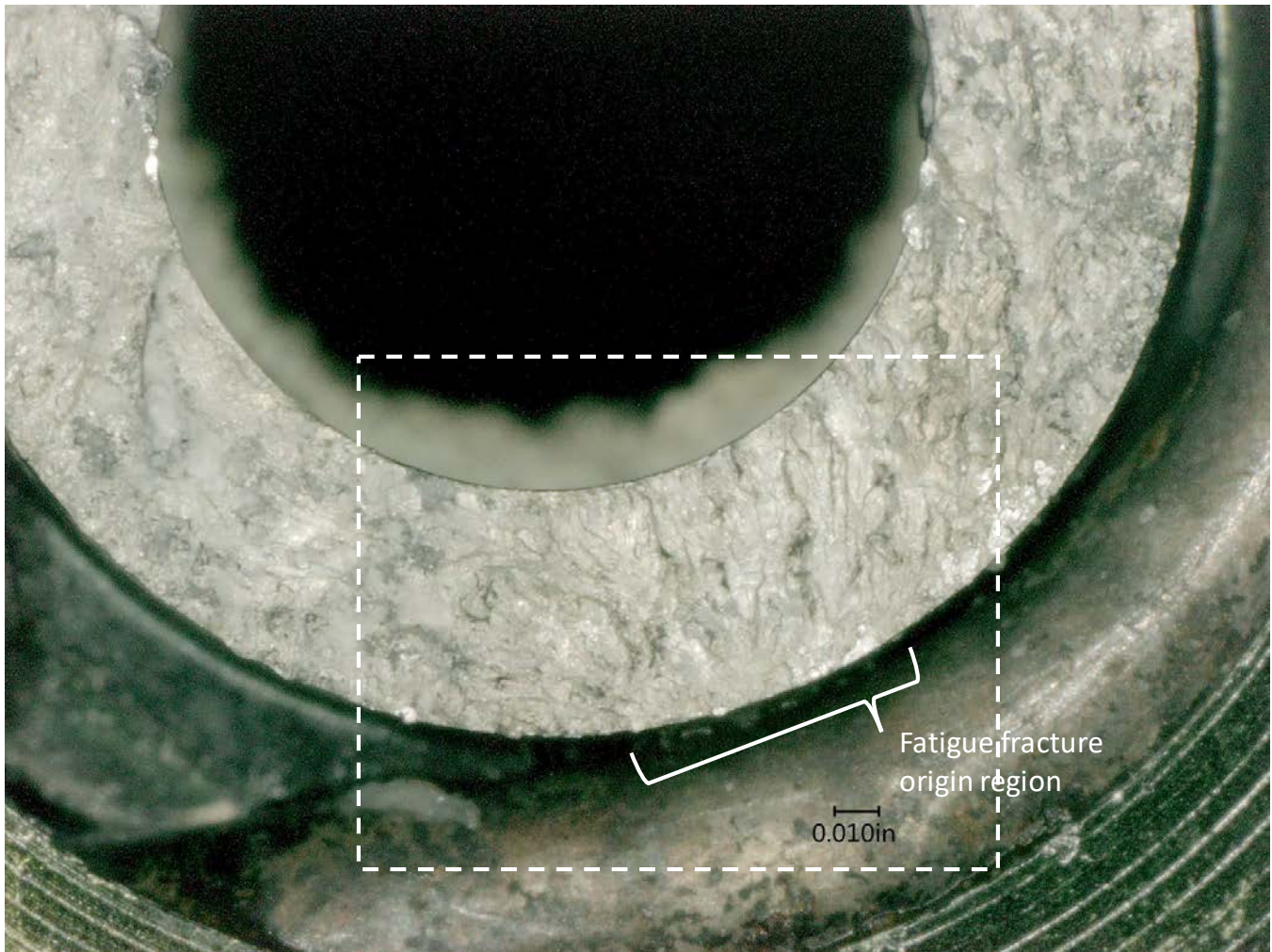


Figure 4 Digital microscope image showing a close view of the origin area identified in Figure 3.

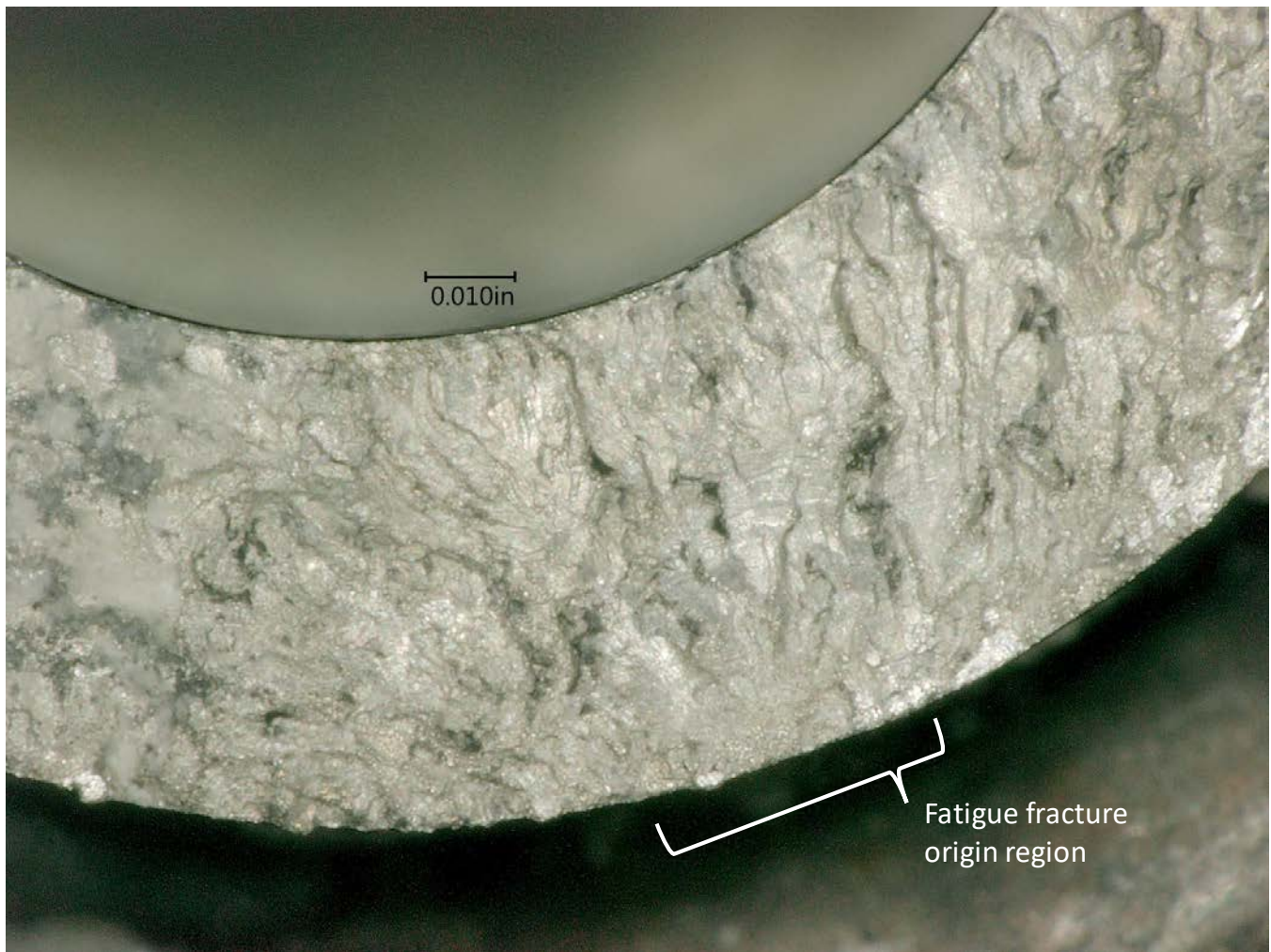


Figure 5 Digital microscope image showing a closer view of the origin area identified in Figure 4.

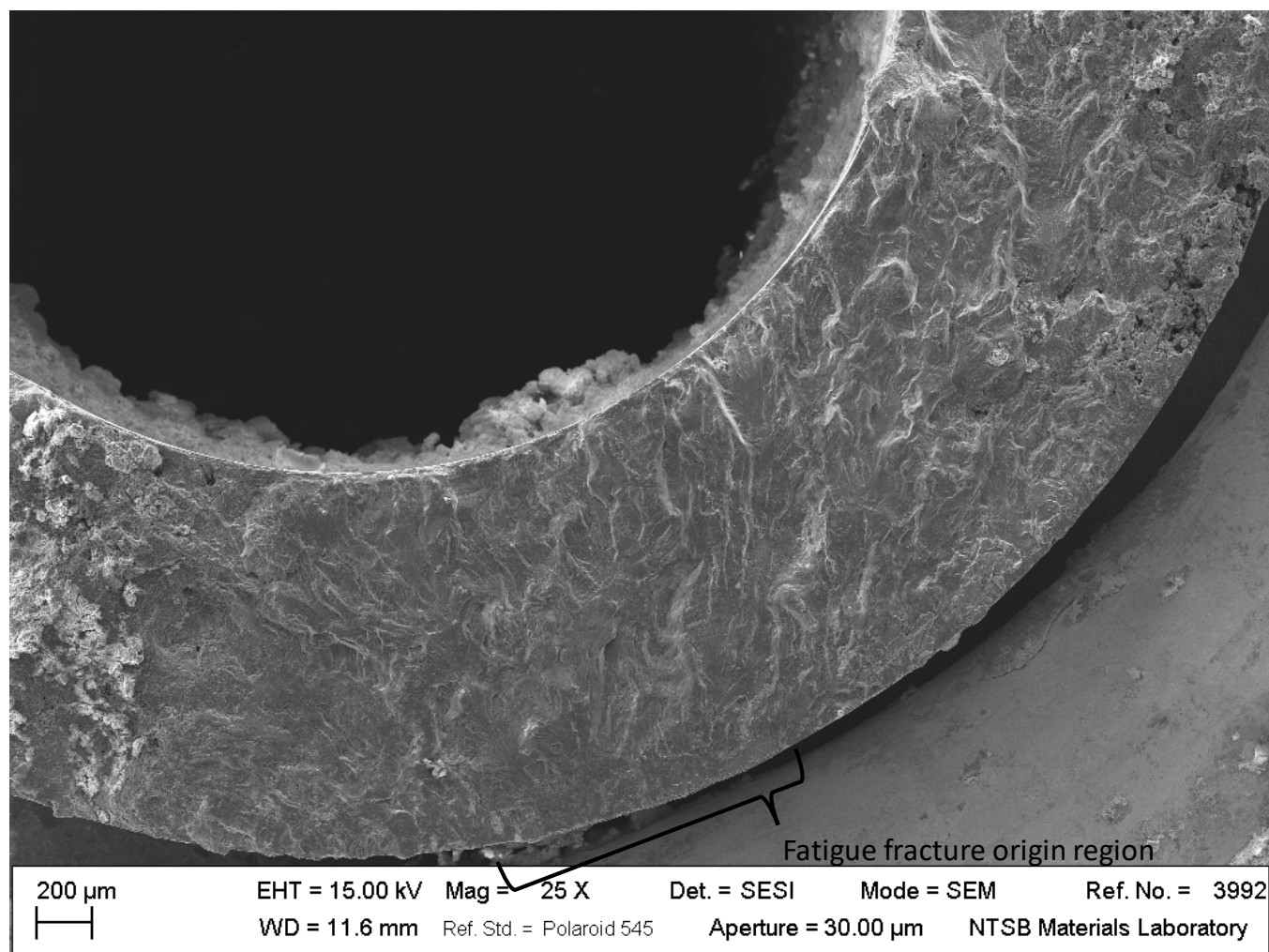


Figure 6 Field emission scanning electron microscope image of the fracture origin region as indicated in Figures 3-5.