
Rejected takeoff, McDonnell Douglas DC-10-10, October 12, 2003

Micro-summary: A takeoff configuration warning horn triggered a decision to successfully and effectively abort this McDonnell Douglas DC-10-10's takeoff.


Event Date: 2003-10-12 at 717 MDT

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

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

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		NTSB ID: DEN04IA012		Aircraft Registration Number: N375FE	
		Occurrence Date: 10/12/2003		Most Critical Injury: None	
		Occurrence Type: Incident		Investigated By: NTSB	
Location/Time					
Nearest City/Place Denver		State CO	Zip Code 80249	Local Time 0717	Time Zone MDT
Airport Proximity: On Airport		Distance From Landing Facility:		Direction From Airport:	
Aircraft Information Summary					
Aircraft Manufacturer McDonnell Douglas		Model/Series DC-10-10		Type of Aircraft Airplane	
Sightseeing Flight: No			Air Medical Transport Flight: No		
Narrative					
Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident:					
HISTORY OF FLIGHT					
<p>On October 12, 2003, at 0717 mountain daylight time, a McDonnell Douglas DC-10-10, N375FE, owned by Federal Express Corporation, Memphis, Tennessee, and operating as FedEx flight 840, sustained minor damage during a rejected takeoff at Denver International Airport (DEN), Denver, Colorado. The airline transport certificated captain, airline transport certificated first officer, flight engineer, and four non-revenue passengers were not injured. Visual meteorological conditions prevailed. An instrument flight rules (IFR) flight plan was filed for the scheduled domestic cargo flight being conducted under the provisions of Title 14 CFR Part 121. The flight to Memphis, Tennessee, was originating at the time of the accident.</p>					
<p>According to a Federal Express representative, at 0646, flight 840 "blocked out" from the FedEx ramp at DEN for a direct flight to Memphis. The aircraft taxied approximately 6 miles, and at 0717 it was cleared for take-off on runway 16R (16,000 x 200 feet). According to the captain, during the take-off roll, and shortly after the first officer called out the take-off decision speed (V1, 158 knots), the take-off warning horn sounded. At that time, the captain initiated a Rejected Take-Off (RTO). Assured that a stop on the runway was possible, he elected not to apply maximum braking in "hopes that a more gentle brake application might avoid or mitigate any damage to the aircraft and lessen the heat and fire risk." During the RTO, DEN tower contacted flight 840 and reported smoke in the vicinity of the left main landing gear. Immediately thereafter, the tower reported that fire was coming from the same area. DEN tower initiated a call to alert aircraft rescue and firefighting equipment (ARFF) to the scene. The aircraft came to a stop on the runway centerline at the D3 intersection. Approximately 1,800 feet of runway remained. After completing the emergency quick evacuation checklist, all seven persons aboard egressed via the L1 escape slide. At 0725, the tower closed the runway to all operations.</p>					
<p>According to a FedEx field line maintenance manager, the initial inspection of the airplane revealed that both of the nose landing gear tires, two main landing gear brake lines, all eight main landing gear brake assemblies, and all eight main landing gear tires were damaged during the RTO. Each damaged item was required to be replaced prior to towing the aircraft off the runway. The maintenance manager stated that the nose and main landing gear assemblies had overheated, during the RTO. He stated that each tire must have deflated after the airplane came to rest, because "there was no indication that the tires had skidded." Each wheel on the left main landing gear assembly (number 1, 2, 5, and 6), was "welded" to its brake assembly. Between each "welded" tire and brake assembly was also an axial spacer that is normally reused during tire replacement. Due to the lack of replacement parts being on hand, replacement tires, brake lines, and spacers were flown in from other locations. The damaged items were replaced and the airplane was towed to the FedEx ramp. The runway was cleared and reopened at 0038 the following morning.</p>					
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National Transportation Safety Board

FACTUAL REPORT

AVIATION

NTSB ID: DEN04IA012

Occurrence Date: 10/12/2003

Occurrence Type: Incident

Narrative (Continued)

TEST AND RESEARCH

According to Flight Data Recorder (FDR) information, during the take-off roll and subsequent RTO, the right outboard (ROB) slats went from take-off (TO) to landing (LAND) configuration at 156 knots and returned to TO configuration at 152 knots. During this same time, the left outboard (LOB) slats went from TO to LAND configuration at 164 knots and returned to TO configuration at 162 knots.

According to a FedEx systems engineer, this condition would result in the activation of the "take-off warning horn because the slats are no longer in take-off configuration." During an examination of the airplane, it was determined that the take-off warning horn was the result of a take-off configuration conflict between the inboard and outboard slats. An inspection of the lower left hand anti-torque strut (p/n ARH0518-1, IPC 27-83-05-01 item 534), revealed that it had separated from its attachment point on the inboard slat drive mechanism. Upon further inspection, it was noted that a rod-end bearing (p/n MS21232-9), had migrated out of the rod-end (p/n ARH0514-1), and that the two required washers (p/n S2431218-9S20G, CPN 5711588), were missing. This allowed the anti-torque strut to ride on the bolt that attaches the rod-end to the slat drive mechanism. An initial inspection of the bearing revealed that the bearing had migrated out of the rod-end under "axial loads" and that the bearing was "never staked." Further examination revealed that whether the bearing was properly staked or not, the bearing migrated out of the rod-end because the washers were not properly installed. There had been no prior repair or maintenance history pertaining to this component and this was the first time the strut had been removed from the airplane.


On October 20, 2003, a FedEx maintenance engineer examined the left and right wheel and brake assemblies. He stated that the left main landing gear brakes appeared to have been exposed to higher heat, due to a "high energy stop," which caused the wheels and brakes to fuse together. Although several tires received heat damage due to the "hot brakes and tire rims contacting the [tire] side walls," the general observation was that the tires had deflated after the airplane came to a stop. The left main landing gear brakes (number 5 and 6), and the aft inboard and outboard brake hoses were damaged by excessive heat. He stated that the tires did not exhibit any signs of "skid-thru" or damage due to rolling while flat. Although there was extensive heat damage to the wheel and brake assemblies, no wheel or brake deficiencies were noted.


ADDITIONAL INFORMATION

According to the captain, FedEx flight 840 was originally a non-stop flight from Oakland, California, to Memphis, Tennessee. During the flight, the captain was directed to divert to Denver to pick up additional freight. The additional freight and fuel resulted in a calculated take-off gross weight of approximately 404,900 pounds, and a landing-limited operational maximum take-off gross weight of approximately 406,700 pounds. The captain said that he anticipated a departure on runway 17R until he noticed that the airplane had been over fueled by approximately 400 pounds. Due to the extra fuel and the reports of wind shear from DEN tower, he elected to taxi to runway 16R to taxi off the over-fuel weight and take advantage of the longer runway.

On November 18, 2003, FedEx issued a Fleet Campaign Directive (FCD), 8-27-040 A, which required the inspection of the inboard slat drive mechanism and the lower left and right hand anti-torque struts for the proper washer installation and staking of the rod-end bearing. The FCD required the inspection of all DC-10, MD-10, and MD-11 aircraft.

According to Douglas Aircraft Company (DAC) CMM 27-83-14, the rod-end bearing (p/n MS21232-9), is to be staked in the rod-end per Douglas Process Specifications (DPS) 1.33-2.

 National Transportation Safety Board FACTUAL REPORT AVIATION		NTSB ID: DEN04IA012			
		Occurrence Date: 10/12/2003			
		Occurrence Type: Incident			
Landing Facility/Approach Information					
Airport Name	Airport ID:	Airport Elevation	Runway Used	Runway Length	Runway Width
Denver International	DEN	5431 Ft. MSL	17R	16000	200
Runway Surface Type: Concrete					
Runway Surface Condition: Dry					
Type Instrument Approach: Unknown					
VFR Approach/Landing: Unknown					
Aircraft Information					
Aircraft Manufacturer		Model/Series		Serial Number	
McDonnell Douglas		DC-10-10		46613	
Airworthiness Certificate(s): Transport					
Landing Gear Type: Retractable - Tricycle					
Homebuilt Aircraft? No	Number of Seats: 9	Certified Max Gross Wt.	440000 LBS	Number of Engines: 3	
Engine Type:	Engine Manufacturer:	Model/Series:	Rated Power:		
Turbo Jet	General Electric	CF6-6D	40000 LBS		
- Aircraft Inspection Information					
Type of Last Inspection	Date of Last Inspection	Time Since Last Inspection	Airframe Total Time		
Continuous Airworthiness	08/2003	1067 Hours	76360 Hours		
- Emergency Locator Transmitter (ELT) Information					
ELT Installed? Yes	ELT Operated? No	ELT Aided in Locating Accident Site? No			
Owner/Operator Information					
Registered Aircraft Owner		Street Address			
Federal Express Corporation		P.O.Box 727			
		City	State	Zip Code	
		Memphis	TN	38194	
Operator of Aircraft		Street Address			
Same as Reg'd Aircraft Owner		Same as Reg'd Aircraft Owner			
		City	State	Zip Code	
Operator Does Business As: FedEx			Operator Designator Code: FDEA		
- 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; Cargo					

 <p>National Transportation Safety Board FACTUAL REPORT AVIATION</p>	NTSB ID: DEN04IA012
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	Occurrence Type: Incident

First Pilot Information

Name On File	City On File	State On File	Date of Birth On File	Age 48
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Sex: M	Seat Occupied: Left	Principal Profession: Civilian Pilot	Certificate Number: On File
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Certificate(s): Airline Transport

Airplane Rating(s): Multi-engine Land

Rotorcraft/Glider/LTA: None

Instrument Rating(s): Airplane

Instructor Rating(s): None

Type Rating/Endorsement for Accident/Incident Aircraft? Yes	Current Biennial Flight Review? 07/2003
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Medical Cert.: Class 1	Medical Cert. Status: Valid Medical--no waivers/lim.	Date of Last Medical Exam: 08/2003
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- 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	3298									
Pilot In Command(PIC)	2615									
Instructor										
Last 90 Days	162									
Last 30 Days	56									
Last 24 Hours	3									

Seatbelt Used? Yes	Shoulder Harness Used? Yes	Toxicology Performed? No	Second Pilot? Yes
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Flight Plan/Itinerary

Type of Flight Plan Filed: IFR

Departure Point Same as Accident/Incident Location	State	Airport Identifier DEN	Departure Time 0717	Time Zone MDT
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Destination Memphis	State TN	Airport Identifier MEM	
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Type of Clearance: IFR

Type of Airspace: Class B

Weather Information

Source of Briefing:
Company

Method of Briefing:

 <p>National Transportation Safety Board FACTUAL REPORT AVIATION</p>	NTSB ID: DEN04IA012
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Weather Information

WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
KDEN	0720	MDT	5431 Ft. MSL	NM	Deg. Mag.

Sky/Lowest Cloud Condition: Few	110 Ft. AGL	Condition of Light: Dawn
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Lowest Ceiling: None	Ft. AGL	Visibility: 10	SM	Altimeter: 30.03	"Hg
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Temperature: 8 °C	Dew Point: -7 °C	Wind Direction: 221	Density Altitude: 5776	Ft.
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Wind Speed: 11	Gusts:	Weather Conditions at Accident Site: Visual Conditions
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Visibility (RVR):	Ft.	Visibility (RVV)	SM	Intensity of Precipitation:
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Restrictions to Visibility: None

Type of Precipitation: None

Accident Information

Aircraft Damage: Minor	Aircraft Fire: Ground	Aircraft Explosion: None
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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					
Other Crew					
Passengers				4	4
- TOTAL ABOARD -				7	7
Other Ground					
- GRAND TOTAL -				7	7

National Transportation Safety Board

FACTUAL REPORT

AVIATION



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Occurrence Date: 10/12/2003

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Administrative Information

Investigator-In-Charge (IIC)

David C. Bowling

Additional Persons Participating in This Accident/Incident Investigation:

Jack Grossman
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Denver, CO 80249