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National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: April 17, 1986
In reply refer to: A-86-24

Honorable Donald D. Engen
Administrator
Federal Aviation Administration
Washington, D. C. 20591

On July 16, 1984, a Hiller Aviation UH-12E helicopter, N1043L, crashed while engaged in an agricultural spraying operation near Redmond, Oregon. The helicopter was destroyed; the pilot, the sole occupant, received minor injuries. The investigation by the National Transportation Safety Board revealed that an outboard section of main rotor blade had separated in flight. Subsequent detailed examination of the fractured surfaces of the main rotor blade spar in the Safety Board's metallurgical laboratory revealed that a fatigue crack had propagated through 80 percent of the spar cross section prior to separation. The fatigue crack originated at the interface between the spar lower surface leading edge and the external spar doubler.

The failed blade was manufactured by the Parsons Company, a Hiller Aviation vendor, in the 1960's. It had accumulated a total of 4,068 hours at the time of the accident. In the 1970's, because of service problems experienced with this blade (PN 2253-1101-04), the Federal Aviation Administration (FAA) issued Airworthiness Directive (AD) 80-14-12 that required, at 100-hour intervals, a dye penetrant inspection of the blade spar for evidence of cracks and coin tap tests for evidence of blade skin to spar bonding voids. The failed blade reportedly had been inspected in accordance with the AD about 29 hours before it separated.

The Safety Board understands that this was the fourth such blade failure since the AD was issued. All four failures reportedly occurred when the blades had accumulated about 4,000 hours, although the approved service life of the PN 2253-1101-04 blade is 6,600 hours. The inspection now being conducted at 100-hour intervals apparently is not adequate to identify fatigue crack propagation originating at the interface between the spar lower surface leading edge and the external spar doubler. The Safety Board concludes that a one-time inspection using ultrasonic or eddy current techniques should be imposed on the remaining Parsons main rotor blades with more than 3,000 hours of accumulated time, in addition to the existing AD requirement. Data from this one-time inspection program should be evaluated to determine if any further nondestructive tests are necessary or if the approved service life of the blades should be reduced.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

> Issue an Airworthiness Directive in addition to AD 80-14-12 to require a one-time ultrasonic or eddy current inspection of Parsons Company main rotor blades (PN 2253-1101-04) with more than 3,000 hours accumulated time used on Hiller Aviation model UH-12 helicopters for

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evidence of bonding voids and fatigue cracks particularly in the area of the interface between the spar lower surface leading edge and the external spar doubler. Data from this one-time inspection program should be evaluated to determine if any further ultrasonic or eddy current inspections are necessary or if the approved service life should be reduced. (Class II, Priority Action) (A-86-24)

BURNETT, Chairman, GOLDMAN, Vice Chairman, and LAUBER, Member, concurred in this recommendation.

By: Jim Burnett
Chairman