Aviation Investigation Final Report

Location:	Galesburg, Illinois	**Accident Number:**	CEN17LA309
Date & Time:	August 9, 2017, 07:30 Local	**Registration:**	N528MB
Aircraft:	Air Tractor AT-802A	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (total)	**Injuries:**	1 None
Flight Conducted Under:	Part 137: Agricultural		

Analysis

The pilot was on an agricultural flight when the engine lost total power. The pilot completed a forced landing in a nearby field, but he was unable to maintain directional control of the airplane after it landed in the dense soybean crop. The outboard portion of the right wing and aileron were substantially damaged during the forced landing.

A postaccident engine examination revealed that a single 1st stage compressor rotor airfoil had fractured near its root. The fatigue crack originated from a thinned leading edge due to significant erosion at the bottom of the airfoil pressure side; however, the exact location of the fatigue origin could not be determined because it had been obliterated by the erosion. The observed fracture features were consistent with a crack that had progressed in highcycle fatigue. Dimensional measurements of the fractured airfoil and the two adjacent airfoils revealed that they were under the minimum requirement for an airfoil. The airfoils also exhibited evidence of fine wear scratches, characteristic of fine abrasive particles impacting the airfoil, and thinning of their leading edges. The underlying cause of the airfoil erosion could not be determined with certainty; however, based on the observed damage, it was possibly the result of environmental conditions. The engine had accumulated 4,349.3 hours since new and had never been overhauled. The engine manufacturer's recommended time between overhaul (TBO) was 3,000 hours; however, the operator was not required to comply with the recommended TBO interval under current regulations due to the type of operation.

Probable Cause and Findings

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

A total loss of engine power due to the fracture of a single 1st stage compressor rotor airfoil in high-cycle fatigue as a result of the erosion and thinning of the airfoil's leading edge. Contributing to the fractured airfoil and loss of engine power was the operator’s decision to operate the engine past the manufacturer’s recommended time between overhaul.

Findings

Aircraft	Compressor section - Fatigue/wear/corrosion
Aircraft	Time limits - Not inspected
Personnel issues	Decision making/judgment - Owner/builder

Factual Information

History of Flight

Maneuvering-low-alt flying	Loss of engine power (total) (Defining event)
Landing	Off-field or emergency landing
Landing	Loss of control on ground
Landing	Landing gear collapse

On August 9, 2017, about 0730 central daylight time, an Air Tractor AT-802A airplane, N528MB, was substantially damaged when it was involved in an accident near Galesburg, Illinois. The pilot was not injured. The airplane was operated as a Title 14 *Code of Federal Regulations* (*CFR*) Part 137 agricultural flight.

The pilot reported that the accident occurred about 1 hour into his first aerial-application flight of the day. He stated that he felt a slight "thud or bump" that he initially believed was the airplane flying through its own propeller wash during a turn. The pilot stated that the engine gauges were indicating normal parameters as he continued to line-up for another spray pass; however, before his next spray pass the engine experienced a similar "thud" that he identified as a compressor stall. The pilot entered a climb to gain safe altitude and maneuvered the airplane away from nearby homes. The engine experienced several more compressor stalls and the pilot saw sparks departing the engine exhaust ducts before it experienced a total loss of power. The pilot completed a forced landing in a nearby field, during which the airplane ground looped in the dense soybean crop. The landing gear collapsed, and the outboard portion of the right wing and aileron were substantially damaged during the forced landing.

Examination of the engine revealed that a single 1st stage compressor rotor airfoil had fractured near the root. The fatigue crack originated from a thinned leading edge due to significant erosion at the bottom of the airfoil pressure side; however, the exact location of the fatigue origin could not be determined due to erosion damage. The observed fracture features were consistent with a crack that had progressed in high-cycle fatigue. Dimensional measurements of the fractured airfoil and the two adjacent airfoils revealed that they were up to 0.050 inch less than the minimum requirement for an airfoil. The airfoils also exhibited evidence of fine wear scratches, characteristic of fine abrasive particles impacting the airfoil, and thinning of the leading edge of the airfoils. The remaining damage observed through the remaining gas path was considered secondary to the separation of the single 1st stage compressor rotor airfoil.

According to maintenance documentation, the engine had accumulated 4,349.3 hours since new, and 1,808.6 hours since being partially disassembled for inspection and repair on December 16, 2013; however, according to the logbook entry, the gas generator was not inspected at that time. The most recent inspection of the gas generator was completed during an annual/100-hour inspection completed on May 1, 2017, about 99.3 hours before the accident. Based on the available maintenance documentation, the engine had not been

overhauled during its service history. The engine manufacturer recommends that the engine be overhauled after 3,000 hours. Federal Aviation Administration regulations do not require Part 137 operators to comply with an engine manufacturer's recommended time between overhaul interval provided the engine meets annual and 100-hour requirements.

Pilot Information

Certificate:	Commercial	**Age:**	36,Male
Airplane Rating(s):	Single-engine land; Single-engine sea	**Seat Occupied:**	Center
Other Aircraft Rating(s):	None	**Restraint Used:**	5-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane single-engine	**Toxicology Performed:**	No
Medical Certification:	Class 2 Without waivers/limitations	**Last FAA Medical Exam:**	December 13, 2016
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	January 14, 2017
Flight Time:	(Estimated) 10000 hours (Total, all aircraft), 6000 hours (Total, this make and model), 450 hours (Last 90 days, all aircraft), 150 hours (Last 30 days, all aircraft), 0 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Air Tractor	**Registration:**	N528MB
Model/Series:	AT-802A	**Aircraft Category:**	Airplane
Year of Manufacture:	2010	**Amateur Built:**	
Airworthiness Certificate:	Restricted (Special)	**Serial Number:**	802A-0350
Landing Gear Type:	Tailwheel	**Seats:**	1
Date/Type of Last Inspection:	May 1, 2017 Annual	**Certified Max Gross Wt.:**	16000 lbs
Time Since Last Inspection:	99.3 Hrs	**Engines:**	1 Turbo prop
Airframe Total Time:	4349.3 Hrs at time of accident	**Engine Manufacturer:**	Pratt & Whitney Canada
ELT:	Not installed	**Engine Model/Series:**	PT6A-67AG
Registered Owner:	Lesco Aviation Inc.	**Rated Power:**	1350 Horsepower
Operator:	Lesco Aviation Inc.	**Operating Certificate(s) Held:**	Agricultural aircraft (137)

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	GBG,764 ft msl	**Distance from Accident Site:**	6 Nautical Miles
Observation Time:	07:35 Local	**Direction from Accident Site:**	248°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:		**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	30.21 inches Hg	**Temperature/Dew Point:**	16°C / 16°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Monmouth, IL (C66)	**Type of Flight Plan Filed:**	None
Destination:	Monmouth, IL (C66)	**Type of Clearance:**	None
Departure Time:	06:30 Local	**Type of Airspace:**	Class G

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	1 None	**Latitude, Longitude:**	40.973056,-90.303611

Administrative Information

Investigator In Charge (IIC):	Fox, Andrew
Additional Participating Persons:	Curt Lindauer; Federal Aviation Administration, Springfield FSDO; Springfield, IL Earl Chapman; Transportation Safety Board of Canada; Ottawa Leslie Ederer; Pratt & Whitney Canada; Longueuil
Original Publish Date:	May 6, 2021
Last Revision Date:	
Investigation Class:	Class 3
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=95787