

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



CEN24FA167

MATERIALS LABORATORY

Factual Report 24-036

June 14, 2024

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A. ACCIDENT INFORMATION

Location: Spring Branch, Texas
Date: April 29, 2024
Vehicle: Vertical Aviation Technologies Hummingbird 260L, N829SH
Investigator: Mike Hodges, AS-CEN

B. COMPONENTS EXAMINED

Portion of a driveshaft universal joint assembly.

C. EXAMINATION PARTICIPANTS

Specialist Matthew R. Fox, Ph.D.
NTSB
Washington, DC

D. DETAILS OF THE EXAMINATION

An overall view of the submitted portion of a driveshaft universal joint assembly is shown in figure 1. Overall, the steel bearing housing was darkened and oxidized consistent with high heat exposure. The aluminum alloy shaft piece was oxidized and wrinkled with missing material consistent with exposure to heat sufficient to cause partial melting. The driveshaft joint arm with the attached bearing housing was bent, displacing the attached bearing housing radially outward.

The driveshaft joint arm at the upper side of the photograph in figure 1 was fractured, and the fracture surface is shown in figure 2. The fracture surfaces were heavily oxidized. On the left side of the fracture as shown in figure 2, the fracture surface was thinned to a ridge near the middle of the fracture with external surface oxidation extending toward the ridge consistent with extensive deformation and necking prior to separation at high temperatures. Less deformation was observed at the right side of the fracture surface, but the overall fracture pattern had a rough, irregular fracture consistent with ductile overstress fracture. No evidence of a preexisting separation prior to exposure to high heat approaching the melting temperature was observed.

Submitted by:

Matthew R. Fox, Ph.D.
Chief Technical Advisor - Materials



Figure 1. Overall view of the submitted driveshaft universal joint piece.



Figure 2. Fracture surface of the arm at the upper side of the photograph in figure 1.