

NATIONAL TRANSPORTATION SAFETY BOARD

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



February 16, 2018

MATERIALS LABORATORY FACTUAL REPORT

Report No. 18-021

A. ACCIDENT INFORMATION

Place : Pacific Ocean near Japan
Date : January 26, 2018
Vehicle : Airbus Helicopters (Aérospatiale) SA330J
NTSB No. : ANC18LA020
Investigator : Shaun Williams, AS-ANC

B. COMPONENTS EXAMINED

Tail rotor drive shaft section number 7.

C. DETAILS OF THE EXAMINATION

Overall views of the fractured tail rotor drive shaft pieces are shown in figures 1 and 2. The drive shaft was fractured near the middle of the shaft, and two larger pieces had fracture features that were mated to the adjacent end pieces as shown in figures 1 and 2. Several smaller drive shaft pieces were also submitted, but the mating location for those pieces was not determined conclusively.

As indicated in figures 1 and 2, the shaft had buckling deformation in the area of the fracture and adjacent areas on the forward and aft pieces consistent with an overstress torsion load. The buckling was oriented at an angle relative to the shaft axis, and the angle was consistent the forward end rotating clockwise¹ relative to the aft end. Inward and outward deformation and a fracture at an outward crease were continuous across the fractured pieces, consistent with buckling deformation occurring before the fracture.

Sliding contact marks extending around much of the circumference were observed on the aft shaft piece at locations indicated in figures 1 and 2. However, the marks did not coincide with a fracture location. The fractured pieces between the two end pieces were deformed and curled outward consistent with a change in the relative axis of rotation between the forward and aft pieces as the fractures progressed.

Matthew R. Fox, Ph.D.
Senior Materials Engineer

¹ The shaft rotation direction is referenced as viewed looking forward.

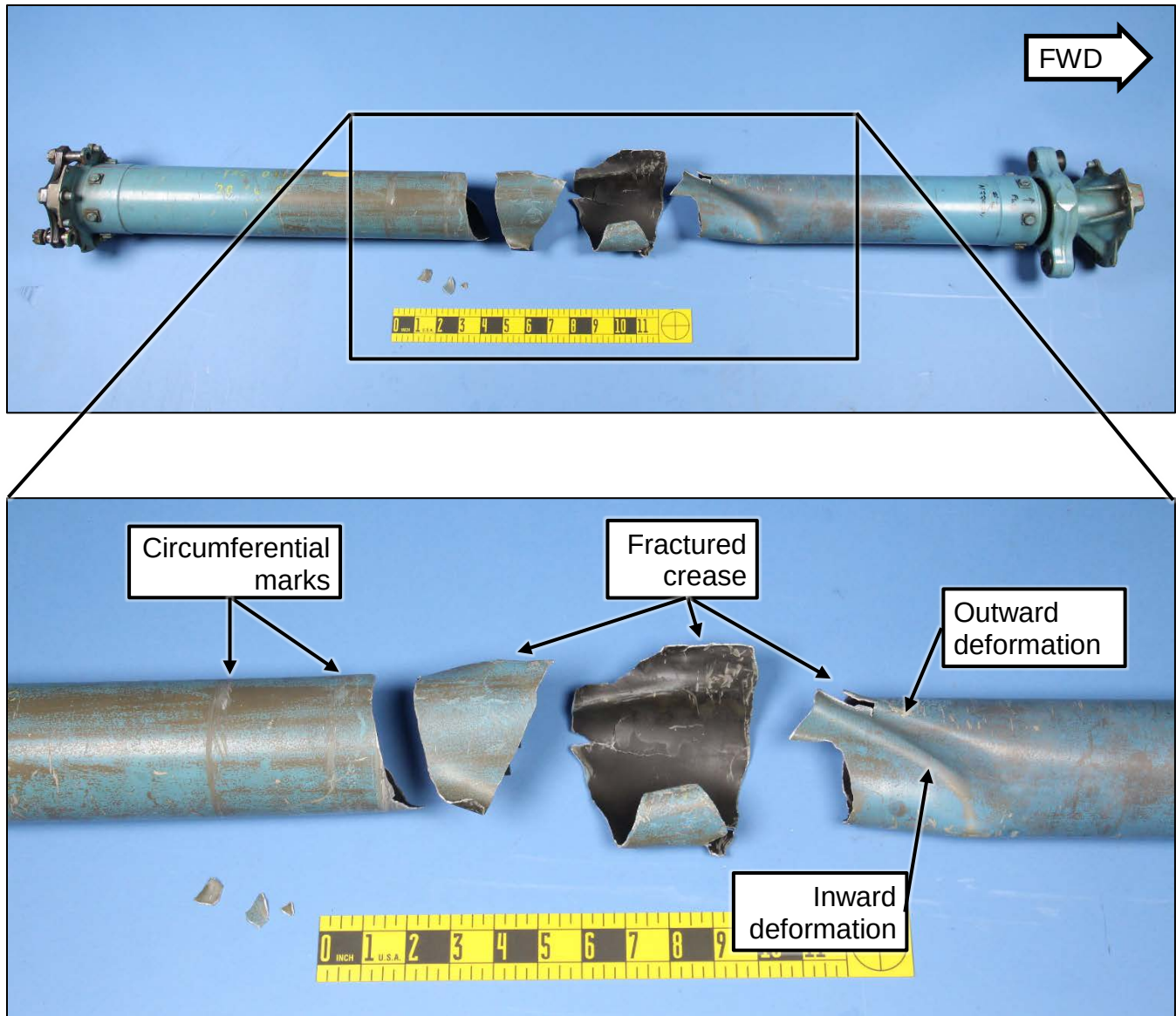


Figure 1. Overall view of the tail rotor drive shaft (upper image) with a closer view of the fractured pieces from the middle portion (lower image). Mating fracture faces of the larger pieces are displayed close to each other and are aligned approximately circumferentially.

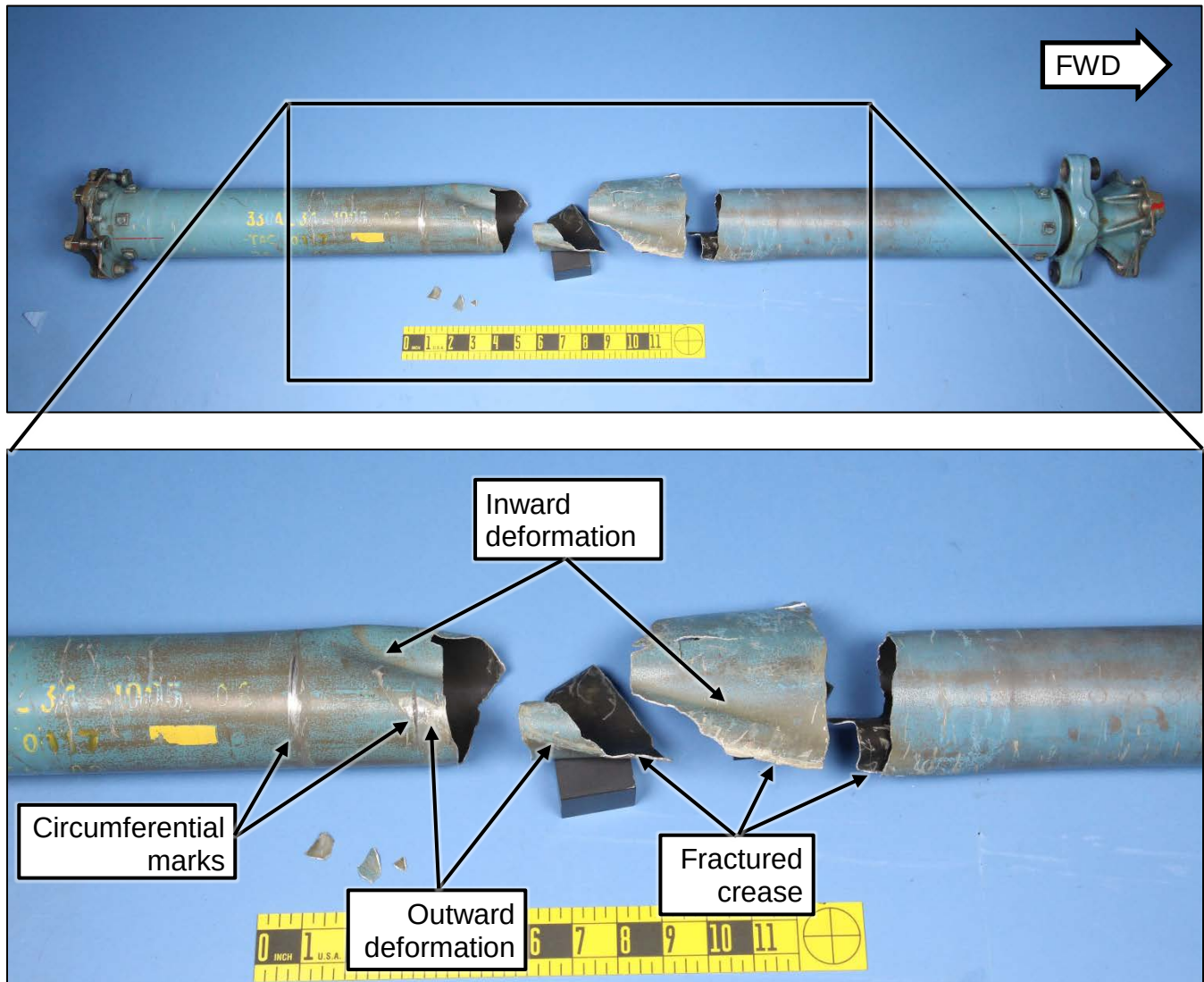


Figure 2. Overall view of the tail rotor drive shaft (upper image) rotated 180 degrees relative to the previous figure with a closer view of the fractured pieces from the middle portion (lower image). Mating fracture faces of the larger pieces are displayed close to each other and are aligned approximately circumferentially.