

NATIONAL TRANSPORTATION SAFETY BOARD

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



December 17, 2019

MATERIALS LABORATORY STUDY REPORT

Report No. 19-084

A. ACCIDENT INFORMATION

Place : Westhampton Beach, NY
Date : October 13, 2018
Vehicle : Piper PA34, N593MS
NTSB No. : ERA19LA012
Investigator : Lynn Spencer (AS-ERA)

B. COMPONENTS EXAMINED

Vacuum pump

C. DETAILS OF THE STUDY

The vacuum pump was submitted disassembled. Corrosion products covered the surfaces of the various parts likely due to the aircraft wreckage resting in ocean water prior to recovery. Not all the components from the vacuum pump were recovered and analyzed, specifically, the shear coupling.

The data plate on the pump states the manufacturer was Airborne. Logbook entries for the aircraft indicate the original vacuum pump for the left engine was replaced in 2012 with vacuum pump '441CC-7 S.N. 523121'. However, the half of the data plate with the model number and serial number was missing, thus the logbook information could not be confirmed.

The parts from the vacuum pump recovered and assessed are shown in the top image of Figure 1. The mating shear coupling was not recovered and thus could not be examined.

The core was fractured into several pieces (bottom image of Figure 1). The fracture pattern on the core emanated from the fin slots to the center bore, which is a fracture pattern consistent with failure due to vane drag observed in previous cases. Wear was observed on the fins and the vane faces, which could have led to binding of the vanes in the slots.

The inner diameter of the housing was caked with corrosion products, as shown in Figure 2. The housing was ultrasonically cleaned of all deposits that could be removed without heavy scrubbing, in order to preserve the surface to examine it for circumferential wear marks consistent with operation of the pump during the crash. Unfortunately, no

such marks were visible and thus the operating status of the pump at the time of the crash is inconclusive.

Adrienne V. Lamm
Materials Engineer



the fractured core (bottom image).



Figure 2: Overall photos showing the corrosion deposits on the inner diameter surface of the vacuum pump housing.