18 December 2018

Mr. Craig Hatch
National Transportation Safety Board

MEMO: MPS-18-049

SUBJECT: Teardown Inspection of Propeller from:
Cessna 206H, N247F,
File #:(MPS: 18-08, NTSB: CEN18LA382)

Subject propeller was installed on a Cessna 206H, N247F, which crashed on 19 September 2018 near Sugar Land, TX. McCauley was requested to assist in the examination of the propeller and with the interpretation of the damage indications.

The propeller wreckage was inspected in the McCauley Maintenance Training Facility at TRU Simulation + Training, Wichita, Kansas on 27 November 2018, with the following in attendance:

Ms. Christy Eckerman	Federal Aviation Administration
Mr. Jeff Janusz	Federal Aviation Administration
Mr. Todd Prince	Drug Enforcement Administration
Mr. Ricardo Asensio	Textron Aviation-Air Safety Investigation
Mr. Travis Martin	Textron Aviation-McCauley Engineering Lab
Mr. Kevin Stahl	Textron Aviation-McCauley Propeller Engineering
Mr. Danny Ball	Textron Aviation-McCauley Propeller Engineering

The propeller wreckage arrived in a cardboard McCauley 3 blade shipping box banded to single wooden shipping pallet. The provided wreckage consisted of a 3-blade propeller with a spinner bulkhead attached, and a propeller governor.

The model number and serial numbers of the propeller and blades are as follows: *(Dates of manufacture for the serialized components are shown parenthetically in italics, bracketed italicized items are inferred as the parts stampings were unavailable/unreadable in the provided wreckage)*

Model:	**B3D36C432-C/I-80VSA-1**	
Serial (S/N):	**041104**	*(2004 mfg)*
Blade 1 S/N:	**ALE26085**	*(May 2017 mfg)*
Blade 2 S/N:	**A*{L}*E26083**	*(May 2017 mfg)*
Blade 3 S/N:	**ALE26081**	*(May 2017 mfg)*

Blade numbering in the table above is based on factory stamped hub socket numbering. The examined blades were paint marked with letters at some point prior to the wreckage examination by McCauley. Blade 1 was marked "A", Blade 2 was marked "B" and Blade 3 was marked "C".

After the propeller examination, the following conclusions are drawn:

1. The propeller has damage from impact. No indications of any type of propeller failure or malfunction prior to impact were found.

2. The propeller has indications consistent with a low amount of rotational energy absorption (rotation at impact likely with low engine power) during the impact sequence. Exact engine power levels were not determined.

3. The propeller low and high pitch stop shims were measured by request and the resulting theoretical assembly blade angles were calculated:

Specification	Thickness (in)	Calculated Angle* (degrees)	Dwg Spec (degrees)
Low Pitch Stop:	0.155	12.8	12.6+/-0.2
High Pitch Stop:	0.200	30.7	30.0+/-0.5

**Calculation assumes nominal dimensions for all pitch change components, assembly dims, and blade dims*

4. No impact signature markings or component positions were found that indicate blades outside normal operating range at impact.

The conclusions noted above are based on a variety of observations, some of which are noted below:

1. The propeller has sudden-failure type damage that is typically associated with impact forces and gross part deflections. The investigation found no evidence of any type of fatigue failure or pre-impact issue.

2. The propeller had several indications of electrical arcing on the airfoil surfaces. The markings appeared recent and were assumed to have occurred during the impact sequence.

3. The propeller blade bending, twisting, paint scuffing, leading edge impacts, and overall propeller assembly damage is typical of that associated with low rotational energy absorption (rotation with likely low engine power) at impact.

4. The propeller blade serials indicate a factory matched set produced in 2017. The propeller hub is older. The propeller shows evidence of post-delivery field service, including hub painting.

The provided governor (Model: DC290D1F-T37, P/N: D-20893-37, S/N: 090066) was externally examined and functionally tested to manufacturing requirements. The requested test, performed in the McCauley engineering lab, showed normal operation. A teardown examination was not requested.

Specification	Requirement	Measured
Pressure Relief (PSIG):	290 +/-20	300
Pump Capacity @ 1750 RPM: (Qts/min)	5 (minimum)	5.2
Maximum RPM:	2557 +/- 10	2546*
Control Arm Setting (deg):	90 +/- 7	97
Control Arm Travel (deg):	60 +/- 7	56

**measured bench values do not exactly reflect an "on-aircraft" value. Normal installation process requires the installing mechanic to adjust the stop screw to achieve the desired installed maximum rpm.*

The wreckage was return shipped to Ft. Worth, TX (FedEx Freight Tracking Number: 463160348-0).

Respectfully,

[redacted]

Danny L. Ball
Textron Aviation-McCauley Propeller Engineering