



14 May 2025

To:
Thomas Driscoll
National Transportation Safety Board

MEMO: MPS-25-018

SUBJECT: Teardown Inspection of Propeller from:
Cessna 208EX, N321BA
File #:(MPS: 2025-02, ANC25MA018)

Subject propeller was installed on a Cessna 208EX which crashed on 6 February 2025 near Nome, AK. McCauley was requested to assist in the examination of the propeller and with the interpretation of the damage indications.

The inspection occurred at McCauley Propeller Systems Engineering Lab, Wichita, Kansas, on 14 May 2025, with the following in attendance:

Thomas Driscoll	In-person and Present	NTSB
Travis Martin	In-person and Present	Textron Aviation-McCauley Engineering Lab
Brian Cozine	In-person and Present	Textron Aviation-McCauley Propeller Engineering
Dustin Baerg	In-person and Present	Textron Aviation-McCauley Propeller Engineering
Scott Thompson	In-person and Present	Textron Aviation-McCauley Engineering Lab
Ernest Hall	In-person and Present	Textron Aviation Air Safety Investigations

The propeller arrived in a single wooden crate. Inside the crate was one propeller assembly with three blades attached and one separated blade, all secured to the floor of the crate with straps. No spinner, logbook, or papers were included in the crate.



The model number and serial numbers of the propeller are as follows: (*Obscured characters are shown as #. Dates of manufacture for the serialized components are shown parenthetically in italics*)

<u>Propeller Model:</u>	4HFR34C778-I
<u>Serial (S/N):</u>	191258 (<i>2019 manufacture</i>)
<u>Blade Model:</u>	102BHA-0
<u>Blade 1 (S/N):</u>	ANJ30075 (<i>2019 manufacture</i>)
<u>Blade 2 (S/N):</u>	ANJ30079 (<i>2019 manufacture</i>)
<u>Blade 3 (S/N):</u>	ANJ30078 (<i>2019 manufacture</i>)
<u>Blade 4 (S/N):</u>	ANJ300## (<i>2019 manufacture</i>)

Examination of the propeller produced the following observations and conclusions:

1. The propeller had sudden-failure type damage and gross part deflections typically associated with impact forces. All eight propeller attachment studs were missing, and all stud holes were significantly stripped of internal threads and exhibited deformation in the direction of applied power. One P&WC engine propeller flange dowel was still in a dowel hole in the hub of the propeller and fell out when the propeller was moved by hand out of the shipment crate. The dowel also exhibited bending deformation. Blade #4 was separated from the propeller. The aft half of blade socket #4 was missing and the fracture surface showed evidence of gross overload and metal smearing. The observations of the hub are consistent with significant power and rotation at the time of impact. The investigation found no evidence of fatigue failure. There were no indications of propeller failure or malfunction prior to the impact sequence. It should be noted that because the mounting studs were missing and the threads in the stud holes were significantly damaged and unusable, two of the dowel holes were tapped and temporary mounting studs were installed in order to mount the propeller on a prop stand during the investigation.
2. The blade pitch actuation components exhibited gross part deflection and structural overload failure associated with the impact sequence. The spring can, feathering spring, cylinder, piston, and piston rod were intact and unremarkable. The three retained blades were free to spin in their



sockets. All four blade links were intact, attached to the piston rod yoke, and deformed. Actuation pins for blades 1, 2, and 3 were intact and attached to their respective links but the screws attaching them to the butt end of their respective blades had been fractured. Blade 4's actuating pin was missing, but its respective link was deformed in the same manner as the other links and blade 4's butt end had the remains of pin attachment fasteners still in its butt end. All four beta rods were still installed and intact but showed varying amounts of bending from impact with internal hub components. The beta ring normally on the aft side of the hub was missing. The butt end of each blade had witness marks from relative motion caused by the impact sequence. Witness marks on the butt of each blade were consistent with the blades being at high power forward thrust condition.

3. Red dyed oil was observed in the hub. Engine oil was found inside the cylinder. Both of these observations are normal and expected.
4. All four blades had anti-ice feed shoes installed. Anti-ice hardware was found on blades 1, 2, and 4. Blade No. 3 was missing the spray head assembly. The remnants of the fasteners that attached the spray head assembly to the blade shank were found sheared in their respective mounting holes indicating the spray head assembly and hardware were installed but separated during the impact sequence.
5. All four blades exhibited minor leading edge paint removal, consistent with normal operation. Blades 2 and 3 exhibited S bending. Blades 1 and 4 exhibited multiple bends towards their face (engine facing) sides. Blade 1 had leading and trailing edge gouging on approximately the outer foot of span. These observations are consistent with a high amount of power and rotational energy during the impact sequence.

Following the investigation, the components of the propeller were returned to the shipping crate. Upon request from NTSB, the propeller will be return shipped.

Respectfully,

Brian Cozine
Textron Aviation-McCauley Propeller Engineering