
		NTSB ID: WPR10LA060		Aircraft Registration Number: N551CR	
		Occurrence Date: 11/20/2009		Most Critical Injury: None	
		Occurrence Type: Accident		Investigated By: NTSB	
Location/Time					
Nearest City/Place Kahuku		State HI	Zip Code 96731	Local Time 1020	Time Zone HST
Airport Proximity: On Airport/Airstrip		Distance From Landing Facility:			
Aircraft Information Summary					
Aircraft Manufacturer MCDONNELL DOUGLAS HELI CO		Model/Series 369E		Type of Aircraft Helicopter	
Revenue Sightseeing Flight: Yes			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 aircraft accident report. ***</p> <p>HISTORY OF FLIGHT</p> <p>On November 20, 2009, at 1020 Hawaiian standard time, a McDonnell Douglas 369E helicopter, N551CR, sustained substantial damage when the left rear landing skid strut collapsed while the helicopter was standing with its engine operating at the Turtle Bay Resort Heliport, Kahuku, Hawaii. K & S Helicopters, Inc., d.b.a. Paradise Helicopters, operated the helicopter under the provisions of Title 14 Code of Federal Regulations Part 135. The commercial pilot and four passengers were not injured. Visual meteorological conditions prevailed, and a company flight plan had been filed.</p> <p>The helicopter was positioned on a movable landing platform. Four passengers had boarded the helicopter for a sightseeing tour of Oahu. The pilot brought the engine up to flight idle, preparing for takeoff, when the left rear landing gear collapsed. The helicopter tilted to the left rear and the tail stinger and vertical stabilizer contacted the ground. The tail rotor blades also struck the ground. The pilot shut down the engine and stopped the rotor using the rotor brake. Examination of the left rear landing gear strut revealed that the strut fractured at the bolt hole where the strut was attached to the fuselage drag brace. The tail stinger and the vertical stabilizer were bent, and the tail rotor blades were damaged.</p> <p>PERSONNEL INFORMATION</p> <p>The pilot, age 36, held a commercial pilot certificate with a rating for rotorcraft-helicopter issued on January 4, 2006, and a second-class medical certificate issued June 26, 2009, with no limitations. The pilot reported that he had 6,200 flight hours in helicopters.</p> <p>AIRCRAFT INFORMATION</p> <p>The five seat single engine helicopter, serial number (S/N) 0534E, was manufactured in 1997. It was powered by a Rolls Royce 250-C20B, 450-hp engine. The operator reported that the airframe had 11,393 hours on it at the time of the accident, and the engine had 15,997 hours. The last engine inspection was performed 30 hours prior to the accident. The most recent airframe inspection was a 100-hour inspection performed on November 7, 2009, at a helicopter total time of 11,361.8 hours, 30.2 hours prior to the accident. As part of the 100-hour inspection, the landing gear was inspected in accordance with the manufacturer's maintenance inspection program.</p> <p>TESTS & RESEARCH</p>					
FACTUAL REPORT - AVIATION					

 <p>National Transportation Safety Board FACTUAL REPORT AVIATION</p>	NTSB ID: WPR10LA060
	Occurrence Date: 11/20/2009
	Occurrence Type: Accident

Narrative (Continued)

The rear left and right landing gear struts were sent to the National Transportation Safety Board's Material Laboratory for examination.

Of the two struts submitted for examination, one was fractured and consisted of two pieces (left strut). The fractured skid strut tube had broken in the area of the bolt holes used to attach the strut to the drag brace. A section containing one end of the fracture was cut off the smaller portion of the strut to facilitate examination under the stereo microscope and in the scanning electron microscope (SEM). Examination of the fracture surface under the stereo microscope revealed an area adjacent to one of the bolt holes which had a planar, thumbnail like appearance. This area was further examined with the SEM, which revealed a series of striations consistent with the growth of a crack due to fatigue. Additional areas exhibiting striations consistent with a fatigue crack were also observed on the opposite side of the same bolt hole and spreading downwards along the fracture surface. The remainder of the fracture surface had a distinct shear lip, consistent with an over stress fracture.


On the exterior surface of the fractured strut, in the areas surrounding the bolt holes, evidence was noted of grinding consistent with an abrasive process to remove paint. On the exterior surface of the intact skid strut tube there was also evidence noted of grinding around the area of the bolt holes. Measurements of the diameter of the bolt holes were made on the intact (right) skid strut. The smaller bolt hole was found to have an average diameter of 0.5057 inch (the maximum diameter allowed per the maintenance manual is 0.500 inch). The larger bolt hole was found to have an average diameter of 0.5336 inch (the maximum diameter allowed per the maintenance manual is 0.5313 inch). In addition to being oversize, the smaller of the two bolt holes had evidence of cold working on the interior surface of the bolt hole. This cold working was consistent with the bushing, which would have been installed through the bolt hole, repeatedly pressing against the bore of the hole due to relative movement between the two. On the exterior surface of the intact strut, adjacent to the area of cold working in the bore of the bolt hole, a crack is visible. This crack was approximately 2 mm long and could be seen with the unaided eye.


The full Materials Laboratory Factual Report is available in the official docket of this investigation.

Following examination by the NTSB Materials Laboratory, the struts were brought to the MD Helicopter facility in Mesa, Arizona, under supervision of the Safety Board IIC, for a functional installation check on a MD 369E airframe, in accordance with MD Helicopters, Inc. Maintenance Manual (CSP-HMI-2, Chapter 32-10-00, page 602, Landing Gear Strut Inspection and Chapter 32-10-00, page 401, Landing Gear Replacement). The landing gear strut inspection is incorporated into the 100-hour or annual inspection. The aft left side of the exemplar airframe was fitted with a new strut, the aft right side of the airframe was fitted with the right strut from the accident helicopter. According to the Maintenance Manual, the inspection procedure is to jack the helicopter until the landing gear dampers are fully extended, shake the landing gear assemblies, and note any play or looseness at pivot bearings, inboard strut assembly fittings, and drag brace holes. If any play or looseness is noted the landing gear is to be removed and the strut requires further inspection. The results of the inspection revealed that the right strut exhibited some fore/aft and vertical play of the strut, while the new strut on the left side was completely rigid, exhibiting no play under the test conditions.

The MD Helicopters Maintenance Manual describes the installation of the drag brace with the attaching hardware as follows. "Attach brace to strut with attaching hardware. Torque nut to 5 inch-pounds (0.56 Nm) maximum." A caution note precedes the installation step. The caution states, "Do not over-tighten brace-to-strut hardware. Maximum permissible nut torque is finger-tight; then backed off to nearest castellation for installation of cotter pin." The actual torque on the brace-to-strut hardware on the accident helicopter was not measured.

Updated on May 19 2011 2:18PM

 National Transportation Safety Board FACTUAL REPORT AVIATION		NTSB ID: WPR10LA060			
		Occurrence Date: 11/20/2009			
		Occurrence Type: Accident			
Landing Facility/Approach Information					
Airport Name	Airport ID:	Airport Elevation	Runway Used	Runway Length	Runway Width
Turtle Bay	HI58	Ft. MSL	N/A		
Runway Surface Type:					
Runway Surface Condition:					
Approach/Arrival Flown: NONE					
VFR Approach/Landing: None					
Aircraft Information					
Aircraft Manufacturer		Model/Series		Serial Number	
MCDONNELL DOUGLAS HELI CO		369E		0534E	
Airworthiness Certificate(s): Restricted (Special)					
Landing Gear Type: High Skid					
Amateur Built Acft? No	Number of Seats: 5	Certified Max Gross Wt.	3000 LBS	Number of Engines: 1	
Engine Type:	Engine Manufacturer:	Model/Series:	Rated Power:		
Turbo Shaft	Rolls Royce	250 C20B	450 HP		
- Aircraft Inspection Information					
Type of Last Inspection	Date of Last Inspection	Time Since Last Inspection	Airframe Total Time		
100 Hour	11/2009	30 Hours	11392 Hours		
- Emergency Locator Transmitter (ELT) Information					
ELT Installed?/Type Yes /	ELT Operated? No	ELT Aided in Locating Accident Site? No			
Owner/Operator Information					
Registered Aircraft Owner		Street Address			
K & S HELICOPTERS INC		PO BOX 5371			
		City	State	Zip Code	
		KAILUA KONA	HI	96745-5371	
Operator of Aircraft		Street Address			
K & S HELICOPTERS INC		PO BOX 5371			
		City	State	Zip Code	
		KAILUA KONA	HI	96745-5371	
Operator Does Business As:			Operator Designator Code:		
- Type of U.S. Certificate(s) Held:					
Air Carrier Operating Certificate(s): On-demand Air Taxi					
Operating Certificate:			Operator Certificate:		
Regulation Flight Conducted Under: Part 135: Air Taxi & Commuter					
Type of Flight Operation Conducted: Non-scheduled; Domestic; Passenger Only					

 <p>National Transportation Safety Board FACTUAL REPORT AVIATION</p>	NTSB ID: WPR10LA060
	Occurrence Date: 11/20/2009
	Occurrence Type: Accident

First Pilot Information

Name On File	City On File	State On File	Date of Birth On File	Age 36
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Sex: M	Seat Occupied: Left	Occupational Pilot? Yes	Certificate Number: On File
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Certificate(s): Commercial

Airplane Rating(s): None

Rotorcraft/Glider/LTA: Helicopter

Instrument Rating(s): None

Instructor Rating(s): None

Current Biennial Flight Review?

Medical Cert.: Class 2	Medical Cert. Status: Without Waivers/Limitations	Date of Last Medical Exam: 06/2009
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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	6200							6200		
Pilot In Command(PIC)										
Instructor										
Instruction Received										
Last 90 Days										
Last 30 Days										
Last 24 Hours										

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 Kahuku	State HI	Airport Identifier HI58	Departure Time 1020	Time Zone HST
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Destination Same as Accident/Incident Location	State	Airport Identifier HI58	
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Type of Clearance: None

Type of Airspace:

Weather Information

Source of Wx Information:

Commercial Weather Service


 National Transportation Safety Board FACTUAL REPORT AVIATION	NTSB ID: WPR10LA060
	Occurrence Date: 11/20/2009
	Occurrence Type: Accident

Weather Information					
WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
PHHI	1055	HST	13 Ft. MSL	14 NM	180 Deg. Mag.
Sky/Lowest Cloud Condition: Few			7500 Ft. AGL	Condition of Light: Day	
Lowest Ceiling: None		Ft. AGL		Visibility: 10 SM	Altimeter: 30.09 "Hg
Temperature: 26 °C	Dew Point: 16 °C	Weather Conditions at Accident Site: Visual Conditions			
Wind Direction: 80		Wind Speed: 13		Wind Gusts:	
Visibility (RVR): Ft.		Visibility (RVV) SM			
Precip and/or Obscuration: No Obscuration; No Precipitation					

Accident Information		
Aircraft Damage: Substantial	Aircraft Fire: None	Aircraft Explosion: None

- 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				4	4
- TOTAL ABOARD -				5	5
Other Ground					
- GRAND TOTAL -				5	5

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 National Transportation Safety Board FACTUAL REPORT AVIATION	NTSB ID: WPR10LA060	
	Occurrence Date: 11/20/2009	
	Occurrence Type: Accident	

Administrative Information

Investigator-In-Charge (IIC)

Van McKenny

Additional Persons Participating in This Accident/Incident Investigation:

Herman L Rios
Federal Aviation Administration
Honolulu, HI

John Hobby
MD Helicopters
Mesa, AZ

Adrian Booth
Boeing
Mesa, AZ

Roger Carlin
MD Helicopters
Mesa, AZ