



Aviation Investigation Final Report

Location:	Hollywood, Florida	Accident Number:	ERA22LA340
Date & Time:	July 27, 2022, 13:45 Local	Registration:	N42WC
Aircraft:	ROBINSON HELICOPTER COMPANY R22 MARINER	Aircraft Damage:	Substantial
Defining Event:	Flight control sys malf/fail	Injuries:	1 Minor, 1 None
Flight Conducted Under:	Part 91: General aviation - Instructional		

Analysis

The instructor reported hearing a popping and banging sound while hover-taxiing during an instructional flight followed by an uncommanded right yaw. The instructor attempted to regain control, but the helicopter collided with the ground and rolled over onto its right side.

Postaccident examination of the helicopter revealed that the tail rotor gearbox had fractured and that the tail rotor assembly had separated from the helicopter. Additional examination of the tail rotor blades, which had remained attached to the tail rotor drive shaft and gearbox, revealed corrosion and interior delamination of the blades. There was also erosion present on the blade leading edges, which likely provided a path for moisture to ingress, thereby resulting in the observed corrosion as well the failure of the bonding adhesive within the blade. It is likely that this condition resulted in an imbalance of the blades that imparted a vibratory loading onto the tail rotor gearbox that ultimately resulted in its failure during the accident flight. Review of partial maintenance records provided by the operator revealed that the tail rotor blades installed on the accident helicopter were not the blades that were noted in the maintenance logbooks, and the service history of the installed blades could not be determined.

Probable Cause and Findings

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

Inadequate maintenance of the helicopter's tail rotor blades, which resulted in a failure of the tail rotor drive system, and an inflight loss of yaw control from which the flight instructor was unable to recover.

Findings

Aircraft	Tail rotor blade - Failure
Personnel issues	Scheduled/routine inspection - Maintenance personnel

Factual Information

History of Flight

Maneuvering-hover	Flight control sys malf/fail (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On July 27, 2022, about 1345 eastern daylight time, a Robinson R22 helicopter, N42WC, was substantially damaged when it was involved in an accident near Hollywood, Florida. The flight instructor was not injured, and the student pilot received minor injuries. The helicopter was operated as a Title 14 *Code of Federal Regulations* Part 91 instructional flight.

According to the instructor, after completing an engine run-up, he “picked up” the helicopter and was air-taxiing to the practice area to conduct some hover work. Before reaching the practice area, a “popping” and “banging” sound was heard from behind the helicopter, followed by an uncommanded right yaw. The instructor attempted to regain control, but the helicopter collided with the ground and rolled over onto its right side. The instructor and student pilot exited the helicopter.

Examination of the helicopter by a Federal Aviation Administration inspector revealed that the tail rotor assembly was separated; both tail rotor blades remained attached and the output shaft was also attached. Both tail rotor blades were bent and were impact damaged. The tail rotor gearbox was fractured, with half of the casing missing. The main rotor blades were bent down and curled, with multiple kinks and creasing from leading edge to trailing edge. Multiple impact signatures were noted on the ground within the rotor diameter of the helicopter.

Examination of the tail rotor gear box and tail rotor blades revealed corrosion within both blades. The exam revealed that erosion of the leading edge provided a path for moisture to ingress into the bond joint and deteriorate the adhesive.

The owner and the mechanic stated that the helicopter’s maintenance records were previously damaged by water and had to be reconstructed digitally. The records provided appeared to show that most life-limited parts had been overflown by 374.1 hours. The pilot stated that he had noted damage on the helicopter’s tail rotor blades during a preflight inspection about two weeks before the accident and that the operator had replaced the blades. Review of the available maintenance records for the helicopter revealed that the serial numbers of the tail rotor blades installed did not match that noted in the maintenance records. The available records also did not document any replacement of the tail rotor blades.

Flight instructor Information

Certificate:	Commercial; Flight instructor; Remote	Age:	32, Male
Airplane Rating(s):	None	Seat Occupied:	Left
Other Aircraft Rating(s):	Helicopter	Restraint Used:	4-point
Instrument Rating(s):		Second Pilot Present:	Yes
Instructor Rating(s):	Helicopter; Instrument helicopter	Toxicology Performed:	
Medical Certification:	Class 1 With waivers/limitations	Last FAA Medical Exam:	September 1, 2021
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	June 22, 2022
Flight Time:	669 hours (Total, all aircraft), 669 hours (Total, this make and model), 579 hours (Pilot In Command, all aircraft), 44 hours (Last 90 days, all aircraft), 8 hours (Last 30 days, all aircraft)		

Student pilot Information

Certificate:	None	Age:	Male
Airplane Rating(s):	None	Seat Occupied:	Right
Other Aircraft Rating(s):	None	Restraint Used:	4-point
Instrument Rating(s):	None	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	
Medical Certification:	None None	Last FAA Medical Exam:	
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:	0 hours (Total, all aircraft), 0 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	ROBINSON HELICOPTER COMPANY	Registration:	N42WC
Model/Series:	R22 MARINER	Aircraft Category:	Helicopter
Year of Manufacture:	1990	Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	1531M
Landing Gear Type:	None; Skid	Seats:	2
Date/Type of Last Inspection:	October 27, 2021 Annual	Certified Max Gross Wt.:	1370 lbs
Time Since Last Inspection:	391 Hrs	Engines:	1 Reciprocating
Airframe Total Time:	6975.1 Hrs as of last inspection	Engine Manufacturer:	Lycoming
ELT:	Installed	Engine Model/Series:	O-320
Registered Owner:	On file	Rated Power:	124 Horsepower
Operator:	On file	Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Day
Observation Facility, Elevation:	HWO,8 ft msl	Distance from Accident Site:	0 Nautical Miles
Observation Time:	13:53 Local	Direction from Accident Site:	0°
Lowest Cloud Condition:	Few	Visibility	10 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	11 knots /	Turbulence Type Forecast/Actual:	None / None
Wind Direction:	120°	Turbulence Severity Forecast/Actual:	N/A / N/A
Altimeter Setting:	30.13 inches Hg	Temperature/Dew Point:	0°C / 0°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Hollywood, FL	Type of Flight Plan Filed:	None
Destination:	Hollywood, FL	Type of Clearance:	None
Departure Time:		Type of Airspace:	Class D

Airport Information

Airport:	North Perry HWO	Runway Surface Type:	
Airport Elevation:	8 ft msl	Runway Surface Condition:	Dry
Runway Used:		IFR Approach:	None
Runway Length/Width:		VFR Approach/Landing:	None

Wreckage and Impact Information

Crew Injuries:	1 Minor, 1 None	Aircraft Damage:	Substantial
Passenger Injuries:	N/A	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Minor, 1 None	Latitude, Longitude:	26.001222,-80.240722(est)

Administrative Information

Investigator In Charge (IIC):	Alleyne, Eric
Additional Participating Persons:	William Chadwick; FAA/FSDO; Miramar, FL Thom Webster; Robinson Helicopter Company; Torrance, CA Ricardo P. Queiroz; FAA/FSDO; Miramar, FL
Original Publish Date:	January 4, 2024
Last Revision Date:	
Investigation Class:	Class 3
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=105598

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The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).