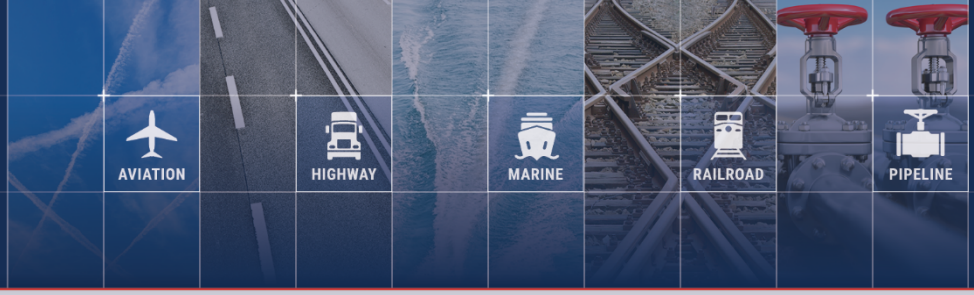

Aviation Investigation Final Report

Location:	Romeoville, Illinois	**Incident Number:**	CEN23LA218
Date & Time:	April 27, 2023, 14:00 Local	**Registration:**	N6384H
Aircraft:	Piper J3C	**Aircraft Damage:**	Minor
Defining Event:	Part(s) separation from AC	**Injuries:**	1 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot reported that no anomalies were noted during the preflight inspection of the airplane. During the takeoff, about 650 ft agl, the airplane began to shake “very violently.” The pilot closed the throttle, issued an emergency transmission to the air traffic control tower, and executed a 180° turn to the left to land back on the departure runway. About halfway through turn, the pilot turned off the engine as he felt the airplane could successfully make the landing. The pilot was able to land the airplane on the runway without further incident. After the pilot exited the airplane, he noticed that about 5 inches of the outboard portion of one of the aluminum propeller blades had separated. The airplane sustained minor damage to the propeller.

Postincident examination revealed features that were consistent with fatigue cracking initiating at the midpoint of the cambered face of the propeller blade. These initiation sites exhibited corrosion pits consistent with those found on the cambered face of the propeller, which had been present underneath the paint and primer. On closer examination, these pits exhibited higher amounts of chlorine than the rest of the blade surfaces. It is unclear as to the origin of the pitting corrosion, which was likely due to chlorine species. Chlorine is a common element known to cause pitting of aluminum alloys in service. Many chemicals, locales, and substances can impart chlorine (as well as sulfur, phosphorus, and alkali metals) onto metal parts. These constituents can diffuse through a variety of coatings and materials, though their effectiveness resisting potentially aggressive chemicals in this case is unknown.

The propeller was overhauled on January 28, 2015, and the total time since new was listed as “unknown.” The propeller was installed on the airplane on August 18, 2015. The maintenance records did not show any overhaul work performed on the propeller since it was installed on the airplane. According to the propeller manufacturer, this propeller is to be overhauled at

2,000 hours or 72 calendar months, whichever occurs first. The Federal Aviation Administration (FAA) does not mandate that propellers be overhauled for Title 14 *Code of Federal Regulations* (*CFR*) Part 91 operations.

Cracks in propellers can grow to fracture in just a few flights once started. At overhaul, the paint, primer, and any coatings would likely be removed, and the surfaces refinished. These processes would likely remove surface stress concentrators like pitting and other imperfections, along with detecting any visible cracks. With the blade being 2.5 years outside of a recommended overhaul, the chances of cracks initiating would be higher.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this incident to be:

The inflight failure of the propeller blade due to fatigue cracking from corrosion pits, initiating at the midpoint of the cambered face.

Findings

Aircraft	Propeller blade section - Failure
Aircraft	Propeller blade section - Fatigue/wear/corrosion

Factual Information

History of Flight

Initial climb	Miscellaneous/other
Initial climb	Powerplant sys/comp malf/fail
Initial climb	Part(s) separation from AC (Defining event)
Initial climb	Attempted remediation/recovery
Landing	Off-field or emergency landing

On April 27, 2023, about 1400 central daylight time, a Piper J3C-65 airplane, N6384H, sustained minor damage when it was involved in an incident near Romeoville, Illinois. The pilot sustained no injuries. The airplane was operated as a Title 14 *CFR* Part 91 personal flight.

The pilot reported that during the preflight inspection of the airplane, no anomalies were noted. The pilot decided to use runway 09 for the departure at the Lewis University Airport (LOT), Romeoville, Illinois, for the local area flight. During the takeoff, about 650 ft agl, the airplane began to shake "very violently." The pilot closed the throttle, issued an emergency transmission to the LOT air traffic control tower, and executed a 180° turn to the left to land back on the departure runway. About halfway through turn, the pilot turned off the engine as he felt the airplane could successfully make the landing. The pilot was able to land the airplane on the runway without further incident.

After the pilot exited the airplane, he noticed that about 5 inches of the outboard portion of one of the aluminum propeller blades had separated. The separated blade segment was not recovered. The propeller sustained minor damage. There was no other damage sustained to the propeller, the engine, and the airframe. The airplane was equipped with a McCauley 1B90/CM7144 fixed pitch propeller.

Postincident examination revealed features consistent with fatigue cracking initiating at the midpoint of the cambered face of the propeller blade. These initiation sites exhibited corrosion pits consistent with those found on the cambered face of the propeller, which had been present underneath the paint and primer.

An annual inspection was performed on the airplane on October 25, 2022. A review of the airplane's maintenance records revealed that the airplane had accumulated 0.7 hours since the annual inspection was performed. The propeller was overhauled on January 28, 2015, and the total time since new was listed as "unknown." The propeller was installed on the airplane on August 18, 2015.

The propeller had about 223 total hours since its installation. The maintenance records did not show any overhaul work performed on the propeller since it was installed on the airplane. According to McCauley, this propeller is to be overhauled at 2,000 hours or 72 calendar months, whichever occurs first. The FAA does not mandate that propellers be overhauled for 14 *CFR* Part 91 operations.

Pilot Information

Certificate:	Commercial	**Age:**	80,Male
Airplane Rating(s):	Single-engine land; Single-engine sea	**Seat Occupied:**	Rear
Other Aircraft Rating(s):	None	**Restraint Used:**	Lap only
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	
Medical Certification:	BasicMed With waivers/limitations	**Last FAA Medical Exam:**	July 1, 2020
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	August 1, 2022
Flight Time:	(Estimated) 2684 hours (Total, all aircraft), 1768 hours (Total, this make and model), 2542 hours (Pilot In Command, all aircraft), 6 hours (Last 90 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N6384H
Model/Series:	J3C 65	**Aircraft Category:**	Airplane
Year of Manufacture:	1946	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	19565
Landing Gear Type:	Tailwheel	**Seats:**	2
Date/Type of Last Inspection:	October 25, 2022 Annual	**Certified Max Gross Wt.:**	1225 lbs
Time Since Last Inspection:	0.7 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	4531 Hrs as of last inspection	**Engine Manufacturer:**	Continental Motors
ELT:	C91 installed, not activated	**Engine Model/Series:**	C85-12F
Registered Owner:	On file	**Rated Power:**	85 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None
Operator Does Business As:	On file	**Operator Designator Code:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KLOT,660 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	13:45 Local	**Direction from Accident Site:**	106°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	9 knots /	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:	130°	**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	29.98 inches Hg	**Temperature/Dew Point:**	18°C / -1°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Romeoville, IL	**Type of Flight Plan Filed:**	None
Destination:	Romeoville, IL	**Type of Clearance:**	None
Departure Time:		**Type of Airspace:**	Class D

Airport Information

Airport:	LEWIS UNIVERSITY LOT	**Runway Surface Type:**	Asphalt
Airport Elevation:	679 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	09	**IFR Approach:**	None
Runway Length/Width:	5500 ft / 75 ft	**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Minor
Passenger Injuries:	N/A	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 None	**Latitude, Longitude:**	41.608067,-88.103775(est)

Administrative Information

Investigator In Charge (IIC):	Hodges, Michael
Additional Participating Persons:	Beau Klingbeil; FAA Greater Chicago FSDO; Des Plaines, IL Brian Cozine; McCauley Propeller Systems; Wichita, KS
Original Publish Date:	March 20, 2024
Last Revision Date:	
Investigation Class:	Class 3
Note:	The NTSB did not travel to the scene of this incident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=192286