



National Transportation Safety Board Aviation Incident Final Report

Location:	Rome, NY	Incident Number:	ERA10IA094
Date & Time:	12/03/2009, 0747 EST	Registration:	N701FX
Aircraft:	CESSNA 208B	Aircraft Damage:	None
Defining Event:	Loss of engine power (total)	Injuries:	1 None
Flight Conducted Under:	Part 135: Air Taxi & Commuter - Non-scheduled		

Analysis

The airplane was climbing through 7,500 feet when the pilot heard a grinding noise and saw that the gas generator speed indicator had dropped to zero. The engine then seized and the pilot declared an emergency. An air traffic controller provided vectors toward an airport; however, the airplane landed in a field about 3 miles short of the runway. Subsequent disassembly of the engine revealed compressor turbine blade fractures at varying heights above the platform and downstream damage to the power turbine blades. Further examination revealed that 13 blades were fractured at the platform, with 8 of those exhibiting fatigue fractures at the leading edge, and overload fractures toward the trailing edge. The remaining five blades exhibited ductile overload fractures over the entire fracture surface. A number of blades were also fixed to the disc, with the mating surfaces of both the blades and the disc exhibiting corrosion. Examination of blade serrations revealed an accumulation of orange dust, with black corrosion blisters observed at various locations. Dust analysis revealed sulphidation, with airborne salts likely reacting with the oxide layer on the blades to result in oxide layer decay. Subsequent to the incident, the operator increased engine water washes from once every 50 hours of engine operation to weekly, and incorporated borescope inspections into the engine maintenance program at every 100 hours of operation.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this incident to be: The operator's inadequate engine wash intervals, which resulted in compressor turbine blade sulphidation and subsequent turbine blade failure.

Findings

Aircraft	Compressor section - Fatigue/wear/corrosion (Cause)
Personnel issues	Scheduled/routine maintenance - Not specified
Organizational issues	Maintenance scheduling - Operator (Cause)

Factual Information

On December 3, 2009, at 0747 eastern standard time, a Cessna 208B, N701FX, operated as Wiggins Airways flight 8409, experienced a loss of engine power followed by a forced landing to a field near Rome, New York. The certificated airline transport pilot was not injured, and there was no damage to the airplane. Visual meteorological conditions prevailed at the landing site. The airplane was operating on an instrument flight rules flight plan from Syracuse Hancock International Airport (SYR), Syracuse, New York, to Plattsburgh International Airport (PBG), Plattsburgh, New York. The unscheduled cargo flight was operating under the provisions of 14 Code of Federal Regulations Part 135.

According to the company vice president of operations, the airplane was climbing through 7,500 feet when the pilot heard a "grinding noise," and saw the Ng indication drop to zero. The engine then seized, and the pilot declared an emergency. Air traffic control provided vectors toward Griffiss International Airport (RME), Rome, New York; however, the airplane forced landed in a field about 3 miles short of runway 15.

The engine was subsequently disassembled under Federal Aviation Administration oversight at Pratt and Whitney Engine Services, Bridgeport, West Virginia. Disassembly revealed compressor turbine (CT) blade fractures at varying heights above the platform, and downstream damage to the power turbine blades. The CT disc was forwarded to Pratt and Whitney Canada facilities in Montreal, Quebec, for further examination.

According to Pratt & Whitney Canada Engine/Component Investigation Report No. 09ASAO6, a total of 13 blades were fractured at the platform, with 8 of those exhibiting smooth fracture surfaces at the leading edge, consistent with fatigue. Those blades also exhibited a "dull dendritic appearance" toward the trailing edge, consistent with overload. The remaining five blades exhibited a dull dendritic appearance over the entire fracture surface, consistent with ductile overload.

During disc disassembly, only 14 of the blades were easily removed, and the others had to be pushed out, which was partially attributed to the disc having rubbed against the case.

Several other blades were extracted with little or no evidence of rubbing, suggesting they were fixed to the disc. Further examination revealed black corrosion blisters on the mating surfaces of both the blades and the disc.

Examination of blade serrations revealed an accumulation of orange dust, with black corrosion blisters also observed at various locations. Dust analysis indicated the presence of calcium and sulphur, with sulphates noted by the report as being common in "concrete, runway dust and in marine atmospheres." Analysis was also conducted on "grayish nodules" in a corroded area of one blade, which indicated features consistent with sulphidation. "The sulphur in the dust, most likely a salt, was the corrosive element."

Spectrum analysis revealed that the chemical composition of the blades and blade coatings were within specifications.

Subsequent to the incident, the operator increased engine water washes from once every 50 hours of operation to weekly, and incorporated borescope inspections into the engine maintenance program at every 100 hours of operation.

History of Flight

Enroute-climb to cruise	Loss of engine power (total) (Defining event)
Emergency descent	Off-field or emergency landing

Pilot Information

Certificate:	Airline Transport	Age:	46, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 2 Without Waivers/Limitations	Last Medical Exam:	02/26/2009
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	07/01/2009
Flight Time:	8200 hours (Total, all aircraft), 4500 hours (Total, this make and model), 4460 hours (Pilot In Command, all aircraft), 126 hours (Last 90 days, all aircraft), 37 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	CESSNA	Registration:	N701FX
Model/Series:	208B	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	208B0420
Landing Gear Type:	Tricycle	Seats:	
Date/Type of Last Inspection:	11/13/2009, AAIP	Certified Max Gross Wt.:	8750 lbs
Time Since Last Inspection:	14 Hours	Engines:	1 Turbo Prop
Airframe Total Time:	6606 Hours	Engine Manufacturer:	P&W
ELT:	Installed, not activated	Engine Model/Series:	PT6A SER
Registered Owner:	FEDERAL EXPRESS CORPORATION	Rated Power:	750 hp
Operator:	Wiggins Airways, Inc.	Air Carrier Operating Certificate:	On-demand Air Taxi (135)
Operator Does Business As:		Operator Designator Code:	AXSA

Meteorological Information and Flight Plan

Observation Facility, Elevation:	RME, 481 ft msl	Observation Time:	0753 EST
Distance from Accident Site:	3 Nautical Miles	Condition of Light:	Day
Direction from Accident Site:	150°	Conditions at Accident Site:	Visual Conditions
Lowest Cloud Condition:	Few / 3300 ft agl	Temperature/Dew Point:	11° C / 10° C
Lowest Ceiling:	Broken / 4000 ft agl	Visibility	8 Miles
Wind Speed/Gusts, Direction:	6 knots, 220°	Visibility (RVR):	
Altimeter Setting:	29.25 inches Hg	Visibility (RVV):	
Precipitation and Obscuration:	Light - Rain; No Obscuration		
Departure Point:	Syracuse, NY (SYR)	Type of Flight Plan Filed:	IFR
Destination:	Plattsburgh, NY (PBG)	Type of Clearance:	IFR
Departure Time:	0730 EST	Type of Airspace:	

Wreckage and Impact Information

Crew Injuries:	1 None	Aircraft Damage:	None
Passenger Injuries:	N/A	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 None		

Administrative Information

Investigator In Charge (IIC):	Paul R Cox	Adopted Date:	08/03/2011
Additional Participating Persons:	Joseph A Yacko; FAA/FSDO; Albany, NY Murray Little; Wiggins Airways, Inc.; Manchester, NH		
Publish Date:	08/03/2011		
Investigation Docket:	http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=75155		

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