Aviation Investigation Final Report

Location:	Altus, Oklahoma	**Accident Number:**	FTW02LA223
Date & Time:	August 2, 2002, 12:20 Local	**Registration:**	N57597
Aircraft:	Piper PA-36-285	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	1 None
Flight Conducted Under:	Part 137: Agricultural		

Analysis

According to the pilot, he was flying east, executing his final pass in a field when he heard a "loud noise" and the engine lost total power. He looked for a forced landing location, but obstructions/hazards were identified ahead and on both sides of the airplane. He attempted to turn the airplane 180 degrees, but the airplane impacted the ground, slid approximately 200 feet and came to rest upright. The engine examination revealed that compressor turbine blade #22 fractured due to creep and there was heat distress in the combustion liner, and burnt temperature probes.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The loss of engine power as a result of the fracture of a compressor turbine blade due to fatigue. A contributing factor was the lack of suitable terrain for the forced landing.

Findings

Occurrence #1: LOSS OF ENGINE POWER
Phase of Operation: MANEUVERING - AERIAL APPLICATION

Findings
1. (C) TURBINE ASSEMBLY,TURBINE BLADE - FATIGUE

Occurrence #2: FORCED LANDING

Phase of Operation: DESCENT - EMERGENCY

Occurrence #3: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: EMERGENCY LANDING

Findings
2. (F) TERRAIN CONDITION - NONE SUITABLE
3. TERRAIN CONDITION - GROUND

Factual Information

On August 2, 2002, at 1220 central daylight time, a Piper PA-36-285 single-engine agricultural airplane, N57597, was substantially damaged during a forced landing following a complete loss of engine power while maneuvering near Altus, Oklahoma. The airplane was registered to and operated by Altus Ag-Air, of Altus. The commercial pilot, sole occupant of the airplane, was not injured. Visual meteorological conditions prevailed, and a flight plan was not filed for the 14 Code of Federal Regulations Part 137 aerial application flight. The local flight originated from a private airstrip (Scotty's Field) near Altus at 1130.

According to the pilot, the airplane operated "normally" during the morning spray runs. The pilot stated, he was flying east, executing his final pass in a field (empty hopper) when he heard a "loud noise" and the engine lost total power. The pilot began looking for a forced landing location and straight ahead was a creek, to the south was a creek, and to the north was a ditch and a power line. The pilot attempted to turn the airplane 180 degrees; however, the airplane impacted the ground, slid approximately 200 feet and came to rest upright. During the forced landing, one wing partially separated from the airframe.

The Pratt & Whitney (P&W) Canada PT6A-6 turboprop engine (serial number PCE 20068) was examined at a P&W Canada Facility, St. Hubert, Canada, and was overseen by the Transportation Safety Board of Canada. The engine, which was manufactured in 1964, had accumulated 4,343.1 hours since overhaul (10,586.7 hours total time). The engine exhibited impact damage and the reduction gear box was separated. The exhaust duct was separated in two sections; one piece remained attached to the gas generator and displayed deformation and impact marks consistent with that from turbine blades, and the second piece remained attached to the reduction gear box. The gas generator and accessory gearbox were not damaged. The reduction gearbox chip detector contained fine metallic debris and dirt. The oil and fuel filters were clean.

The compressors 1st, 2nd, and 3rd stage blade tips were circumferentially rubbed, and contact was observed on their respective shrouds. The compressors 1st, 2nd, and 3rd stage stator vanes were deformed in the direction of rotation, and the tips were circumferentially rubbed. The centrifugal impeller and shroud displayed circumferential rubbing. The combustion sections chamber liner exhibited heat distress cracking in the vicinity of the fuel nozzle bosses. The compressor turbine guide vane ring airfoils displayed impact damage on the trailing edge downstream side. The compressor turbine (CT) blade airfoils were all fractured between midspan and the blade root. The CT disc exhibited witness marks, consistent with the disc moving axially. The turbine section's inlet turbine temperature probes (ITT) were burnt. The power turbine guide vane ring airfoil leading edges displayed impact damage on the leading edges of the airfoils. Several power turbine blades exhibited damage, consistent with that from a CT blade. The reduction gear box and accessory gear box displayed no

indications of operational distress. Additionally, one glow plug (ignition system) exhibited heat distress in its element area.

The CT assembly (disk and blades) was examined by the P&W Canada Materials Laboratory. One blade, which was numbered 22 for the purpose of identification and analysis, exhibited ripples in the area of its fracture, consistent with creep. Decohesion at grain boundaries was observed on the concave side of the blade and the coating was not cracked, also consistent with blade fracturing due to creep (rather than by impact). Examination of the remaining blades revealed features consistent with fracture due to impact.

Pilot Information

Certificate:	Commercial	**Age:**	43,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Center
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 None	**Last FAA Medical Exam:**	April 15, 2002
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	May 2, 2002
Flight Time:	12200 hours (Total, all aircraft), 2500 hours (Total, this make and model), 12075 hours (Pilot In Command, all aircraft), 200 hours (Last 90 days, all aircraft), 100 hours (Last 30 days, all aircraft), 6 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N57597
Model/Series:	PA-36-285	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Restricted (Special)	**Serial Number:**	36-7560132
Landing Gear Type:	Tailwheel	**Seats:**	1
Date/Type of Last Inspection:	April 15, 2002 Annual	**Certified Max Gross Wt.:**	4400 lbs
Time Since Last Inspection:	14 Hrs	**Engines:**	1 Turbo prop
Airframe Total Time:	4471.3 Hrs at time of accident	**Engine Manufacturer:**	Pratt & Whitney Canada
ELT:	Not installed	**Engine Model/Series:**	PT6A-6
Registered Owner:	Altus Ag-Air Inc	**Rated Power:**	525 Horsepower
Operator:		**Operating Certificate(s) Held:**	None
Operator Does Business As:	N/A	**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	LTS,1382 ft msl	**Distance from Accident Site:**	10 Nautical Miles
Observation Time:	11:55 Local	**Direction from Accident Site:**	45°
Lowest Cloud Condition:	Scattered / 2500 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	2 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.06 inches Hg	**Temperature/Dew Point:**	35°C / 21°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Altus, OK (NONE)	**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	Unknown
Departure Time:	11:30 Local	**Type of Airspace:**	Class G

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 None	**Latitude, Longitude:**	34.650001,-99.26667

Administrative Information

Investigator In Charge (IIC):	Ragogna, Jason
Additional Participating Persons:	Carl S Keesy; Federal Aviation Administartion (FSDO); Oklahoma City, OK
Original Publish Date:	September 30, 2003
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=55363