

NATIONAL TRANSPORTATION SAFETY BOARD

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



5/18/2016

MATERIALS LABORATORY FACTUAL REPORT

Report No. 16-048

A. ACCIDENT INFORMATION

Place : Stuart, IA
Date : 9/12/2015
Vehicle : Baby Bell, N135PA
NTSB No. : CEN15LA412
Investigator : Aaron Sauer

B. COMPONENTS EXAMINED

Portion of a tail rotor drive shaft coupler (figure 1)

C. DETAILS OF THE EXAMINATION

One half of a tail rotor drive shaft flexible coupling assembly, including the flexible elastomeric element, was submitted for examination (figure 1). A portion of the driveshaft remained inside the coupling and was visible from the bore side of the coupling. The through bolt securing the drive shaft in the coupling bore was in place and firmly secured including the cotter pin through the castellated lock nut. The jaw side of the coupling exhibited some gouges and dents in the metal surface (figure 2). The jaws were not damaged and maintained a snug fit with the elastomeric element.

From the bore side of the coupling a portion of the drive shaft was visible and exhibited a smeared fracture surface (figure 3). The through bolt securing the drive shaft was removed and the portion of the driveshaft remaining in the coupling was pressed out pushing from the jaw side of the coupling. The portion of the driveshaft that was removed had a weld bead deposit on the jaw side and appeared necked down on the bore side (figure 4). The outer surface of this portion of driveshaft exhibited file markings and areas with a brass color. Examination with a stereo microscope followed by sectioning in the transverse direction revealed that the drive shaft was sleeved in order to fit the bore of the coupling (figure 5). The drive shaft had an outer diameter of approximately 0.490 inch and an inner diameter of approximately 0.333 inch. The sleeve had an outer diameter of approximately 0.625 inch. The bore of the coupling was approximately 0.625 inch. The fracture surface of the driveshaft was mechanically and thermally deformed and the failure mode could not be established.

Joseph Panagiotou
Fire Protection Engineer

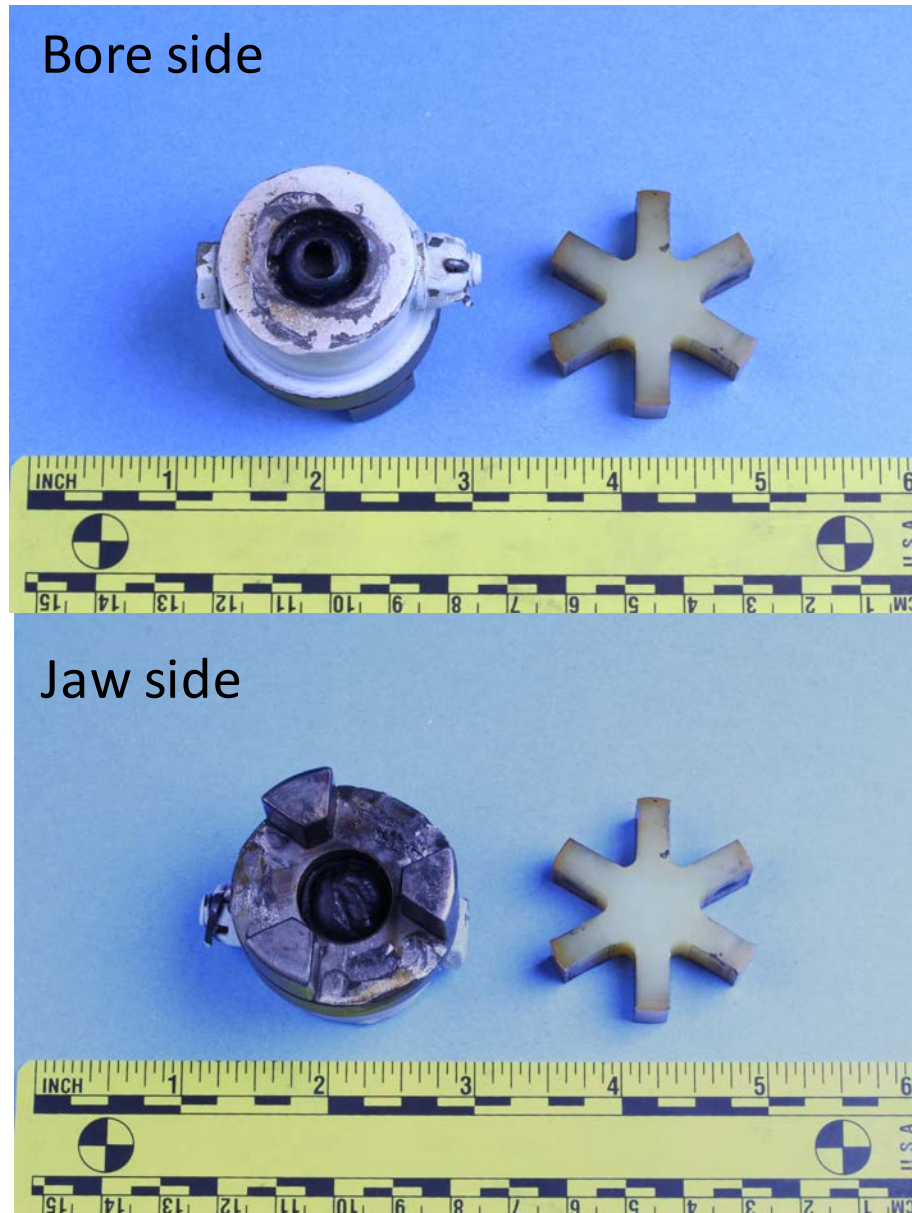


Figure 1: Tail rotor driveshaft coupler as received (both ends shown).



Figure 2: Jaw side of coupling exhibiting dents and gouges.



Figure 3: Bore side of coupling with a portion of the driveshaft visible.

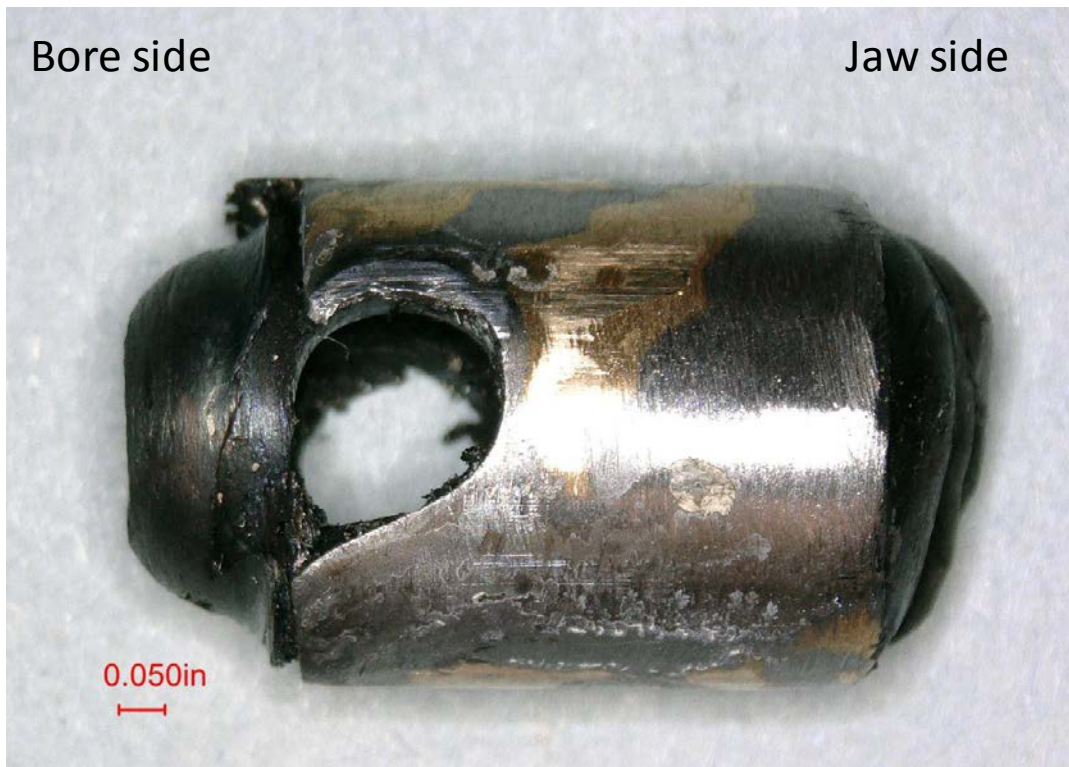


Figure 4: Portion of driveshaft removed from coupling.

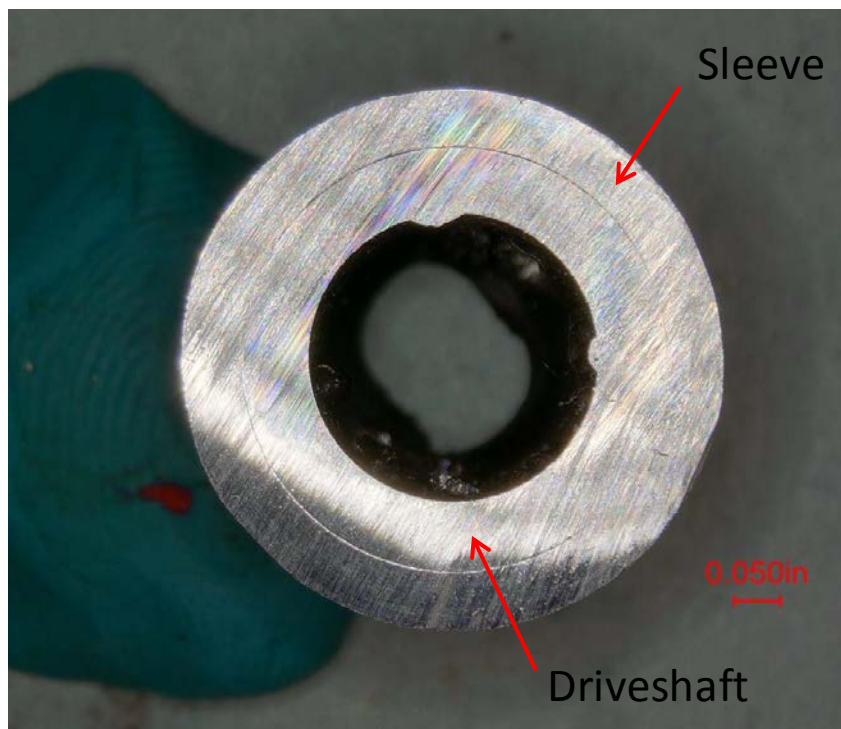


Figure 5: Transverse section through the portion of the driveshaft (near jaw side end).