



INVESTIGATION NOTES

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During the course of the investigation, the following information was obtained.

Federal Aviation Administration (FAA) inspectors from the Rapid City FSDO, South Dakota, responded to the accident site and collected information. The pilot reported that wind was blowing about 30-40 mph in the vicinity. The landing area was a field in a bowl-shaped area. He conducted an approach into the wind pointing general northwest. When the helicopter was between 20-50 ft above the ground, the engine stopped producing power with associated low rotor and engine out warnings. The helicopter descended, spun two times, landed hard, and rolled on its side. Substantial damage was sustained to the fuselage and tail boom. About 50 gallons of fuel was extracted from the fuel tank during recovery of the helicopter.

The airframe and engine were examined at Essential Flight, Arlington, Washington, under the auspices of the NTSB with assistance from Bell Helicopters (Canada), and Rolls-Royce Engines. No anomalies were detected with the airframe and engine.

The engine was removed from the helicopter and transported to Keystone Turbine Services, an authorized maintenance center for Rolls-Royce. The examination was conducted with oversight from the FAA. Examination of the engine revealed:

- A check of the Pc system was conducted using shop air at the inlet side of the Pc air filter at 80 psi.
 - No leaks were detected anywhere throughout the system
- Both N1 and N2 rotors could be rotated by hand without hinderance.
- The 4th stage turbine blades appeared undamaged as did the surrounding turbine sections and exhaust plenum.
- The compressor front support and inlet guide vanes appeared undamaged.
- Several 1st stage compressor blades contained areas of missing material from impact damage.
 - The compressor module needed to be replaced but to maintain as much system consistency, the original bleed valve and anti-ice valve were installed on the replacement unit.
- Both the upper and lower Magnetic Chip Detectors (MCDs) were removed and examined.

- No evidence of flakes or related metallic debris was noted on either MCD.
- The fuel supply line was removed from the fuel spray nozzle.
 - About 1 teaspoon of clean fuel was drained from the line.
- The fuel spray nozzle was removed and examined.
 - There was no evidence of obstruction in the fuel spray nozzle inlet.
 - The spray face exhibited a heavy carbon and sooty appearance.
 - There did not appear to be any blockage within the air distribution holes.
 - The nozzle was not disassembled further.
- A borescope was used to inspect the overall condition of the combustion liner, nozzle shield,
- 1st-stage gas producer nozzle, & 1st-stage gas producer wheel (blades).
 - There were no visually obvious hot spots, streaks, missing material, or related thermal distress noted.
 - There was no apparent damage noted beyond the 4th stage power turbine wheel or within the exhaust collector support.
- The engine was installed on a test cell and a 6-point performance test was conducted to new engine production standards (model M250-C20J), in accordance with Rolls-Royce M250-C20 Overhaul Manual (Publication ref. 10W3) revision 16 dated 1 June 2020.
 - The engine successfully started, ran and shut down.
 - The engine successfully completed ground idle, flight-idle, max-continuous-power and take-off power runs.
 - When corrected for standard atmospheric conditions, the engine yielded performance
 - +11.3% below new-production standards at “low cruise” (300-horsepower)
 - +8.7% below new-production standards at normal cruise (370-hp)
 - +14.7% above new-production standards at maximum (Take-Off) power (420-hp)
 - The engine then completed “wave-off” max-power transients where the power was reduced to flight idle and then rapidly increased to take-off power.
 - The engine responded normally and responded with maximum power without surging or hesitation.

During the investigation, a completed NTSB Form 6120 was not received. Neither were logbooks. The pilot’s training and recurrency was mainly conducted at the Bell Academy in Hurst, Texas. The pilot reported have accrued a total of 1039.65 hour of total time, with 974.5 hours in make and model, 45.5 hours in the preceding 90 days, and 45.5 hours total in the last year.

Airframe total time was estimated at 1,450 hours.

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