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Log 1838

NATIONAL TRANSPORTATION SAFETY BOARD  
WASHINGTON, D.C.

ISSUED: November 8, 1985

Forwarded to:

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

SAFETY RECOMMENDATION(S)

A-85-120 and -121

On September 6, 1985, a McDonnell Douglas DC-9 airplane with Pratt & Whitney JT8D-7 engines installed crashed shortly after takeoff from runway 19R at General Mitchell Field, Milwaukee, Wisconsin. The airplane was owned and operated by Midwest Express Airlines and was on a regularly scheduled passenger flight. The airplane was destroyed in the crash, and all 31 persons aboard were killed. Reportedly, witnesses heard a loud bang during the airplane's initial climb and saw smoke coming from its right engine. The National Transportation Safety Board's investigation of the accident is continuing. The preliminary investigation has disclosed that 9th- and 10th-stage high-pressure (HP) compressor blades and spacer parts separated from the right engine during takeoff.

On January 26, 1985, a Boeing 727 airplane with Pratt & Whitney JT8D engines installed had an uncontained failure of the No. 3 engine. The airplane was owned and operated by Northwest Orient Airlines and was on a regularly scheduled passenger flight. Parts that separated from the No. 3 engine damaged the No. 2 engine. The flightcrew performed appropriate emergency procedures, and 7 minutes after takeoff completed a successful single-engine landing. A postflight examination revealed that the 7th- to 8th-stage HP compressor spacer in the No. 3 engine had ruptured.

These engine failures are two examples in a series of HP compressor rotor spacer failures on Pratt & Whitney JT8D series engines. All of the spacer failures to date have been of the removable sleeve design that has been in service in the JT8D series engines for more than 20 years. Spacers are installed at six locations in the HP compressor of every JT8D engine. Failure of the removable sleeve spacer usually results from cracks which may initiate from one or more of the following: interaction of the spacer with a stationary seal land; stress corrosion, stress alloying, or corrosion pitting of the spacer surface adjacent to the removable sleeves; and improper inspection and repair procedures during compressor module overhaul.

Between 1978 and 1981 Pratt & Whitney issued a series of "All Operators Letters" and "All Operators Wires" and conducted manufacturer/user conferences for the purposes of increasing operator awareness of the spacer failure problem and for disseminating new, more stringent inspection and repair techniques for these assemblies. During the same period, a stronger integral sleeve-type spacer was introduced for the JT8D engine, and Pratt & Whitney recommended use of the integral spacer in an All Operators Letter dated June 30, 1980:

The excellent reliability record of integral spacers leaves no doubt that fleetwide retrofit of the removable sleeve type spacer with integral spacers is the ultimate solution to the problem of spacer barrel fracture.

Following an uncontained spacer disintegration in 1982, another All Operators Letter (December 23, 1982) reemphasized the importance of careful spacer inspection during periodic engine teardown and again recommended replacing the removable sleeve spacers with integral sleeve spacers if economically feasible.

The letter also offered operators an economic incentive to retrofit their JT8D engines with integral spacers:

During a recent operator survey to determine the extent of compliance with our inspection and repair recommendations for removable sleeve spacers we also included an inquiry relative to positive operator programs to retire these spacers and replace them with integral spacers. The response was disappointing. In spite of our recommendations very few operators have positive programs for the timely incorporation of integral spacers. In order to stimulate airline interest in replacing the removable sleeve spacers with the integral design for the 7-8 and 8-9 stages we have recently included these parts in the Order Performance Incentive Plan Catalog.

According to the manufacturer's estimates, more than 7,000 spacers of the removable sleeve design currently are still in service on JT8D engines despite the fact a new, more reliable integral spacer is available for retrofit. To date, the Federal Aviation Administration has not issued any regulatory requirement to install the improved integral sleeve spacer in the JT8D engine.

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

Issue an Airworthiness Directive (AD) to require the installation of the one-piece, integral sleeve spacer at all six locations in the high-pressure compressor rotor of Pratt & Whitney JT8D-series engines not so equipped. The installation should be made as soon as practical but not later than the next opportunity wherein the engine is available in a maintenance facility where a partial or complete disassembly of the compressor can be accomplished. (Class II, Priority Action) (A-85-120)

Notify appropriate foreign civil aviation authorities and foreign operators of airplanes equipped with Pratt & Whitney JT8D-series engines of the failures associated with the removable sleeve spacers installed in the high-pressure compressor rotor and of the actions which should be taken to minimize or eliminate the failures. (Class II, Priority Action) (A-85-121)

BURNETT, Chairman, GOLDMAN, Vice Chairman, and BURSLEY, Member, concurred in these recommendations.

By:  Jim Burnett  
Chairman