



AVIATION



HIGHWAY



MARINE



RAILROAD



PIPELINE

Aviation Investigation Final Report

Location:	Grand Forks, North Dakota	Accident Number:	WPR18LA234
Date & Time:	August 21, 2018, 08:50 Local	Registration:	N7300M
Aircraft:	Air Tractor AT 400	Aircraft Damage:	Substantial
Defining Event:	Loss of engine power (total)	Injuries:	1 Serious
Flight Conducted Under:	Part 137: Agricultural		

Analysis

The pilot was maneuvering the airplane during an aerial application over a field. A witness noticed that the airplane's final turn was different than previous turns. Just before the airplane impacted the ground, the witness noticed a puff of smoke or liquid coming from the airplane. As the witness was a distance away, she was not certain. During the impact, the airplane sustained substantial damage.

Examination of the engine revealed circumferential rubbing marks due to contact between the compressor turbine disk assembly and power turbine (PT) disk assembly. Of the 41 PT blades, 18 were recovered, and those blades exhibited fracture surfaces consistent with overstress fracture under elevated temperatures. Impact marks were identified inside the exhaust duct. The fracture of these blades likely occurred at ground impact when the engine was operational.

It is likely that one or more of the unrecovered PT blades failed for an undetermined reason during the flight and impacted adjacent PT blades and components, including the exhaust duct. The internal engine damage from the released blades caused the PT disc assembly to fail, resulting in a loss of engine power.

Probable Cause and Findings

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

The loss of engine power while maneuvering due to the failure of the power turbine blade assembly for reasons that could not be determined based on available evidence.

Findings

Not determined	(general) - Unknown/Not determined
Aircraft	Turbine section - Failure

Factual Information

History of Flight

Maneuvering-low-alt flying	Loss of engine power (total) (Defining event)
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On August 21, 2018, about 0850 central daylight time, an Air Tractor AT-400, N7300M, sustained substantial damage when it was involved in an accident near Grand Forks, North Dakota. The pilot was seriously injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 137 aerial application flight.

The Federal Aviation Administration (FAA) inspector interviewed the pilot in the hospital. The pilot stated that he does not remember the accident or anything leading up to it.

A witness reported that she watched the accident airplane as it sprayed a field east of her position. The witness stated that the pilot’s final turn did not seem as “graceful” as the other turns. The witness further stated that, during the final turn, she did not notice any abnormal engine noises and that the engine sounded about the same as it did during all the previous turns. The witness added that, just before the airplane impacted the ground, she noticed something that appeared to be “a puff of smoke or liquid” coming from the airplane. She was some distance away and could not be certain.

The airplane impacted an open field and came to rest upright. The forward fuselage, empennage and both wings were substantially damaged. The exhaust duct displayed compressional bending due to impact with the terrain and showed mechanical damages from power turbine (PT) blade release.

Examination of the turbine engine revealed circumferential rubbing marks that were consistent with contact between the compressor turbine disk assembly and the adjacent static parts (CT vane ring & PT baffle) and contact between the power turbine disk assembly with the adjacent static parts (PT vane ring & PT shaft housing). Most of the PT blades were separated and missing; 18 of the 41 PT blades were recovered. The PT shroud was mechanically deformed and exhibited circumferential rub marks and multiple dents that were consistent with PT blade release.

Metallurgical examination of the 18 recovered PT blades revealed that the fracture surfaces exhibited areas of dark coloring, along with light gray-to-dark orange areas, consistent with surface oxidation and combustion deposits. These deposits were typical of exposure to high-temperature environments. In addition, the fracture surfaces exhibited a general rough and twisted surface texture with a dull and dark luster. Postfracture smearing and overstress fractures were also noted on the surfaces.

Pilot Information

Certificate:	Commercial	Age:	24,Male
Airplane Rating(s):	Single-engine land	Seat Occupied:	Single
Other Aircraft Rating(s):	None	Restraint Used:	Unknown
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	Airplane single-engine	Toxicology Performed:	No
Medical Certification:	Class 1 Without waivers/limitations	Last FAA Medical Exam:	January 5, 2018
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	
Flight Time:	1350 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Air Tractor	Registration:	N7300M
Model/Series:	AT 400 Undesignat	Aircraft Category:	Airplane
Year of Manufacture:	1984	Amateur Built:	
Airworthiness Certificate:	Restricted (Special)	Serial Number:	400-0518
Landing Gear Type:	Tailwheel	Seats:	1
Date/Type of Last Inspection:	August 14, 2018 100 hour	Certified Max Gross Wt.:	
Time Since Last Inspection:		Engines:	1 Turbo prop
Airframe Total Time:	11932 Hrs as of last inspection	Engine Manufacturer:	Pratt & Whitney
ELT:		Engine Model/Series:	PT6A SERIES
Registered Owner:		Rated Power:	
Operator:		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:	KGFK,832 ft msl	Distance from Accident Site:	5 Nautical Miles
Observation Time:	13:53 Local	Direction from Accident Site:	236°
Lowest Cloud Condition:	Few / 25000 ft AGL	Visibility	10 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	8 knots /	Turbulence Type Forecast/Actual:	None / None
Wind Direction:	350°	Turbulence Severity Forecast/Actual:	N/A / N/A
Altimeter Setting:	30.19 inches Hg	Temperature/Dew Point:	15°C / 10°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	East Grand Forks, MN (MN81)	Type of Flight Plan Filed:	None
Destination:	East Grand Forks, MN (MN81)	Type of Clearance:	None
Departure Time:		Type of Airspace:	

Airport Information

Airport:	J J And T MN81	Runway Surface Type:	
Airport Elevation:	828 ft msl	Runway Surface Condition:	Unknown
Runway Used:		IFR Approach:	None
Runway Length/Width:		VFR Approach/Landing:	None

Wreckage and Impact Information

Crew Injuries:	1 Serious	Aircraft Damage:	Substantial
Passenger Injuries:		Aircraft Fire:	None
Ground Injuries:		Aircraft Explosion:	None
Total Injuries:	1 Serious	Latitude, Longitude:	47.993888,-97.072219

Administrative Information

Investigator In Charge (IIC):	Swick, Andrew		
Additional Participating Persons:	Kelly P Bosch; FAA-FSDO; Fargo, ND		
Original Publish Date:	June 21, 2022	Investigation Class:	3
Note:	The NTSB did not travel to the scene of this accident.		
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=98125		

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).