
		NTSB ID: SEA03TA116		Aircraft Registration Number: N1502	
		Occurrence Date: 06/25/2003		Most Critical Injury: Minor	
		Occurrence Type: Accident		Investigated By: NTSB	
Location/Time					
Nearest City/Place Big Timber		State MT	Zip Code 59055	Local Time 0900	Time Zone MDT
Airport Proximity: Off Airport/Airstrip		Distance From Landing Facility:			
Aircraft Information Summary					
Aircraft Manufacturer McDonnell Douglas		Model/Series 369E		Type of Aircraft Helicopter	
Revenue 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>*** Note: NTSB investigators may not have traveled in support of this investigation and used data provided by various sources to prepare this public aircraft accident report. ***</p> <p>HISTORY OF FLIGHT</p> <p>On June 25, 2003, approximately 0900 mountain daylight time, a (Hughes) McDonnell Douglas 369E helicopter, N1502, recently acquired by the US Department of Agriculture (USDA), operated by the USDA APHIS Wildlife Services, and being flown by a commercial pilot sustained substantial damage during a hard landing following a total loss of power in level cruise flight approximately six nautical miles northeast of Big Timber, Montana. The pilot and passenger received minor injuries. Visual meteorological conditions prevailed and the aircraft was operating under a USDA flight following procedure at the time. The flight, which was public use, was to be operated as a low level coyote predation operation.</p> <p>The pilot reported that while operating at an altitude of about 40 feet and 40 knots airspeed in level flight (refer to CHART HCD-I) he heard a loud bang, which he described as considerably louder than a compressor stall. The engine immediately lost power and the pilot observed both the "Engine Out" and "Auto Relight" warning lights illuminate.</p> <p>The pilot reported "...I attempted to reduce collective as much as my altitude allowed, and placed the aircraft in decelerative mode. I pulled initial pitch, leveled the aircraft, and struck the ground fairly hard. We bounced but were still level and I used remaining collective pitch to cushion impact but we struck the ground a second time at no more than 5 mph and rolled to the right side. My right landing skid had detached prior to striking the ground the second time, making an upright landing impossible...."</p> <p>PERSONNEL INFORMATION</p> <p>The pilot in command reported a total of 9,450 hours of flight experience of which 6,100 hours were in the Hughes/McDonnell-Douglas 369E helicopter. He also reported that all but 50 hours in the make/model was logged as pilot in command time.</p> <p>AIRCRAFT INFORMATION</p> <p>According to the helicopter's Hobbs meter, the time at the accident was recorded as 1660.0 hours (refer to graphic image I). The last airframe/engine inspection, signed off as a 300 hour/100 hour/annual, was conducted on February 20, 2003, at a total (engine and airframe) time of 7,847.4 hours and a Hobbs time of 1646.7 hours (refer to Attachments MRP-I and MRA-I). The total engine and airframe time at the accident would have been 7,860.7 hours.</p>					
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 <p>National Transportation Safety Board FACTUAL REPORT AVIATION</p>	NTSB ID: SEA03TA116
	Occurrence Date: 06/25/2003
	Occurrence Type: Accident

Narrative (Continued)

The helicopter was equipped with a Rolls Royce (Allison) 250-C20B turboshaft engine, serial number CAE 836294.

According to records maintained by Rolls Royce, the compressor-coupling adapter (part number: 23039791E-1, serial number: 71205) was manufactured by Allison on December 15, 1999, and was shipped out as a spare part four days later. Refer to Diagrams I and II, which show the location within the engine of the compressor coupling adaptor and a close-up view of the compressor/adaptor/spur adaptor gearshaft with respect to one another.

According to the airframe/engine maintenance records the last compressor overhaul was on June 1, 2000, at a total time of 6,855.0 hours. The compressor assembly buildup card also contained an entry referencing the compressor-coupling adapter (part number: 23039791E-1, serial number: 71205) at this same total time (refer to Attachments AR-I and OR-I). There were no further log entries indicating a compressor overhaul between this date and the accident.

WRECKAGE AND IMPACT INFORMATION

The aircraft crashed on hilly, grass covered, terrain approximately six nautical miles northeast of Big Timber, Montana. The accident site coordinates were reported as 45 degrees 55.12 minutes north latitude and 109 degrees 52.27 minutes west longitude (refer to graphic images 2 and 3).

SURVIVAL ASPECTS

Both the pilot and passenger's shoulder restraint system failed during the crash sequence. Both occupants exited the rotorcraft with their dual shoulder harness straps hanging free around their necks and post crash examination revealed that each belt's retention bar had exited the rectangular tongue, which the retention bar passes through and is retained by. There was no evidence of mechanical failure or fracture of either occupants retention bar or tongue. The cover plate for each belt however, had separated from the rectangular tongue unit on each restraint during the impact (refer to attached Survival Factors Factual Report and Metallurgical Report No.s 03-115).

TESTS AND RESEARCH

The engine was removed from the airframe and shipped to Rolls Royce, Indianapolis, Indiana, for further disassembly and examination under the Board's oversight. The initial examination revealed that the forward compressor rotated freely, however the N1/N2 gear train would not rotate. Disassembly of the engine revealed that the compressor coupling adapter had fractured circumferentially with the forward end of the compressor coupling remaining lodged within the compressor impeller and the aft end of the compressor coupling remaining with the spur adapter gearshaft. The compressor rotor assembly and the spur adapter gearshaft along with the associated compressor coupling adapter sections were shipped to the NTSB Materials Laboratory for further examination.

The NTSB Materials Laboratory examination revealed that the forward separated section of the compressor coupling adapter was vibro peened with part number 23039791E-1 and serial number 71205 and the part was identified as having been manufactured by Rolls Royce. Examination and testing of the two adapter sections revealed that the adaptor was of alloy steel that met the Rolls Royce Engineering Material Specifications, the hardness was also within specifications, and the part had been properly heat treated.

Further metallurgical examination revealed that an approximate 0.1 inch wide band aft of the fracture line on the pilot (outside) diameter of the compressor coupling adapter displayed severe fretting*.

Magnified optical and scanning electron microscope examinations of the fracture surfaces of the compressor coupling adapter revealed features in the undamaged areas consistent with fatigue progression.

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Narrative (Continued)

Several fatigue origins were noted on the outside surface of the pilot diameter and the origins were noted within the previously described area of fretting (refer to Metallurgical Report No. 03-095).

*"Fretting wear: Surface damage to a metal part resulting from micro-welding due to slight movement in a nearly stationary joint. Also called fretting corrosion." From "Understanding How Components Fail", 2nd Edition, Donald J. Wulpi.

 National Transportation Safety Board FACTUAL REPORT AVIATION		NTSB ID: SEA03TA116			
		Occurrence Date: 06/25/2003			
		Occurrence Type: Accident			
Landing Facility/Approach Information					
Airport Name	Airport ID:	Airport Elevation Ft. MSL	Runway Used NA	Runway Length	Runway Width
Runway Surface Type: Unknown					
Runway Surface Condition: Unknown					
Approach/Arrival Flown: NONE					
VFR Approach/Landing: Forced Landing					
Aircraft Information					
Aircraft Manufacturer McDonnell Douglas		Model/Series 369E		Serial Number 0324E	
Airworthiness Certificate(s): Restricted (Special)					
Landing Gear Type: Skid					
Amateur Built Acft? No	Number of Seats: 4	Certified Max Gross Wt. 3000 LBS	Number of Engines: 1		
Engine Type: Turbo Shaft	Engine Manufacturer: Allison	Model/Series: 250-C20B	Rated Power: 420 HP		
- Aircraft Inspection Information					
Type of Last Inspection Annual	Date of Last Inspection 02/2003	Time Since Last Inspection 19 Hours	Airframe Total Time 7866 Hours		
- Emergency Locator Transmitter (ELT) Information					
ELT Installed?/Type Yes /	ELT Operated? Yes	ELT Aided in Locating Accident Site? Yes			
Owner/Operator Information					
Registered Aircraft Owner US Department of Agriculture/Wildlife Services		Street Address 2150 Centre Ave., Bldg B, MSC 3W9			
		City Fort Collins	State CO	Zip Code 80526	
Operator of Aircraft USDA APHIS Wildlife Services		Street Address PO Box 1938			
		City Billings	State MT	Zip Code 59103	
Operator Does Business As:			Operator Designator Code:		
- Type of U.S. Certificate(s) Held: None					
Air Carrier Operating Certificate(s):					
Operating Certificate:			Operator Certificate:		
Regulation Flight Conducted Under: Public Use					
Type of Flight Operation Conducted: Public Use					

 <p>National Transportation Safety Board FACTUAL REPORT AVIATION</p>	NTSB ID: SEA03TA116
	Occurrence Date: 06/25/2003
	Occurrence Type: Accident

First Pilot Information

Name On File	City On File	State On File	Date of Birth On File	Age 43
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Sex: M	Seat Occupied: Left	Occupational Pilot? Civilian Pilot	Certificate Number: On File
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Certificate(s): Commercial

Airplane Rating(s): None

Rotorcraft/Glider/LTA: Helicopter

Instrument Rating(s): Helicopter

Instructor Rating(s): Helicopter

Current Biennial Flight Review? 04/2003

Medical Cert.: Class 2	Medical Cert. Status: Valid Medical--no waivers/lim.	Date of Last Medical Exam: 06/2002
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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	9450	6100			980		180			
Pilot In Command(PIC)	9200	6050								
Instructor	2500									
Instruction Received										
Last 90 Days	150	120								
Last 30 Days	35	20								
Last 24 Hours	5	5								

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

Type of Flight Plan Filed: Company VFR

Departure Point Big Timber	State MT	Airport Identifier 6S0	Departure Time 0840	Time Zone MDT
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Destination Helena	State MT	Airport Identifier HLN	
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Type of Clearance: None

Type of Airspace: Class G

Weather Information

UAT C/S Source of Wx Information:
Unknown

 <p>National Transportation Safety Board FACTUAL REPORT AVIATION</p>	NTSB ID: SEA03TA116
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	Occurrence Type: Accident

Weather Information

WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
LVM	0853	MDT	4656 Ft. MSL	27 NM	225 Deg. Mag.
Sky/Lowest Cloud Condition: Few			10000 Ft. AGL	Condition of Light: Day	
Lowest Ceiling: None			Ft. AGL	Visibility: 10 SM	Altimeter: 30.22 "Hg
Temperature: 9 °C	Dew Point: 4 °C	Weather Conditions at Accident Site: Visual Conditions			
Wind Direction: 300	Wind Speed: 9	Wind Gusts:			
Visibility (RVR): Ft.	Visibility (RVV) SM				
Precip and/or Obscuration:					

Accident Information

Aircraft Damage: Substantial	Aircraft Fire: Ground	Aircraft Explosion: None
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- Injury Summary Matrix	Fatal	Serious	Minor	None	TOTAL
First Pilot			1		1
Second Pilot					
Student Pilot					
Flight Instructor					
Check Pilot					
Flight Engineer					
Cabin Attendants					
Other Crew					
Passengers			1		1
- TOTAL ABOARD -			2		2
Other Ground					
- GRAND TOTAL -			2		2

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FACTUAL REPORT

AVIATION



NTSB ID: SEA03TA116

Occurrence Date: 06/25/2003

Occurrence Type: Accident

Administrative Information

Investigator-In-Charge (IIC)

Steven A. McCreary

Additional Persons Participating in This Accident/Incident Investigation:

Steve Jones
FAA FSDO
Helena, MT

Robert Ketchum
Rolls-Royce Corporation
Indianapolis, IN

Adrian Booth
The Boeing Company
Mesa, AZ

James Truitt
USDA - Wildlife Services
Fort Collins, CO