



Aviation Investigation Final Report

Location:	Miami Beach, Florida	Accident Number:	ERA22LA131
Date & Time:	February 19, 2022, 13:10 Local	Registration:	N544SB
Aircraft:	ROBINSON HELICOPTER R44	Aircraft Damage:	Substantial
Defining Event:	Loss of engine power (total)	Injuries:	3 Serious
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The helicopter pilot was flying about 450 ft above ground level over water paralleling a coastline. The engine suddenly developed a violent shaking and vibration, and engine power was lost. The pilot entered an autorotation, flew toward shallow water, and impacted the water hard about 10 seconds after the onset of the vibration. Examination of the engine revealed no evidence of preimpact mechanical malfunction; however, the examination and teardown were significantly limited due to corrosion as a result of postaccident saltwater immersion.

Engine manufacturer guidance indicated that the helicopter was at an increased risk of stuck valves due to being operated in a region with high ambient temperatures, in addition to operating at lower altitudes and slower airspeeds. Within the year preceding the accident, a total of four engine cylinders had been overhauled and replaced due to stuck valves and low compression. The postaccident examination found no evidence of a stuck intake or exhaust valve. Given the engine's repeated history of stuck valves and low compression, combined with the pilot's reported sensations felt during the loss of power, and the lack of any evidence of catastrophic engine failure, it is likely the engine again experienced a stuck valve, which resulted in the loss of engine power and a forced landing in water.

At the time of the accident, the helicopter was 37 flight hours past its manufacturer-required 100-hour inspection interval. Had the inspection intervals been followed, it is possible evidence of valve sticking may have been identified, as it had been several instances within the year before the accident.

Probable Cause and Findings

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

A loss of engine power due to a stuck valve, which resulted in an autorotation and a hard landing in water.

Findings

Aircraft

(general) - Malfunction

Factual Information

History of Flight

Maneuvering-low-alt flying	Loss of engine power (total) (Defining event)
Autorotation	Ditching

On February 19, 2022, at 1310 eastern standard time, a Robinson Helicopter R44, N544SB, was substantially damaged when it was involved in an accident near Miami Beach, Florida. The pilot and two passengers sustained serious injuries. The helicopter was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The pilot reported that, about an hour before the accident, he had departed a helipad in Marathon, Florida, and was returning along the coastline to North Perry Airport (HWO), Hollywood, Florida. As he flew overwater parallel to the South Miami Beach area, he experienced a sudden and violent left to right shaking and vibration, which was followed by a loss of engine power and a low rotor rpm warning light and horn.

The pilot attempted to increase engine power; but realized that the engine had lost power and initiated an autorotation. He maneuvered the helicopter toward an area of shallow water between two groups of people and the helicopter impacted water about 10 seconds after the vibration began. The pilot assisted his passengers in evacuating the helicopter, and they received additional assistance from beachgoers to reach the shore.

The pilot recalled that he was flying about 420 ft to 450 ft above ground level at an airspeed about 85-95 knots when the loss of engine power occurred. Before the loss of power, the helicopter had been functioning normally without issue.

A Federal Aviation Administration inspector examined the helicopter at the accident site and recovery facility. The fuselage, tail boom, and tail rotor sustained substantial damage. One main rotor blade remained intact with little damage and the other had fractured about mid-span.

The National Transportation Safety Board examined the helicopter at the recovery facility. Examination of the helicopter's flight controls found no anomalies that would have prevented normal control or would have contributed to the vibration. The engine and its accessories displayed significant saltwater corrosion consistent with the engine being submerged in the ocean post-accident. Examination of the engine revealed no evidence of a catastrophic failure of the engine core or its accessories.

All cylinders were removed from the engine case and disassembled in order to examine the individual exhaust and intake valves, springs, and pistons. No anomalies were found within the

cylinders, with exception of varying amounts of corrosion to the valves, cylinder walls, and pistons. The level of corrosion was consistent with the engine being submerged in saltwater.

According to maintenance records, four cylinders were replaced in the year preceding the accident. From March 1, 2021, through December 11, 2021, the Nos. 2, 4, and 6 cylinders (and a second time, the No. 2 cylinder) were removed, overhauled, and reinstalled.

According to the maintenance endorsements and interviews with the mechanic who performed the work, the cylinder replacements were due to low compression and stuck piston valve issues.

The pilot reported that he experienced a similar engine malfunction and vibration sensation while in hover flight months before the accident flight. He could not recall exactly when the event occurred; however, he believed it was around the time of one of the cylinder replacements. During this past event, he was able to perform an autorotation from a hover and landed without incident. After the event, a burnt intake valve was discovered. He recalled that a total of 4 intake valves were discovered burnt over the year before the accident.

The most recent 100-hour inspection occurred on August 1, 2021, at hour meter time of 1,509.5. The most recent annual inspection was completed on March 1, 2021. The hour meter at the time of the accident was 1,646.6.

According to the Robinson Helicopter R44 maintenance manual, Chapter 2, inspection intervals are required at 100 hours' time in service or 12 calendar months; whichever occurs first.

The Textron Lycoming Service Instruction, No. 1425A, dated January 19th, 1988, Suggested Maintenance Procedures to Reduce the Possibility of Valve Sticking, stated in part:

Operating in high ambient temperatures, slow flight with reduced cooling, or high lead content of fuel, can promote deposit build-up reducing valve guide clearance and result in valve sticking. If any of the conditions are present or hesitation is observed, the service instruction recommended inspection and cleaning of the valves. Exposing the engine to sudden cool down, as in a rapid descent with the power reduced, or shutting the engine down before it has sufficiently cooled down can also induce valve sticking.

Pilot Information

Certificate:	Commercial	Age:	60, Male
Airplane Rating(s):	Single-engine land; Multi-engine land	Seat Occupied:	Right
Other Aircraft Rating(s):	Helicopter	Restraint Used:	3-point
Instrument Rating(s):	Airplane; Helicopter	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	
Medical Certification:	Class 1 With waivers/limitations	Last FAA Medical Exam:	November 17, 2021
Occupational Pilot:	No	Last Flight Review or Equivalent:	October 7, 2021
Flight Time:	2060 hours (Total, all aircraft), 475 hours (Total, this make and model), 1937 hours (Pilot In Command, all aircraft), 52 hours (Last 90 days, all aircraft), 20 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	ROBINSON HELICOPTER	Registration:	N544SB
Model/Series:	R44 NO SERIES	Aircraft Category:	Helicopter
Year of Manufacture:	2007	Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	1759
Landing Gear Type:	None; Skid	Seats:	4
Date/Type of Last Inspection:	August 1, 2021 100 hour	Certified Max Gross Wt.:	2500 lbs
Time Since Last Inspection:	137 Hrs	Engines:	1 Reciprocating
Airframe Total Time:	1646 Hrs at time of accident	Engine Manufacturer:	LYCOMING
ELT:	Not installed	Engine Model/Series:	O-540-F1B5
Registered Owner:	HD AVIATION SERVICES LLC	Rated Power:	260 Horsepower
Operator:	HD AVIATION SERVICES LLC	Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Day
Observation Facility, Elevation:	MIA,29 ft msl	Distance from Accident Site:	10 Nautical Miles
Observation Time:	13:53 Local	Direction from Accident Site:	274°
Lowest Cloud Condition:	Scattered / 3000 ft AGL	Visibility	10 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	/	Turbulence Type Forecast/Actual:	None / None
Wind Direction:		Turbulence Severity Forecast/Actual:	N/A / N/A
Altimeter Setting:	30.12 inches Hg	Temperature/Dew Point:	29°C / 21°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Marathon, FL (NONE)	Type of Flight Plan Filed:	None
Destination:	Hollywood, FL (HWO)	Type of Clearance:	None
Departure Time:	12:11 Local	Type of Airspace:	Class G

Airport Information

Airport:	NONE	Runway Surface Type:	
Airport Elevation:		Runway Surface Condition:	Water-calm
Runway Used:		IFR Approach:	None
Runway Length/Width:		VFR Approach/Landing:	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 Serious	Aircraft Damage:	Substantial
Passenger Injuries:	2 Serious	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	3 Serious	Latitude, Longitude:	25.77816,-80.126859

Administrative Information

Investigator In Charge (IIC):	Gerhardt, Adam
Additional Participating Persons:	Juan Garcia; FAA/ FSDO; Miramar, FL Thom Webster; Robinson Helicopter Company; Torrance, CA David Harsanyi; Lycoming Engines; Williamsport, PA
Original Publish Date:	September 20, 2023
Last Revision Date:	
Investigation Class:	Class 3
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=104679

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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](#).