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NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: November 16, 1983

Forwarded to:

Honorable J. Lynn Helms
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-83-83

On August 9, 1982, the pilot of an Aerospatiale 315B helicopter, N10067, transporting an external load between two sites near Afton, Wyoming, reported that the helicopter experienced a sudden loss of power about 7,500 feet above mean sea level. The pilot released the external load, after which the helicopter crashed into numerous large pine trees and was demolished. The pilot was not injured as a result of the accident.

Disassembly of the helicopter's Turbomeca Artouste III B engine revealed that one of the axial compressor airfoil blades in the compressor wheel had fractured at its root radius. The fracture, which was almost adjacent to the compressor wheel hub, occurred as a result of the initiation and propagation of a high cycle-low stress fatigue crack or cracks that originated at a radius on the inside surface of the blade's aft flange. ^{1/} No metallurgical anomalies or manufacturing defects were found at the apparent origin points of the fatigue cracks.

The engine manufacturer has had reports of only two other accidents associated with axial compressor blade failures — one at Big Piney, Wyoming, on April 20, 1982, and the other at Crafton, Pennsylvania, on July 4, 1982. The pilot involved in the Big Piney accident was seriously injured; the pilot in the Crafton accident was not injured.

The engine manufacturer reported that of the approximately 2,055 Turbomeca Artouste III series engines currently in use throughout the world, about 163, or 8 percent are on helicopters operating in the United States. This series of engine, which is certified by the French Government Civil Aviation Authorities, has accumulated over 4,313,000 total hours of operation; in 1982 the engines accumulated about 476,388 hours of operation.


^{1/} This flange is used to pin the blade to the wheel hub.

On October 16, 1975, the engine manufacturer issued Modification Order (M.O.) 24967 to increase the structural integrity of the axial compressor blades installed in the Artouste Model III series B, D, and F engines. The engines involved in the Big Piney and Crafton accidents had axial compressor blades that had been modified in accordance with the requirements of M.O. 24967; however, the engine involved in the Afton accident had not been modified. A correlation of the causes of the blade failures has not been made and the reason that failures have been encountered only in the United States' operations is not readily apparent. The Safety Board is aware that the manufacturer has attempted to identify the cause(s) of these failures but currently has not succeeded. However, because of hazard potential associated with this type of failure, and the difficulty in identifying the cause(s) of the blade failures, the Safety Board believes that the Federal Aviation Administration should urge the certification authority to undertake a broader effort to determine the cause(s) of these failures.

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

Urge the Direction Generale de L'Aviation Civil (1) to review the adequacy of the engine manufacturer's program to identify the cause(s) of the axial compressor blade failures in the Turbomeca Artouste III series engines and to require necessary additional investigative measures, and (2) to require appropriate remedial action to prevent failure of the axial compressor blades of these engines. (Class II, Priority Action) (A-83-83)

BURNETT, Chairman, GOLDMAN, Vice Chairman, McADAMS, BURSLEY, and ENGEN, Members, concurred in this recommendation.


By: Jim Burnett
Chairman 