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|  | | NTSB ID: SEA05FA074 | | Aircraft Registration Number: N1241X | |
| | | Occurrence Date: 04/12/2005 | | Most Critical Injury: None | |
| | | Occurrence Type: Incident | | Investigated By: NTSB | |
| Location/Time | | | | | |
| Nearest City/Place Roosevelt Roads | | State PR | Zip Code 00742 | Local Time 1050 | Time Zone AST |
| Airport Proximity: On Airport/Airstrip | | Distance From Landing Facility: 0 | | | |
| Aircraft Information Summary | | | | | |
| Aircraft Manufacturer Cessna | | Model/Series 208B | | Type of Aircraft Airplane | |
| Revenue Sightseeing Flight: No | | | Air Medical Transport Flight: No | | |
| Narrative | | | | | |
| Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident: | | | | | |
| HISTORY OF FLIGHT | | | | | |
| <p>On April 12, 2005, about 1050 Atlantic standard time, a Cessna 208B - Grand Caravan airplane, N1241X, experienced a total loss of engine power during a cross-country flight. Following the loss of power, the pilot successfully landed the airplane, without further incident or damage to the airplane, at Roosevelt Roads Naval Station, Roosevelt Roads, Puerto Rico. The airplane is registered to First Bank of Hazelwood, Missouri, and was being operated by MN Aviation, San Juan, Puerto Rico, as a Title 14, CFR Part 135, scheduled domestic passenger flight. The airline transport pilot (ATP) and three passengers aboard the airplane were not injured. Visual meteorological conditions prevailed and a visual flight rules (VFR) flight plan was activated. The flight originated from Vieques, Puerto Rico, approximately 10 minutes prior to the power failure and subsequent forced landing. The pilot's planned destination was San Juan, Puerto Rico.</p> | | | | | |
| <p>The pilot reported in a written statement "...at a cruising altitude of 2000' and 150 kts IAS [knots indicated airspeed], all engine instruments were reading normal parameters for a cruise power of 1650 torque. At this time I experienced a load bang with the characteristic power loss, deceleration and noise associated with a flameout." The pilot reported that concurrent with the loud bang, oil became visible on the aircraft's windshield and the propeller came to an abrupt stop.</p> | | | | | |
| AIRCRAFT INFORMATION | | | | | |
| <p>The airplane, a 1998 Cessna 208B Grand Caravan, was equipped with a Pratt & Whitney Canada PT6A-114A gas turbine engine rated at 675 shaft horsepower. Maintenance records showed the engine was originally manufactured and equipped with compressor turbine blades (part number 3045741-01) incorporating the CPW 550 coating, which, according to the manufacturer, provides increased resistance to sulphidation. The engine maintenance records showed that in August 2002, during a hot section inspection (HSI), the engine was reconfigured utilizing CPW 333 coated compressor turbine blades (part number 3102401-01), which, according to the manufacturer, does not have sufficient resistance to sulphidation under adverse environmental operating conditions. The engine received three additional hot section inspections subsequent to the August 2002, HSI. All three included the use of CPW 333 coated blades.</p> | | | | | |
| TESTS AND RESEARCH | | | | | |
| <p>The engine was removed from the airframe and shipped to Pratt & Whitney Canada (P&WC), St. Hubert, Quebec, Canada for examination and teardown. Representatives from the National Transportation Safety Board, Pratt & Whitney Canada, MN Aviation and Cessna Aircraft Company were in attendance for the teardown, which took place on June 1-2, 2005.</p> | | | | | |
| FACTUAL REPORT - AVIATION | | | | | |

National Transportation Safety Board

FACTUAL REPORT

AVIATION

NTSB ID: SEA05FA074

Occurrence Date: 04/12/2005

Occurrence Type: Incident

Narrative (Continued)

Disassembly and examination of the engine revealed extensive corrosion and mechanical damage throughout the compressor and power turbine assemblies. The compressor disc assembly was essentially intact, however, all of the compressor turbine blades (58 total) were fractured and displaced. The fracture surfaces were all approximately .250 inches above the corresponding blade platform. Corrosion was present throughout the first, second and third stage compressor disks, associated blades and compressor stators. The corrosion deposits were white and rust colored. The power turbine (PT) assembly was also essentially intact, however, multiple PT blades were fractured and displaced. Mechanical type damage was noted to both the compressor and power turbine guide vane assemblies.


Examination of the fractured compressor turbine blades by P&WC's Material Laboratory revealed the blades fractured in a tensile overload condition. Following the engine examination and subsequent laboratory testing, Pratt & Whitney Canada issued a report outlining the findings pertaining to the fractured compressor turbine blades. The report (dated July 29, 2005) states the overload fractures on the compressor turbine blades was due to a weakening of the underlying base material due to the presence of sulphidation corrosion. The sulphidation corrosion was evident through approximately half of the thickness of the blade airfoils "...thus reducing the blades effective load bearing capabilities." The report stated the material composition of the turbine blades met drawing requirements and no metallurgical anomalies were found.


ADDITIONAL INFORMATION

In a Service Information Letter (SIL) issued (March 1998) by Pratt & Whitney Canada, sulphidation is defined as a type of "hot corrosion" which develops in the gas path of turbine engines operated in salt rich environments. The SIL states "Sulphate salts will form in the gas path if sodium and sulphur are both present. Most aviation turbine fuels contain sulphur in sufficient amounts for sulphidation to occur if a source of sodium is present. The most common source is sea water..." The presence of the "salts" on component surfaces attacks the protective coating and progresses to the underlying base material.

Both Pratt & Whitney Canada and Cessna Aircraft Company outline preventive measures for combating sulphidation in gas turbine engines. The aforementioned P&WC Service Information Letter summarizes procedures to minimize sulphidation by means of a turbine engine wash program. Cessna also outlines a similar procedure in the Caravan Information Manual.

According to the operator, a postflight engine wash was accomplished daily in accordance with Cessna guidelines.

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| | | Occurrence Date: 04/12/2005 | | | | |
| | | Occurrence Type: Incident | | | | |
| Landing Facility/Approach Information | | | | | | |
| Airport Name Roosevelt Roads Airport | | Airport ID: TJNR | Airport Elevation 39 Ft. MSL | Runway Used 25 | Runway Length 11000 | Runway Width |
| Runway Surface Type: Asphalt | | | | | | |
| Runway Surface Condition: Dry | | | | | | |
| Approach/Arrival Flown: Visual | | | | | | |
| VFR Approach/Landing: Forced Landing | | | | | | |
| Aircraft Information | | | | | | |
| Aircraft Manufacturer Cessna | | Model/Series 208B | | Serial Number 208B-657 | | |
| Airworthiness Certificate(s): Normal | | | | | | |
| Landing Gear Type: Tricycle | | | | | | |
| Amateur Built Acft? No | | Number of Seats: 8 | Certified Max Gross Wt. 8750 LBS | | Number of Engines: 1 | |
| Engine Type: Turbo Prop | | Engine Manufacturer: Pratt & Whitney Canada | | Model/Series: PT6A-114A | Rated Power: 675 HP | |
| - Aircraft Inspection Information | | | | | | |
| Type of Last Inspection Continuous Airworthiness | | Date of Last Inspection 04/2005 | Time Since Last Inspection 16 Hours | | Airframe Total Time 3777 Hours | |
| - Emergency Locator Transmitter (ELT) Information | | | | | | |
| ELT Installed?/Type Yes / | | ELT Operated? No | ELT Aided in Locating Accident Site? No | | | |
| Owner/Operator Information | | | | | | |
| Registered Aircraft Owner First Bank Leasing | | Street Address 560 Anglum Road | | | | |
| | | City Hazelwood | | State MO | Zip Code 63042 | |
| Operator of Aircraft MN Aviation | | Street Address PO BOX 9066566 | | | | |
| | | City San Juan | | State PR | Zip Code 00906 | |
| Operator Does Business As: | | | | Operator Designator Code: | | |
| - Type of U.S. Certificate(s) Held: | | | | | | |
| Air Carrier Operating Certificate(s): On-demand Air Taxi | | | | | | |
| Operating Certificate: | | | Operator Certificate: | | | |
| Regulation Flight Conducted Under: Part 135: Air Taxi & Commuter | | | | | | |
| Type of Flight Operation Conducted: Non-scheduled; Domestic; Passenger Only | | | | | | |

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| | Occurrence Type: Incident |

First Pilot Information

| | | | | |
|-----------------|-----------------|------------------|--------------------------|-----------|
| Name On File | City On File | State On File | Date of Birth On File | Age 59 |
|-----------------|-----------------|------------------|--------------------------|-----------|

| | | | |
|--------|---------------------|---------------------|-----------------------------|
| Sex: M | Seat Occupied: Left | Occupational Pilot? | Certificate Number: On File |
|--------|---------------------|---------------------|-----------------------------|

Certificate(s): Commercial

Airplane Rating(s): Multi-engine Land; Single-engine Land

Rotorcraft/Glider/LTA: None

Instrument Rating(s): Airplane

Instructor Rating(s): None

Current Biennial Flight Review? 12/2004

| | | |
|------------------------|--|------------------------------------|
| Medical Cert.: Class 2 | Medical Cert. Status: With Waivers/Limitations | Date of Last Medical Exam: 09/2004 |
|------------------------|--|------------------------------------|

| - Flight Time Matrix | All A/C | This Make and Model | Airplane Single Engine | Airplane Multi-Engine | Night | Instrument | | Rotorcraft | Glider | Lighter Than Air |
|-----------------------|---------|---------------------|------------------------|-----------------------|-------|------------|-----------|------------|--------|------------------|
| | | | | | | Actual | Simulated | | | |
| Total Time | 7745 | 2450 | 2600 | 704 | 514 | 233 | 287 | | | |
| Pilot In Command(PIC) | 7095 | 2450 | 2450 | 704 | | | | | | |
| Instructor | | | | | | | | | | |
| Instruction Received | | | | | | | | | | |
| Last 90 Days | 165 | 165 | 165 | | 45 | | | | | |
| Last 30 Days | 26 | 26 | 26 | | | | | | | |
| Last 24 Hours | 4 | 4 | 4 | | | | | | | |

| | | | |
|--------------------|----------------------------|--------------------------|------------------|
| Seatbelt Used? Yes | Shoulder Harness Used? Yes | Toxicology Performed? No | Second Pilot? No |
|--------------------|----------------------------|--------------------------|------------------|

Flight Plan/Itinerary

Type of Flight Plan Filed: VFR

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|----------------------------|-------------|---------------------------|------------------------|------------------|
| Departure Point Vieques | State PR | Airport Identifier VQS | Departure Time 1041 | Time Zone AST |
|----------------------------|-------------|---------------------------|------------------------|------------------|

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|-------------------------|-------------|----------------------------|--|
| Destination San Juan | State PR | Airport Identifier TJSJ | |
|-------------------------|-------------|----------------------------|--|


Type of Clearance: VFR

Type of Airspace:

Weather Information

Source of Wx Information:


Unknown

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|--|------------------|---------------------|--|---|---|
| Weather Information | | | | | |
| WOF ID | Observation Time | Time Zone | WOF Elevation Ft. MSL | WOF Distance From Accident Site NM | Direction From Accident Site Deg. Mag. |
| Sky/Lowest Cloud Condition: Scattered | | | 3500 Ft. AGL | | Condition of Light: Day |
| Lowest Ceiling: None | | | Ft. AGL | Visibility: 10 SM | Altimeter: 29.89 "Hg |
| Temperature: 31 °C | Dew Point: °C | | Weather Conditions at Accident Site: Visual Conditions | | |
| Wind Direction: 180 | | Wind Speed: 6 | | Wind Gusts: | |
| Visibility (RVR): Ft. | | Visibility (RVV) SM | | | |
| Precip and/or Obscuration: No Obscuration; No Precipitation | | | | | |

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|-----------------------------|---------------------|--------------------------|
| Accident Information | | |
| Aircraft Damage: None | Aircraft Fire: None | Aircraft Explosion: None |

| - Injury Summary Matrix | Fatal | Serious | Minor | None | TOTAL |
|-------------------------|-------|---------|-------|------|-------|
| First Pilot | | | | 1 | 1 |
| Second Pilot | | | | | |
| Student Pilot | | | | | |
| Flight Instructor | | | | | |
| Check Pilot | | | | | |
| Flight Engineer | | | | | |
| Cabin Attendants | | | | | |
| Other Crew | | | | | |
| Passengers | | | | 3 | 3 |
| - TOTAL ABOARD - | | | | 4 | 4 |
| Other Ground | | | | | |
| - GRAND TOTAL - | | | | 4 | 4 |

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Administrative Information

Investigator-In-Charge (IIC)

Dennis J. Hogenson

Additional Persons Participating in This Accident/Incident Investigation:

Ariel Alvarez
San Juan FSDO
San Juan, PR

Robert August
Cessna Aircraft Company
Wichita, KS

Elaine M Summers
TSB - Canada
Dorval,

Marc Gratton
Pratt & Whitney
Longueuil,

Jose Maldonado
MN Aviation
San Juan, PR

Clint Crookshanks
NTSB - AS-40
Denver, CO