
Uncontained engine failure, McDonnell Douglas DC10-10, May 1, 1995

Micro-summary: This McDonnell Douglas DC10-10 experienced an uncontained engine failure of the #2 engine during takeoff.


Event Date: 1995-05-01 at 1120 CDT

Investigative Body: National Transportation Safety Board (NTSB), USA

Investigative Body's Web Site: <http://www.nts.gov/>

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 National Transportation Safety Board FACTUAL REPORT AVIATION		NTSB ID: CHI95IA142		Aircraft Registration Number: N1811U	
		Occurrence Date: 05/01/1995		Most Critical Injury: None	
		Occurrence Type: Incident		Investigated By: NTSB	
Location/Time					
Nearest City/Place CHICAGO	State IL	Zip Code 60666	Local Time 1120	Time Zone CDT	
Airport Proximity: On Airport		Distance From Landing Facility:		Direction From Airport:	
Aircraft Information Summary					
Aircraft Manufacturer MCDONNELL DOUGLAS		Model/Series DC10-10		Type of Aircraft Airplane	
Sightseeing Flight: No			Air Medical Transport Flight: No		
Narrative					
<p>Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident:</p> <p>On May 1, 1995, about 1120 central standard time, a McDonnell Douglas DC10-10, N1811U, operated by United Airlines (UAL) as United Airlines Flight 492, sustained minor damage following the uncontained failure of the number two engine during takeoff roll.</p> <p>The flight crew aborted the takeoff, returned to the gate, and deplaned the passengers without further incident. There were no injuries to the crew of 12, or the 180 passengers aboard the airplane. The scheduled domestic passenger flight, operated under 14 CFR Part 121, originated at the Chicago O'Hare International Airport with a planned destination of the Washington Dulles International Airport, Washington, D. C. An IFR flight plan was filed, and visual meteorological conditions prevailed in Chicago.</p> <p>The flight crew reported that during the application of takeoff power, when the throttles were in approximately the vertical position, the number one and three engines were indicating approximately 70 percent N1. The number two engine was indicating about 48 percent N1 and not accelerating. They heard a "crack". They aborted the takeoff, pulled the number two engine fire handle and discharged the fire bottle.</p> <p>The airplane was transported to the UAL maintenance hanger at O'Hare International airport where it was subsequently examined. Fragments of the turbine blades, shroud material, bolts, and the engine case were recovered from the runway, and from within the engine cowl and the engine. A gap was located in the thrust reverser latch seam which spanned approximately three inches at the trailing edge and .25 inches at the leading edge. The left cowling had a six inch by 21 inch puncture at the ten o'clock position and the right side cowling had a four inch by eighteen inch puncture at the four o'clock position.</p> <p>The engine was removed from the airframe revealing a circumferential penetration of the engine case, about one inch wide, extending around about 270 degrees of the circumference from the three o'clock position to the twelve o'clock position, in the vicinity of the first low pressure turbine. One oil line on the left side of the engine was fractured and the upper surface of the left stabilizer was oil covered.</p> <p>The engine was transported to the UAL engine overhaul facility, San Francisco, California, where it was examined in the presence of the Powerplants Group Chairman. In his factual report of the examination, he reported "the LPT stage one disk was separated from the LPT rotor at the stage one to two flange joint. The bore, web and rim portion of the disk were intact...Several stage one to two disk flange bolts were recovered in the debris. The fracture surfaces on the majority of the recovered bolt fragments were smoothed and rounded. Six stage one to stage two flange bolts were fractured in the shank, adjacent to the threads, in which two bolts had coarse looking fracture surfaces with varying degrees of discoloration."</p>					
FACTUAL REPORT - AVIATION					

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Occurrence Type: Incident


Narrative (Continued)


The LPT components were examined by a National Resource Specialist at the NTSB laboratory, Washington, D. C. In his factual report he stated that "the internal surfaces of the engine hardware in the low pressure turbine section contained multiple small-object impact marks". Seven intact toroid bolts and sets of associated hardware were recovered. X-ray energy dispersive spectroscopy (EDS) examination of the discolored areas of the bolts revealed substantial peaks for oxygen, aluminum, sulfur, and silver. "No evidence of fatigue cracking or corrosion (pitting) was noted on any of the bolt pieces recovered from the engine." A portion of the missing bolt, identified as an unthreaded portion of the shank, designated as bolt number six, was located with the fragments recovered from within the engine. The shank of the bolt exhibited significant damage. The lug arm, used for safetying the number six bolt, exhibited relatively minor damage. Examination of several of the lug arms revealed "noticeable wear patterns" and "crack arrest positions indicative of fatigue cracking."

Statements by UAL maintenance personnel indicate failures of the toroid bolt safeties are occasionally discovered when the engines are disassembled for major overhaul.

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		Occurrence Type: Incident			
Landing Facility/Approach Information					
Airport Name O'HARE INTERNATIONAL	Airport ID: ORD	Airport Elevation 668 Ft. MSL	Runway Used 9L	Runway Length 7967	Runway Width 150
Runway Surface Type: Asphalt					
Runway Surface Condition: Dry					
Type Instrument Approach: NONE					
VFR Approach/Landing: None					
Aircraft Information					
Aircraft Manufacturer MCDONNELL DOUGLAS		Model/Series DC10-10		Serial Number 46610	
Airworthiness Certificate(s): Transport					
Landing Gear Type: Retractable - Tricycle					
Homebuilt Aircraft? No	Number of Seats: 302	Certified Max Gross Wt.	433000 LBS	Number of Engines: 3	
Engine Type: Turbo Jet	Engine Manufacturer: CFM	Model/Series: CF6-6	Rated Power: 39000 LBS		
- Aircraft Inspection Information					
Type of Last Inspection Continuous Airworthiness	Date of Last Inspection 07/1994	Time Since Last Inspection 1903 Hours	Airframe Total Time 63749 Hours		
- Emergency Locator Transmitter (ELT) Information					
ELT Installed? Yes	ELT Operated? No	ELT Aided in Locating Accident Site?			
Owner/Operator Information					
Registered Aircraft Owner UNITED AIRLINES		Street Address P. O. BOX 66100			
		City CHICAGO	State IL	Zip Code 60666	
Operator of Aircraft Same as Reg'd Aircraft Owner		Street Address Same as Reg'd Aircraft Owner			
		City	State	Zip Code	
Operator Does Business As:			Operator Designator Code: UALA		
- Type of U.S. Certificate(s) Held:					
Air Carrier Operating Certificate(s): Flag Carrier/Domestic					
Operating Certificate:			Operator Certificate:		
Regulation Flight Conducted Under: Part 121: Air Carrier					
Type of Flight Operation Conducted: Scheduled; Domestic; Passenger Only					
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First Pilot Information																																																																																				
Name		City		State	Date of Birth	Age																																																																														
On File		On File		On File	On File	56																																																																														
Sex: M	Seat Occupied: Left	Principal Profession: Civilian Pilot		Certificate Number: On File																																																																																
Certificate(s): Airline Transport; Flight Instructor; Flight Engineer																																																																																				
Airplane Rating(s): Multi-engine Land; Single-engine Land																																																																																				
Rotorcraft/Glider/LTA: None																																																																																				
Instrument Rating(s): Airplane																																																																																				
Instructor Rating(s):																																																																																				
Type Rating/Endorsement for Accident/Incident Aircraft? Yes				Current Biennial Flight Review?																																																																																
Medical Cert.: Class 1		Medical Cert. Status: Valid Medical--no waivers/lim.		Date of Last Medical Exam: 01/1995																																																																																
<table border="1"> <tr> <th rowspan="2">- Flight Time Matrix</th> <th rowspan="2">All A/C</th> <th rowspan="2">This Make and Model</th> <th rowspan="2">Airplane Single Engine</th> <th rowspan="2">Airplane Multi-Engine</th> <th rowspan="2">Night</th> <th colspan="2">Instrument</th> <th rowspan="2">Rotorcraft</th> <th rowspan="2">Glider</th> <th rowspan="2">Lighter Than Air</th> </tr> <tr> <th>Actual</th> <th>Simulated</th> </tr> <tr> <td>Total Time</td> <td>19011</td> <td>2909</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Pilot In Command(PIC)</td> <td></td> <td>2909</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Instructor</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Last 90 Days</td> <td></td> <td></td> <td>172</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Last 30 Days</td> <td></td> <td></td> <td>53</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Last 24 Hours</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>						- Flight Time Matrix	All A/C	This Make and Model	Airplane Single Engine	Airplane Multi-Engine	Night	Instrument		Rotorcraft	Glider	Lighter Than Air	Actual	Simulated	Total Time	19011	2909									Pilot In Command(PIC)		2909									Instructor											Last 90 Days			172								Last 30 Days			53								Last 24 Hours										
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Seatbelt Used? Yes		Shoulder Harness Used? Yes		Toxicology Performed? No		Second Pilot? Yes																																																																														
Flight Plan/Itinerary																																																																																				
Type of Flight Plan Filed: IFR																																																																																				
Departure Point		State	Airport Identifier	Departure Time	Time Zone																																																																															
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			Occurrence Type: Incident		
Weather Information					
WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
ORD	1015	CST	668 Ft. MSL	0 NM	0 Deg. Mag.
Sky/Lowest Cloud Condition: Scattered			4000 Ft. AGL	Condition of Light: Day	
Lowest Ceiling: None			0 Ft. AGL	Visibility: 15 SM	Altimeter: 30.00 "Hg
Temperature: 11 °C		Dew Point: 3 °C	Wind Direction: 70		Density Altitude: 700 Ft.
Wind Speed: 15		Gusts: 24	Weather Conditions at Accident Site: Visual Conditions		
Visibility (RVR): 0 Ft.		Visibility (RVV) 0 SM	Intensity of Precipitation: Unknown		
Restrictions to Visibility: None					
Type of Precipitation: None					
Accident Information					
Aircraft Damage: Minor			Aircraft Fire: None		Aircraft Explosion: None
Classification: U.S. Registered/U.S. Soil					
- Injury Summary Matrix	Fatal	Serious	Minor	None	TOTAL
First Pilot				1	1
Second Pilot				1	1
Student Pilot					
Flight Instructor					
Check Pilot					
Flight Engineer				1	1
Cabin Attendants				9	9
Other Crew					
Passengers				180	180
- TOTAL ABOARD -				192	192
Other Ground	0	0	0		0
- GRAND TOTAL -	0	0	0	192	192

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Administrative Information		
<p>Investigator-In-Charge (IIC)</p> <p>WESLEY M. ROBBINS,</p>		
<p>Additional Persons Participating in This Accident/Incident Investigation:</p> <p>JEFFREY S BARNETT FAA, 9950 W. LAWRENCE AVE SCHILLER PARK, IL 60176</p> <p>JEFF PLANTZ UAL, P.O. BOX 66100 CHICAGO, IL 60666</p> <p>ROBERT A RECCHIUTI GE A/C ENGINES, 1 NEWMAN WAY CINCINNATI, OH 45215</p>		
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