NTSB Identification: CEN09IA003, 14 CFR Part 91: General Aviation

Incident occurred Wednesday, October 08, 2008 in Weatherford, TX

Probable Cause Approval Date: 11/09/2009

Aircraft: MD Helicopter Inc MD 900, registration: **N902RN,** Injuries: 1 Uninjured.

NTSB investigators used data provided by various sources and may not have traveled in support of this investigation to prepare this aircraft incident report.

While in cruise flight, the helicopter experienced a hard right yaw and subsequent left nose tuck. The pilot was able to regain control of the helicopter and reduce the airspeed to under 100 knots. The flight continued to its destination without further incident. An examination revealed that the vertical stabilizer control system adapter failed. Metallurgical examination revealed that the failure mode was reverse bending fatigue. The vertical stabilizer control system adapter has since been redesigned. Installation of the improved design is now required by an Airworthiness Directive.

The National Transportation Safety Board determines the probable cause(s) of this incident as follows:

The failure of the vertical stabilizer control adapter due to reverse bending fatigue.

Full narrative available:

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On October 8, 2008, approximately 1410 central daylight time, an McDonnell Douglas Helicopter Inc., MD 900, N902RN, piloted by a commercial pilot, experienced a violent yaw while in cruise flight near Weatherford, Texas. Visual meteorological conditions prevailed at the time of the event. The positioning flight was being operated under the provisions of Title 14 Code of Federal Regulations Part 91 without a flight plan. The pilot was not injured. The flight was en route to Grand Prairie Municipal Airport (KGPM), Grand Prairie, Texas.

According to the written statement submitted by the pilot, he had stopped in Plainview, Texas, for fuel, and was en route to KGPM at an altitude of 5,500 feet mean sea level. The pilot stated that there was a "right quartering tailwind" approximately 15 knots, the sky condition was clear, and there was no turbulence. The airspeed was 125 knots indicated airspeed and the autopilot was "engaged and coupled to [altitude] and [navigation] modes." One hour and thirty-five minutes into the flight the helicopter experienced a "hard right yaw and subsequent left nose tuck." The pilot was able to regain control of the helicopter and reduced the airspeed "below 100" knots. The flight continued to KGPM without further incident.

The helicopter was examined under the supervision of National Transportation Safety Board (NTSB) investigators and a representative from MD Helicopters. The examination revealed that the adapter located between the actuator and the control rod for the left vertical stabilizer control system (VSCS) had fractured. Further examination revealed minor damage to the front and rear fairings located between the upper and lower fins and a small rub mark on the leading edge of the horizontal stabilizer. With the exception of the fractures, the actuation assembly was intact, correctly installed, and appropriately wire-locked. The actuator and the control rod rotated freely within the limitations of their respective rod-ends. Examination of the rigging of the right and left vertical fins revealed no anomalies.

The left actuation assembly was removed from the helicopter and sent to the NTSB Materials Laboratory in Washington, D.C., for further examination. Examination of the fracture face on the adapter revealed two distinct opposing zones displaying crack arrest marks and ratchet marks, typical of reverse bending fatigue.

A review of the maintenance records revealed that fractured adapter had been installed in September 2, 2008, in compliance with MDHI Service Bulletin (SB) 900-109, dated August 15, 2008.

According to MDHI, at least three other helicopters encountered similar failures of the VSCS actuator, (Please reference NTSB case number **SEA08SA170, DEN08RA132, and CEN09IA032**) all within a six-month period of time. On October 17, 2008, MDHI issued SB 900-110 "Operational Restrictions Concerning VSCS Tube Adapters." This SB was directed at all MD900 helicopters within a specific serial number range. The SB required owners and operators to reduce the operational airspeed of their helicopters to 100 knots indicated airspeed, or Velocity Never Exceed Speed (whichever was less), in visual meteorological conditions, with the autopilot off, VSCS on, until the VSCS adapters could be replaced.

On December 3, 2008, MDHI issued SB 900-110R1 "Operational Restrictions and Replacement of VSCS Tube Adapters." This SB superseded the SB 900-110 and directed operators to replace the two VSCS tube adapters with the "improved" tube adapters. Once this SB had been complied with, the operational airspeed and autopilot restrictions were no longer applicable.

On December 17, 2008, Airworthiness Directive (AD) 2008-22-53 issued by the Federal Aviation Administration became effective. This AD required all MD900 helicopter operators with the old VSCS tube adapters to comply with airspeed and autopilot restrictions. If the operator had replaced the old VSCS tube adapter with the new "improved" design, the AD was not applicable.

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