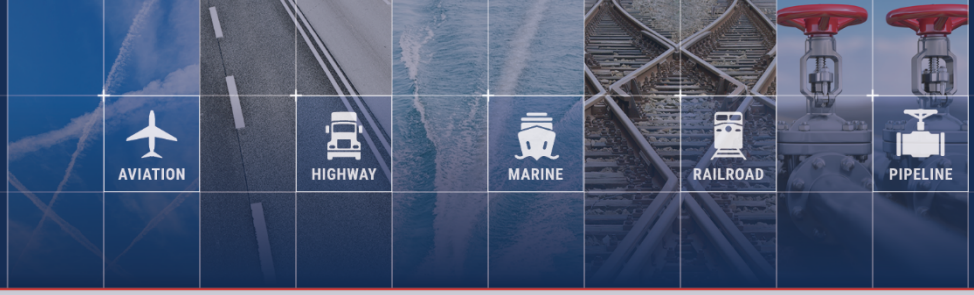

Aviation Investigation Factual Report

Location:	Honesdale, Pennsylvania	**Accident Number:**	NYC01FA141
Date & Time:	June 11, 2001, 10:10 Local	**Registration:**	N450M
Aircraft:	Cessna P210N	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	3 Fatal
Flight Conducted Under:	Part 91: General aviation - Other work use		

Factual Information

HISTORY OF FLIGHT

On June 11, 2001, about 1010 eastern daylight time, a turbine-powered Cessna P210N, N450M, was destroyed during a forced landing near Honesdale, Pennsylvania. The two certificated private pilots and the passenger were fatally injured. Visual meteorological conditions prevailed at the time of the accident. No flight plan had been filed for the local flight, which originated at Seamans Field (9N3), Factoryville, Pennsylvania. The sales demonstration flight was conducted under 14 CFR Part 91.

The airplane was being brokered by O & N Aircraft Modifications, Inc., which was located at Seamans Field. In 1992, under a Supplemental Type Certificate, O & N installed an Allison (Rolls-Royce Corporation) 250-B17F2 engine in the airplane as part of a Silver Eagle conversion, then subsequently sold the converted airplane to the current owner. According to the president of O & N, the current owner, who operated the airplane as a Delaware-based corporation, had recently lost his medical certificate, and requested that O & N handle the airplane's resale.

About a week prior to the accident, the airplane arrived from Delaware. An O & N pilot flew with the ferry crew back to Delaware, then returned to O & N with the airplane. The O & N pilot wrote up some maintenance discrepancies, including an engine vibration at high power rpm. However, at the time, none of the discrepancies appeared noteworthy, and the airplane's owner had not commented on the airplane having any engine difficulties. The airplane had not flown since its arrival.

The sales demonstration pilot, who worked under contract with O & N from his home in Vermont, had arranged the demonstration flight with the prospective buyer and his adult son, from California. The three met at O & N on the morning of the accident, with the airplane fueled to capacity to demonstrate full-fuel performance. The sales demonstration pilot was observed conducting a preflight inspection, which included taking fuel samples, while explaining the preflight procedures to the prospective buyer. After the preflight inspection, the sales demonstration pilot got into the right front seat, and the prospective buyer got into the left front seat. The airplane was subsequently started up, and departed Seamans Field about 0845.

The maneuvers performed during the accident flight were not known; however, according to the president of O & N, a sales demonstration flight would normally include a climb to about 16,000 feet, some maneuvering at that altitude, and a descent to incorporate lower level maneuvers and touch and go landings at one of several airports that had longer runways than Seamans Field.

During a portion of level flight, at an altitude estimated by a witness to be between 3,000 feet and 3,500 feet, the airplane was seen transiting westbound, towards Factoryville. The witness, who was also a private pilot, stated the airplane had caught his attention because he was part-owner of a Cessna 206, and originally thought it was his airplane.

As the witness continued to watch the airplane, he saw a puff of smoke emanate from the right side of the engine compartment, and shortly thereafter, he heard an explosion which sounded like a "blown piston." Immediately following that, he saw white smoke come from the engine's exhaust stacks, and trail beneath the airplane.

Another witness, close to the accident site, was in front of her house when she heard a high pitched hum. She stepped away from the house to get a better look, and saw the airplane pass almost directly over it. At the time, the airplane was flying in a circle, and she lost it from view. About 15 seconds later, it came around to the front of her house again. The airplane was flying lower than the first time she saw it, and she could make out the propeller and the airplane's painted stripes. She continued to hear the high pitched hum, and could see "a dirty white ribbon of smoke coming from the back of the plane." The airplane banked more sharply than the first time; and the last she saw of it, it flew over her house, then disappeared over trees towards the northwest. About 10 seconds later, she heard the sound of the airplane impacting trees.

A third witness, about 1 mile from the accident site, heard the airplane approach, making a whistling sound. She looked up and saw flames emanating from behind the propeller, and a 10- to 12-foot trail of grayish smoke. At the time, the airplane was flying straight; however, it then made a left turn, and she lost sight of it.

A fourth witness also heard the airplane make a whistling sound. The airplane was very low when he saw it, and heading westbound, directly toward him. The witness did not see any smoke, but did see one of the propeller blades sticking straight up. As the airplane approached him, he saw it make a sharp left turn, then descend and impact the trees. He raced to the accident site, but the wreckage was in flames when he arrived.

The accident occurred during the hours of daylight, in the vicinity of 41 degrees, 38.35 minutes north latitude, 75 degrees, 19.44 minutes west longitude.

PERSONNEL INFORMATION

The sales demonstration pilot held a private pilot certificate, with ratings for single-engine and multi-engine airplanes, and instrument airplane. According to his flight logbook, as of May 15, 2001, he had 8,553 hours of flight time, with an estimated 274 hours in the turbine-powered P210s. His latest Federal Aviation Administration (FAA) third class medical certificate was dated September 8, 2000.

The prospective buyer also held a private pilot certificate, with ratings for single-engine and multi-engine airplanes, and instrument airplane. On his latest application for his FAA third class medical certificate, dated September 12, 2000, he reported 2,300 hours of flight time.

METEOROLOGICAL INFORMATION

Weather, recorded at an airport about 28 nautical miles to the southwest, about 15 minutes before the accident and 45 minutes after the accident, included calm winds, clear skies, and visibility 8 - 10 statute miles.

AIRCRAFT INFORMATION

A review of the Safety Board database revealed that on December 15, 1999, the airplane was substantially damaged when it collided with trees at the end of a runway, then landed gear-up in a field. The event was documented as Safety Board accident number NYC00LA052.

According to engine maintenance records dated April 28, 2000, the engine gearbox and turbine assemblies, and the combustion section and fuel nozzle, were disassembled and inspected by Keystone Engine Services, West Chester, Pennsylvania. The propeller reduction gearbox and the compressor were replaced with zero-time units, and additional parts were replaced or reworked as required. The engine was reassembled, and tested with a slaved fuel system, without the propeller reduction gearbox. After testing, the reduction gearbox and original fuel system were installed.

During the engine rebuild, torquemeter gearshaft part number 23035299 serial number NN129830 was replaced with a new, Rolls-Royce-manufactured torquemeter gearshaft, serial number NN134898.

According to the airplane's maintenance logbook, engine reinstallation on the airframe was completed on September 13, 2000. Operating time of the engine since then, until the accident flight, was 25.2 hours.

WRECKAGE AND IMPACT INFORMATION

The accident site was about 20 nautical miles east of Factoryville, in a pasture located within a group of pastures, in an area of rolling hills and farms. The pastures were bordered by stone walls embedded with trees. The pastures were located south of an east-west road, and a farm and irregular terrain were located north of the road.

A wreckage path began at the base of a stone wall, between two of the pastures, and proceeded along a 160-degree magnetic heading. Part of the wall was displaced, and two trees along the wall, about 20 feet apart, exhibited impact marks. Other trees that were originally located between those two, one with a 10-inch diameter trunk, were sheared off at their bases.

The majority of the right wing and the outboard 1/3 of the left wing were separated from the main wreckage, and located about 15 feet beyond the stone wall. Where the wings had separated from the airplane, they exhibited indentations and tearing, consistent with ground and tree strikes.

The top engine cowling was also separated from the fuselage, and was located about 75 feet beyond the stone wall. Midway, along the right side of the cowling, there were perforations in the fiberglass, as well as fire damage, predominantly on the interior surface.

The main wreckage was located about 135 feet beyond the stone wall. It was fire-damaged, with the cabin area almost completely destroyed. There was also fire damage within the engine compartment.

All flight control surfaces were accounted for at the accident scene, and control continuity was confirmed.

The three-bladed propeller and hub were separated from the engine, and lying next to it. One of the propeller blades was bent backwards, and stuck in the ground. None of the blades exhibited any leading edge damage or chordwise scoring. All of the blades were in the "feather" position.

Inside the cockpit, the firewall fuel shutoff lever was in the "shutoff" position, and the condition lever was in the "cutoff" position. In the engine compartment, the "throttle coordinator" fuel lever was also in the cutoff position. The throttle coordinator power position indicated full power; however, the power cable had been pulled out of the coordinator.

The engine power turbine casing was fractured, and the power turbine section was separated from the gas generator section. The third stage nozzle vane was found on the ground, as was a wedge-shaped segment from the third stage turbine wheel. Most of the fourth stage nozzle vane was missing, as was the entire fourth stage turbine wheel. In addition, numerous turbine and casing fragments were found in and around the engine compartment, and shrapnel marks were noted on several engine accessory pieces.

MEDICAL AND PATHOLOGICAL INFORMATION

On June 11, 2001, autopsies were performed on the decedents' remains at Pathology Associates of Northeast Pennsylvania, Limited, Dunmore Pennsylvania. In addition, blood was submitted to Clinical Laboratories, Inc., Throop, Pennsylvania, for toxicological testing.

TESTS AND RESEARCH

On September 20, 2001, an engine teardown examination was conducted under Safety Board supervision at the Rolls-Royce facilities in Indianapolis, Indiana. Observations included a tri-

burst of the third stage turbine wheel, which, according to an air safety investigator from Rolls Royce, "was a result of an overspeed of N2 after a sudden loss of load on the power train." In addition, the torquemeter gearshaft was fractured into three pieces.

Binocular and scanning electron microscope (SEM) examination of the torquemeter gearshaft further revealed fracture type and progression, and the existence of intergranular separation. According to a Rolls-Royce metallurgist's report:

"[A crack in the gearshaft] initiated from an area of prior intergranular separation and progressed in high cycle fatigue (HCF) from the forward flange of the OD [outside diameter]. The fatigue progressed in an axial direction perpendicular to the flange end face. The fatigue branched in two directions at the intersection of the gear teeth. One crack continued along the end of the teeth before turning in the forward direction, resulting in the break out of [a] small section.... The other crack progressed through the gear teeth and into the web of the input gear.... The fatigue crack reinitiated in the EB [electronic beam] weld and propagated circumferentially for approximately 2 inches before final fracture occurred in overload.

Based on the evidence of the intergranular fracture features and the presence of black oxide on the fracture surface, it is concluded that the intergranular cracking was produced during the manufacturing process by stress corrosion mechanisms during the AMS 2485 black oxide treatment [process]."

ADDITIONAL INFORMATION

Immediately after the accident, a request was made through the Federal Aviation Administration (FAA) party member to provide radar data of the flight. The initial response was that data did exist; however, when a status request was made 5 months later, the response at that time was that it did not exist.

On June 13, 2001, the wreckage was released to a representative of the owner's insurance company, with the exception of the engine and engine fragments, which were retained for further disassembly and metallurgical examination at Rolls-Royce. On January 14, 2002, the engine and engine fragments were shipped back to the insurer's representative by Rolls-Royce personnel.

Pilot Information

Certificate:	Private	**Age:**	63,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	September 8, 2000
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	November 15, 2000
Flight Time:	8553 hours (Total, all aircraft), 270 hours (Total, this make and model), 26 hours (Last 90 days, all aircraft), 2 hours (Last 30 days, all aircraft)		

Co-pilot Information

Certificate:	Private	**Age:**	57,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	September 12, 2000
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	2300 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N450M
Model/Series:	P210N	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	P21000631
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	September 13, 2000 Annual	**Certified Max Gross Wt.:**	4016 lbs
Time Since Last Inspection:	25 Hrs	**Engines:**	1 Turbo prop
Airframe Total Time:	2311 Hrs at time of accident	**Engine Manufacturer:**	Allison
ELT:	Installed, not activated	**Engine Model/Series:**	250-B17F/2
Registered Owner:	Imperial Sales, Inc.	**Rated Power:**	450 Horsepower
Operator:	O & N Aircraft Modifications, INc.	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	AVP,955 ft msl	**Distance from Accident Site:**	28 Nautical Miles
Observation Time:	09:54 Local	**Direction from Accident Site:**	230°
Lowest Cloud Condition:	Clear	**Visibility**	8 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	/ None	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.87 inches Hg	**Temperature/Dew Point:**	19°C / 15°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Factoryville, PA (9N3)	**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	None
Departure Time:	08:45 Local	**Type of Airspace:**	Class G

Wreckage and Impact Information

Crew Injuries:	2 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	1 Fatal	**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	In-flight
Total Injuries:	3 Fatal	**Latitude, Longitude:**	41.569721,-75.250602(est)

Administrative Information

Investigator In Charge (IIC):	Cox, Paul
Additional Participating Persons:	Scott Scheurich; Rolls-Royce (Allison) ; Indianapolis, IN Todd Sigler; Cessna Aircraft Company ; Wichita, KS Myron Olson; O&N Aircraft Modifications, Inc.; Factoryville, PA John Loney; Keystone Engine Services, a division of; West Chester, PA Don Borda; FAA/FSDO; Allentown, PA
Report Date:	March 26, 2002
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=52461