



National Transportation Safety Board Aviation Accident Final Report

Location:	PENSACOLA, FL	Accident Number:	DCA96MA068
Date & Time:	07/06/1996, 1424 CDT	Registration:	N927DA
Aircraft:	McDonnell Douglas MD-88	Aircraft Damage:	Substantial
Defining Event:		Injuries:	2 Fatal, 2 Serious, 3 Minor, 135 None
Flight Conducted Under:	Part 121: Air Carrier - Scheduled		

Analysis

During the initial part of its takeoff roll, the airplane experienced an engine failure. Uncontained engine debris from the front compressor front hub (fan hub) of the #1 (left) engine penetrated the left aft fuselage. Two passengers were killed and two others were seriously injured. The takeoff was rejected, and the airplane was stopped on the runway. The fan hub had fractured through a tierrod hole and blade slot. Some form of drill breakage or drill breakdown, combined with localized loss of coolant and chip packing, had occurred during the drilling process, creating an altered microstructure and ladder cracking in the fan hub. Drilling damage extended much deeper into hole sidewall material than previously anticipated by P & W. Fatigue cracks initiated from the ladder cracking in the tierrod hole and began propagating almost immediately after the hub was put into service in 1990. The crack was large enough to have been detectable during the last fluorescent penetrant inspection at Delta. Delta's nondetection of the crack was caused either by a failure of the cleaning and fluorescent penetrant inspection processing, a failure of the inspector to detect the crack, or some combination of these factors.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: the fracture of the left engine's front compressor fan hub, which resulted from the failure of Delta Air Lines' fluorescent penetrant inspection process to detect a detectable fatigue crack initiating from an area of altered microstructure that was created during the drilling process by Volvo for Pratt & Whitney and that went undetected at the time of manufacture. Contributing to the accident was the lack of sufficient redundancy in the in-service inspection program. (NTSB Report AAR-98/01)

Findings

Occurrence #1: LOSS OF ENGINE POWER(TOTAL) - MECH FAILURE/MALF
Phase of Operation: TAKEOFF - ROLL/RUN

Findings

1. 1 ENGINE
2. (C) COMPRESSOR ASSEMBLY, ROTOR DISC - FATIGUE
3. (C) MAINTENANCE, INSPECTION - INADEQUATE - COMPANY MAINTENANCE PERSONNEL
4. (C) COMPRESSOR ASSEMBLY, ROTOR DISC - FRACTURED
5. COMPRESSOR ASSEMBLY, ROTOR DISC - SEPARATION

Occurrence #2: MISCELLANEOUS/OTHER
Phase of Operation: TAKEOFF - ROLL/RUN

Findings

6. MISC, ENGINE UNCONTAINED FAILURE
7. FUSELAGE, CABIN - FOREIGN OBJECT DAMAGE

Factual Information

On July 6, 1996, Delta Airlines flight 1288, an MD-88, N927DA, experienced an uncontained failure of the left engine during the beginning of the takeoff roll. The flightcrew stopped the airplane about 1400 feet down the takeoff runway. On board the airplane were 142 passengers, 2 flightcrew members, 3 cabincrew, and 2 non-revenue Delta employees occupying the cockpit and aft jumpseats. Engine parts entered the left side of the aft cabin resulting in 2 passengers sustaining fatal injuries and 2 sustained major injuries. Three other passengers received minor injuries during the evacuation. The captain stopped the evacuation from the emergency exits, and an airstair was brought to the airplane to evacuate the remaining passengers and the crew. The fan hub for the left engine was found fractured.

Pilot Information

Certificate:	Airline Transport	Age:	40, Male
Airplane Rating(s):	Multi-engine Land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	Class 1 Valid Medical--w/ waivers/lim.	Last Medical Exam:	01/23/1996
Occupational Pilot:	Last Flight Review or Equivalent:		
Flight Time:	12000 hours (Total, all aircraft), 2300 hours (Total, this make and model), 142 hours (Last 90 days, all aircraft), 39 hours (Last 30 days, all aircraft)		

Co-Pilot Information

Certificate:	Airline Transport	Age:	37, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Right
Other Aircraft Rating(s):	None	Restraint Used:	
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	Class 1 Without Waivers/Limitations	Last Medical Exam:	06/21/1996
Occupational Pilot:	Last Flight Review or Equivalent:		
Flight Time:			

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	McDonnell Douglas	Registration:	N927DA
Model/Series:	MD-88 MD-88	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Transport	Serial Number:	49714
Landing Gear Type:	Retractable - Tricycle	Seats:	142
Date/Type of Last Inspection:	Continuous Airworthiness	Certified Max Gross Wt.:	149500 lbs
Time Since Last Inspection:		Engines:	2 Turbo Jet
Airframe Total Time:	22031 Hours	Engine Manufacturer:	P&W
ELT:	Installed, not activated	Engine Model/Series:	JT8D-219
Registered Owner:	DELTA AIR LINES INC	Rated Power:	21000 lbs
Operator:	DELTA AIR LINES INC	Air Carrier Operating Certificate:	Flag carrier (121)
Operator Does Business As:		Operator Designator Code:	DALA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	PNS, 121 ft msl	Observation Time:	1406 CDT
Distance from Accident Site:	0 Nautical Miles	Direction from Accident Site:	200°
Lowest Cloud Condition:	Scattered / 3400 ft agl	Temperature/Dew Point:	32° C / 25° C
Lowest Ceiling:	Unknown	Visibility	7 Miles
Wind Speed/Gusts, Direction:	12 knots, 210°	Visibility (RVR):	
Altimeter Setting:	29 inches Hg	Visibility (RVV):	
Precipitation and Obscuration:			
Departure Point:	(PNS)	Type of Flight Plan Filed:	IFR
Destination:	ATLANTA, GA (ATL)	Type of Clearance:	IFR
Departure Time:	1424 CDT	Type of Airspace:	Class D

Airport Information

Airport:	PENSACOLA REGIONAL (PNS)	Runway Surface Type:	Asphalt
Airport Elevation:	121 ft	Runway Surface Condition:	Dry
Runway Used:	17	IFR Approach:	None
Runway Length/Width:	7002 ft / 150 ft	VFR Approach/Landing:	None

Wreckage and Impact Information

Crew Injuries:	5 None	Aircraft Damage:	Substantial
Passenger Injuries:	2 Fatal, 2 Serious, 3 Minor, 130 None	Aircraft Fire:	On-Ground
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	2 Fatal, 2 Serious, 3 Minor, 135 None	Latitude, Longitude:	

Administrative Information

Investigator In Charge (IIC):	THOMAS R CONROY	Adopted Date:	03/31/1998
Additional Participating Persons:	ROBERT HENLEY		
Publish Date:			
Investigation Docket:	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinq@ntsb.gov , or at 800-877-6799. Dockets released after this date are available at http://dms.nts.gov/pubdms/ .		

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report.