



National Transportation Safety Board Aviation Accident Final Report

Location:	West Chester, PA	Accident Number:	ERA17LA046
Date & Time:	11/15/2016, 1500 EST	Registration:	N306RL
Aircraft:	ROBINSON HELICOPTER COMPANY R22	Aircraft Damage:	Substantial
Defining Event:	Hard landing	Injuries:	2 None
Flight Conducted Under:	Part 91: General Aviation - Instructional		

Analysis

The flight instructor was demonstrating straight-in autorotations to a power recovery over the runway. He stated that the wind during the flight was generally from the north, but shearing horizontally to the northeast/northwest. He began to flare the helicopter about 40 ft above the ground. About 20 ft above the ground, a large wind gust with a horizontal wind shear resulted in a drift to the right and loss of tail rotor effectiveness. He corrected the drift and heading with flight control inputs, returned to the runway area, and continued the flare. During the last portion of the flare, the helicopter encountered a vertical wind shear and climbed about 20 ft. At that point, "all wind stopped," and the helicopter descended. The instructor attempted a power recovery; however, the helicopter landed hard on the skids with some lateral motion. The helicopter bounced, the left skid broke, and the helicopter rolled and came to rest on its left side. The flight instructor did not report any preaccident mechanical malfunctions or failures with the helicopter that would have precluded normal operation. Postaccident examination of the wreckage confirmed substantial damage to the airframe and main rotor blades; there was no evidence of a preimpact mechanical failure or malfunction. Additionally, the flight instructor reported that there were no preaccident mechanical malfunction or failures that would have precluded normal operation.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The flight instructor's decision to continue the practice autorotation in known gusting wind conditions, which resulted in a hard landing and roll over.

Findings

Aircraft	Descent/approach/glide path - Not attained/maintained (Cause)
Personnel issues	Decision making/judgment - Instructor/check pilot (Cause) Aircraft control - Instructor/check pilot (Cause)
Environmental issues	Gusts - Effect on operation

Factual Information

On November 15, 2016, about 1500 eastern standard time, a Robinson R22, N306RL, was substantially damaged during a practice autorotation landing at Brandywine Airport (OQN), West Chester, Pennsylvania. The flight instructor and a student pilot were not injured. The helicopter was privately owned and operated under the provisions of 14 *Code of Federal Regulations* Part 91 as an instructional flight. Day, visual meteorological conditions prevailed at the time, and no flight plan was filed. The local flight departed OQN about 1430.

The flight instructor reported that he was demonstrating straight-in autorotation landings to a power recovery using the runway. The wind was generally from the north, but shearing from the northeast to the northwest, horizontally. During an autorotation to runway 9/27, he began to flare about 40 feet above the ground. At 20 feet, a large gust with a horizontal wind shear caused the helicopter to drift to the right and lose tail rotor effectiveness. He corrected the drift and heading with flight control inputs, returned to the runway, and continued the flare. During the last portion of the flare, a vertical wind shear was encountered, and the helicopter climbed, uncommanded, about 20 feet. At that point, "all wind stopped," and the helicopter descended. He attempted a power recovery; however, the helicopter landed hard on the skids, with some sideward motion. The helicopter bounced, the left skid broke, and the aircraft rolled and came to rest on its left side. The two pilots egressed the helicopter and were met by first responders.

An inspector with the Federal Aviation Administration responded to the accident site and examined the wreckage. Structural damage to the airframe was confirmed. The main rotor blades were deformed from impact forces and the tail boom was partially separated. He determined that the helicopter was operated within the aircraft's weight and balance limitations at the time of the accident; however, it was operated at the forward center of gravity limit. The pilots weighed about 200 pounds each, which placed the helicopter near the upper weight limit. His examination of the wreckage did not reveal evidence of a mechanical failure or malfunction. He reported that the surface wind at the time of the accident varied between 330 and 350 degrees at 11 to 14 knots.

The flight instructor did not report any preaccident mechanical malfunction or failures with the helicopter that would have precluded normal operation.

History of Flight

Landing-flare/touchdown	Windshear or thunderstorm
	Loss of tail rotor effectiveness
	Hard landing (Defining event)
	Roll over

Flight Instructor Information

Certificate:	Flight Instructor; Commercial	Age:	45, Male
Airplane Rating(s):	None	Seat Occupied:	Left
Other Aircraft Rating(s):	Helicopter	Restraint Used:	3-point
Instrument Rating(s):	Helicopter	Second Pilot Present:	Yes
Instructor Rating(s):	Helicopter	Toxicology Performed:	No
Medical Certification:	Class 2 With Waivers/Limitations	Last FAA Medical Exam:	06/07/2016
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	09/15/2015
Flight Time:	5554 hours (Total, all aircraft), 5372 hours (Pilot In Command, all aircraft), 150 hours (Last 90 days, all aircraft), 50 hours (Last 30 days, all aircraft)		

Student Pilot Information

Certificate:	Student	Age:	41, Male
Airplane Rating(s):	None	Seat Occupied:	Right
Other Aircraft Rating(s):	None	Restraint Used:	3-point
Instrument Rating(s):	None	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 3 None	Last FAA Medical Exam:	
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:	42 hours (Total, all aircraft), 42 hours (Total, this make and model), 12 hours (Last 90 days, all aircraft), 4 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	ROBINSON HELICOPTER COMPANY	Registration:	N306RL
Model/Series:	R22 Mariner	Aircraft Category:	Helicopter
Year of Manufacture:	1998	Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	2833M
Landing Gear Type:	Skid;	Seats:	2
Date/Type of Last Inspection:	09/20/2016, Annual	Certified Max Gross Wt.:	1369 lbs
Time Since Last Inspection:	50 Hours	Engines:	1 Reciprocating
Airframe Total Time:	3121 Hours at time of accident	Engine Manufacturer:	LYCOMING
ELT:	Not installed	Engine Model/Series:	O-360-J2A
Registered Owner:	THREE IF BY AIR INC	Rated Power:	145 hp
Operator:	On file	Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	MQS, 660 ft msl	Distance from Accident Site:	13 Nautical Miles
Observation Time:	1455 EST	Direction from Accident Site:	270°
Lowest Cloud Condition:		Visibility	10 Miles
Lowest Ceiling:	Broken / 10000 ft agl	Visibility (RVR):	
Wind Speed/Gusts:	9 knots /	Turbulence Type Forecast/Actual:	/ None
Wind Direction:	300°	Turbulence Severity Forecast/Actual:	/ N/A
Altimeter Setting:	29.81 inches Hg	Temperature/Dew Point:	14° C / -4° C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	West Chester, PA (OQN)	Type of Flight Plan Filed:	None
Destination:	West Chester, PA (OQN)	Type of Clearance:	None
Departure Time:	1430 EST	Type of Airspace:	Class G

Airport Information

Airport:	Brandywine Airport (OQN)	Runway Surface Type:	Asphalt
Airport Elevation:	462 ft	Runway Surface Condition:	Dry
Runway Used:	27	IFR Approach:	None
Runway Length/Width:	3347 ft / 50 ft	VFR Approach/Landing:	Simulated Forced Landing

Wreckage and Impact Information

Crew Injuries:	2 None	Aircraft Damage:	Substantial
Passenger Injuries:	N/A	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	2 None	Latitude, Longitude:	39.990000, -75.581944 (est)

Administrative Information

Investigator In Charge (IIC):	Ralph E Hicks	Report Date:	09/10/2018
Additional Participating Persons:	Robert Drapala; FAA/FSDO; Philadelphia, PA		
Publish Date:	09/10/2018		
Note:	The NTSB did not travel to the scene of this accident.		
Investigation Docket:	http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=94380		

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