NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region
June 27, 2016

AIRFRAME AND ENGINE FOLLOW-UP EXAM REPORT

WPR16FA130

This document contains 21 embedded photos.

A. ACCIDENT

Location:	Wikieup, AZ
Date:	June 23, 2016
Aircraft:	Robinson R66, Registration Number: N117TW, Serial #: 0042
NTSB IIC:	Howard Plagens

B. EXAMINATION PARTICIPANTS:

Howard Plagens
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C. SUMMARY

Examination of the recovered airframe and engine was conducted on June 27, 2016, at the facilities of Air Transport, Phoenix, Arizona. No evidence of preimpact mechanical malfunction was noted during the examination of the recovered airframe and engine.

D. DETAILS OF THE INVESTIGATION

1.0 Airframe Examination

Controls

All main rotor flight control rod ends and attachments were accounted for. All identified fracture surfaces were angular and jagged. Some control tube sections were consumed by fire.

Photo 1 Main Rotor Flight Controls

Investigators established continuity for tail rotor flight controls from the tail to the fire wall.

The right side set of pedals were identified.

The left side pedals and flight controls were not identified.

The vertical cyclic stick had impact marks consistent of contact with the leading edge of a main rotor blade; all separation surfaces were jagged and angular.

The input shaft from the engine was disconnected at both ends; the fracture surfaces were angular and jagged. That shaft remained within the upper airframe.

The tail rotor driveshaft was disconnected from the main rotor gearbox; the forward section remained within the airframe. The aft section of the tail rotor driveshaft remained within the tail cone. The tail rotor gearbox rotated 360 degrees by hand.

One tail rotor blade bent outward near the root. There was no directional or chordwise scoring on either blade.

The empennage separated from the tail cone along an angular and jagged plane.

The tail cone separated near the forward mount; the fracture surface was angular and jagged. There was no indication of contact from a main rotor blade.

Photo 2 Tail Boom and Tail Section

The airframe was vertically compressed, from an upward to a down direction to the horizontal firewall due to the inverted impact.

Most of the cabin area was consumed by fire.

The forward left nose of the fuselage, including the windshield bow and left front door, were separated along a straight slice along with some accordianed floor panels at the aft end of the slice.

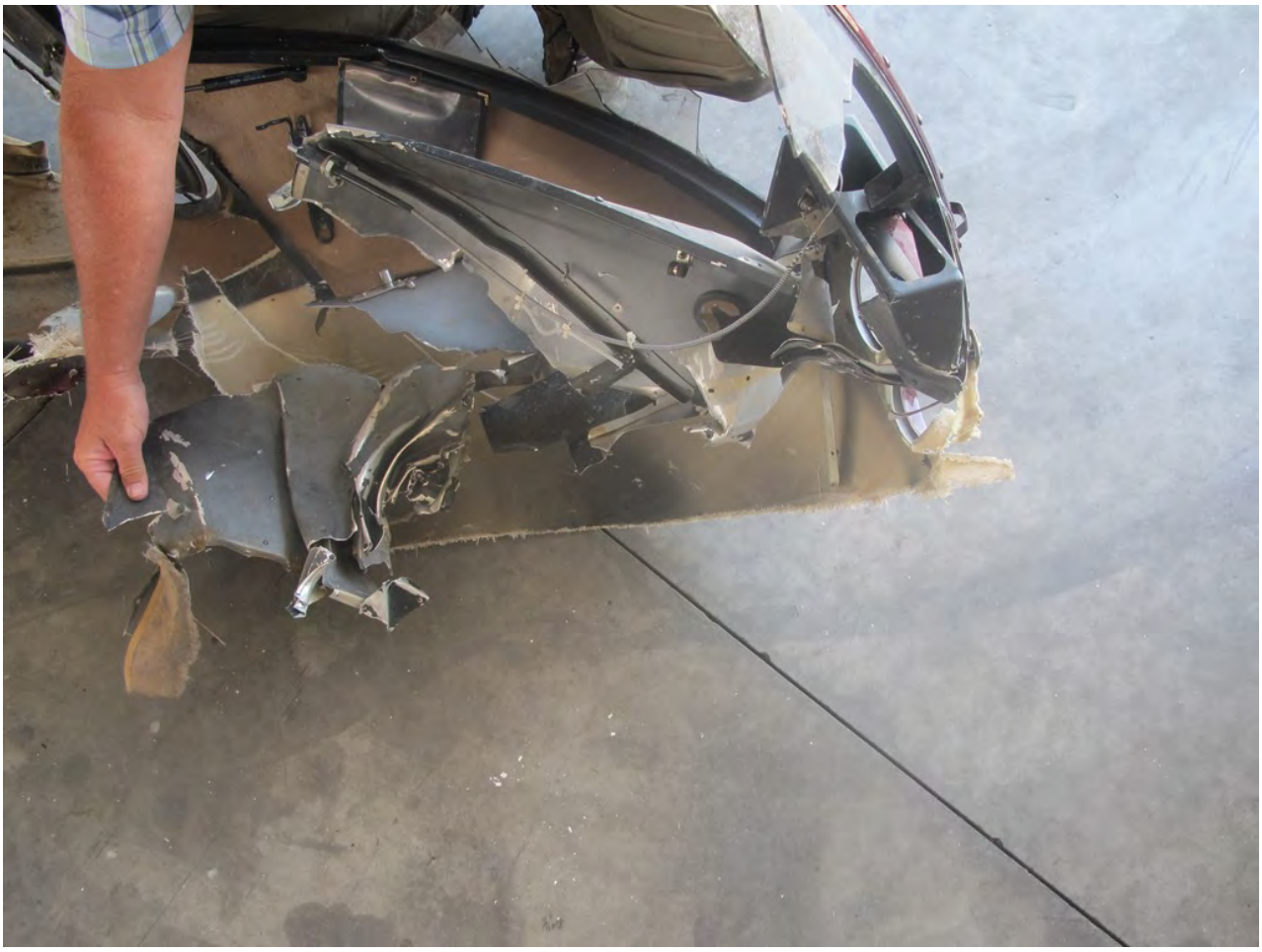

Photo 3 Left Nose and Floor Sections

The front left floor was recovered.

The right side of the console sustained impact damage.

Photo 4 Instrument Panel

Landing Gear

Most of both skid tubes were consumed by fire.

The aft struts remained connected to the aft cross tube and remaining skid tube. The aft cross tube bowed up at its tip.

The fuel tank finger screen was clear of debris. The entire fuel system was consumed by fire.

Powerplant Controls

The fuel cutoff knob was raised about 1/2 inch (the floor position is full rich). No other switches were recovered.

The front left seat cushion was smashed at its forward edge. The front left panel separated from the airframe, and was in the debris field.

2.0 Main Rotor System Examination

About 5 feet of one main rotor blade after-body was recovered at the beginning of the debris field. The spar for that blade was bent 130 -140 degrees forward in the direction of rotation. The spindle for that blade was fractured and separated with the coning bolt remaining in the hub. There were black paint transfer marks near the tip. The coning bolt was bent. Both teeter stops were smashed across the center. The other blade was bent midspan approximately 10-20 degrees opposite the direction of rotation.

Photo 5 Main Rotor Blades

Photo 6 Separated Man Rotor Blade

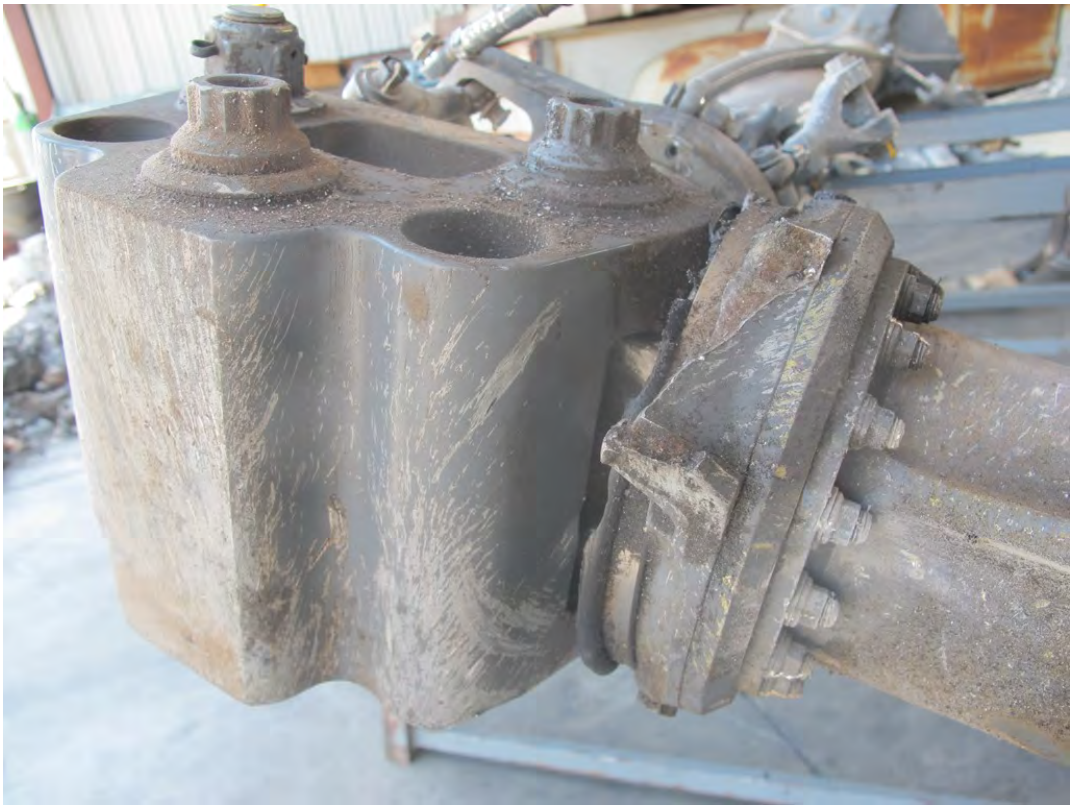

Photo 7 Hub at Retained Blade

Photo 8 Teeter Stop of Attached Blade

Photo 9 Teeter Stop and Coning Bolt of Separated Blade

The main rotor drive shaft was bent approx. 10 – 15 degrees. The main rotor drive shaft rotated by hand about 300 degrees in both directions.

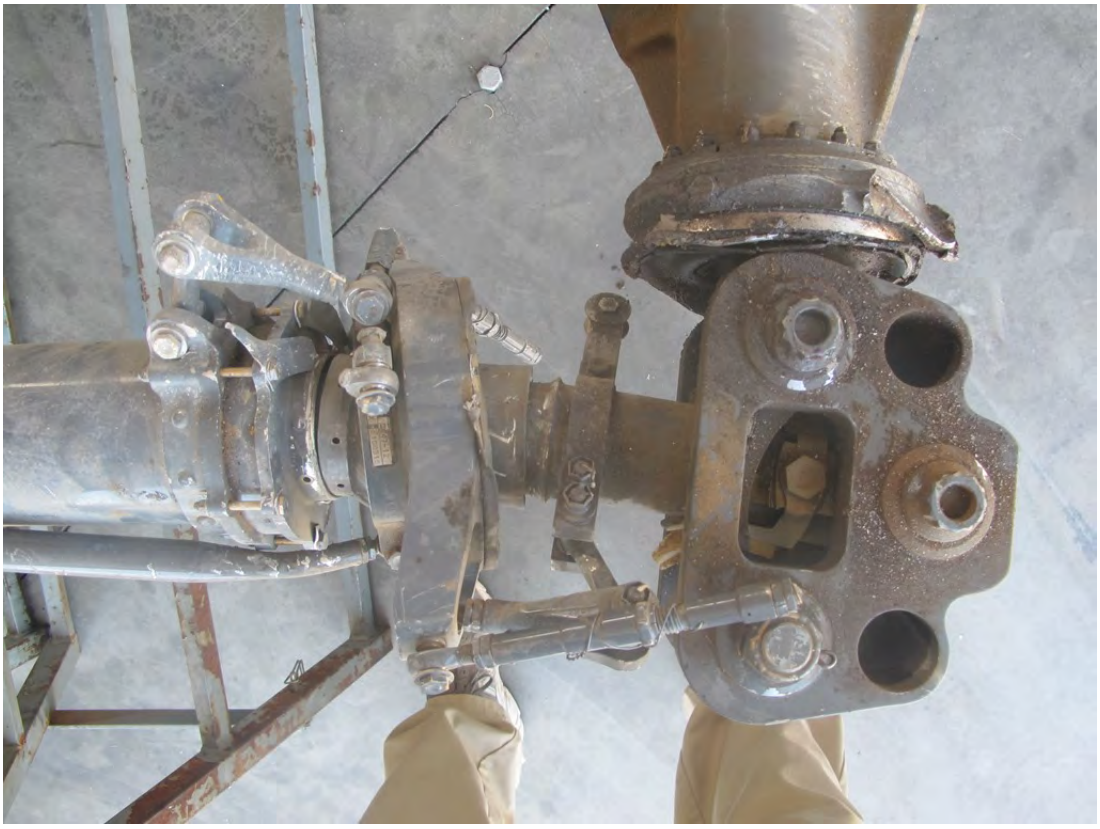

Photo 10 Bent Main Rotor Drive Shaft

The main rotor gearbox separated from the airframe.

3.0 Engine Examination

There was no evidence of preimpact failure or malfunction.

The crush damage was consistent with a hard, inverted vertical impact.

Photo 11 Engine

There was evidence of N1 and N2 rotation at impact. When removed, the compressor rotated freely.

Photo 12 Compressor Section

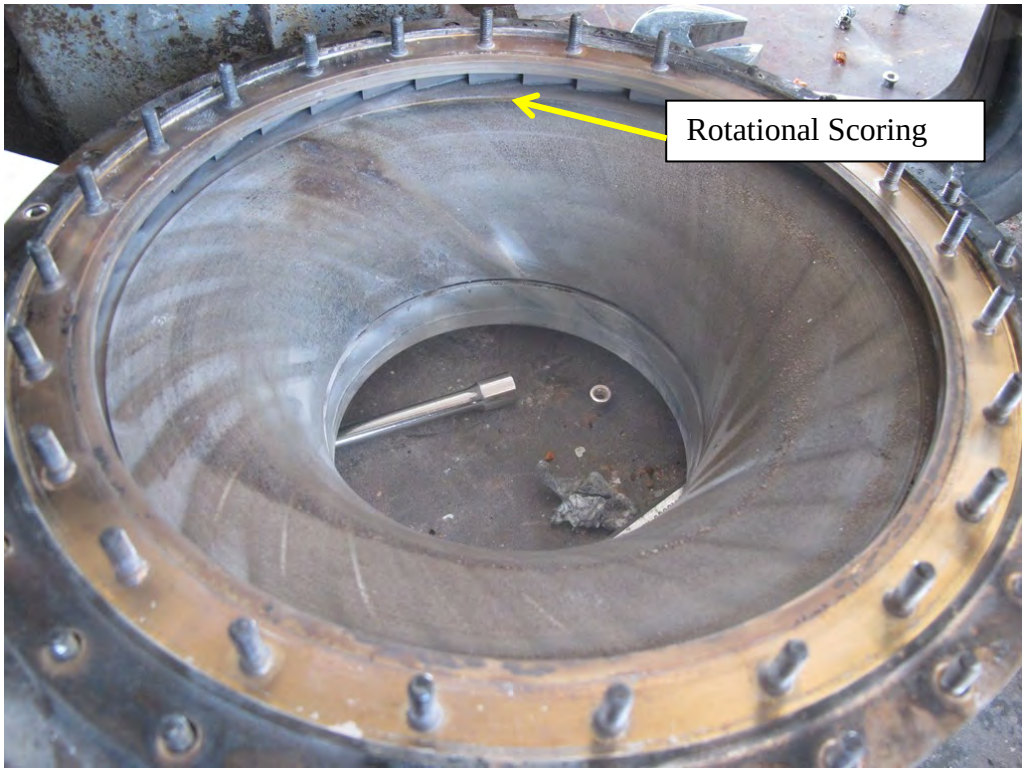

Photo 13 Compressor Shroud

There was metal splatter on the first stage turbine nozzle shield, which was evidence of combustion at impact.

The fourth stage turbine wheel fragmented. The outer ring was in several pieces. All blades were liberated, and the remaining bases were bent opposite the direction of rotation.

Photo 14 Fourth Stage Turbine Compressor Wheel

There was no metallic contamination of the oil filters or chip detectors. The oil filter was not in bypass.

Photo 15 Oil Filter

Photo 16 Upper Chip Detector

Photo 17 Lower Chip Detector

There was no evidence of contamination of the fuel filter.

Photo 18 Fuel Filter

There was clean, clear liquid that smelled like jet fuel in the supply line to the fuel spray nozzle. A water paste test indicated that there was no water contamination. The fuel spray nozzle was normal, and the fuel spray nozzle filter was clean.

Photo 19 Fuel Nozzle

Photo 20 Fuel Spray Nozzle Filter

Photo 21 Fuel Sample Water Test

Control continuity from the cockpit to the engine could not be established because the cockpit was destroyed.

The engine monitoring unit (EMU) was not located, and it was presumed to be destroyed by fire.

There was insufficient evidence to determine engine power at impact.