



# Aviation Investigation Final Report

<b>Location:</b>	Billings, Montana	<b>Accident Number:</b>	WPR18FA260
<b>Date &amp; Time:</b>	September 12, 2018, 12:45 Local	<b>Registration:</b>	N166LC
<b>Aircraft:</b>	ROBERT L Coons RotorWay RW 1	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>	Controlled flight into terr/obj (CFIT)	<b>Injuries:</b>	1 Fatal
<b>Flight Conducted Under:</b>	Part 91: General aviation - Personal		

## Analysis

The pilot, who did not hold a helicopter rating, was maneuvering his experimental amateur-built helicopter around the airport area. An acquaintance of the pilot stated that the accident pilot would regularly hover-taxi around the airport area testing the helicopter. The acquaintance also stated that, on the day of the accident, the pilot mentioned that the helicopter was flying well and that he did not have any issues with it. Afterward, the pilot started the helicopter and departed to the west and hover-taxied around the row of hangars back to his hangar. The acquaintance reported that he did not see the accident but that he heard the sound of the helicopter impacting a hangar.

Postaccident examination of accident site showed that the helicopter's main rotor blades had collided with the top section of the hangar and that the helicopter came to rest oriented upward on an angle of about 30° and against the front of the hangar on a westerly heading. It is likely that, during the hover-taxi, the accident pilot ascended above a hover to the height of the hangars before colliding with one.

The left anti-torque pedal for the pilot's right-seat position had failed where the horizontal and vertical tubes met. Notwithstanding the failed anti-torque pedal, examination of the airframe and engine found no mechanical anomalies that would have precluded normal operation of the helicopter.

A metallurgical examination of the fractured horizontal and vertical components of the pilot's right seat's left anti-torque pedal assembly revealed that they failed from a lack of complete fusion at a fillet joint, which led to an overstress fracture. The fractured pedal tube assembly consisted of two aluminum tubes joined together with a filler metal that was consistent with a zinc solder alloy. However, the right anti-torque pedal tube assembly, which was intact, consisted of alloy steel tubes that were welded together with an alloy steel filler metal. The intact tube assembly had a much stronger quality due to the welding process and the inherent higher mechanical properties of the steel than those of the fractured tube assembly.

A build ledger for the helicopter revealed that the anti-torque pedals had been fabricated in December 1996 by the previous owner, almost 20 years before the accident pilot purchased the helicopter. However, the ledger did not detail the fabrication differences among the anti-torque pedals.

The investigation could not determine if the left anti-torque pedal for the right-seat position failed before the impact with the hangar or during the impact sequence. Although the pilot might have been able to control the helicopter after the pedal failed, that possibility would be unlikely given the pilot's minimal experience in helicopters.

## Probable Cause and Findings

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

The pilot's failure to maintain clearance with a hangar while maneuvering to his hangar. Contributing to the accident was the pilot's limited experience in helicopters.

### Findings

<b>Personnel issues</b>	Task monitoring/vigilance - Pilot
<b>Aircraft</b>	Heading/course - Not attained/maintained
<b>Personnel issues</b>	Total experience - Pilot
<b>Environmental issues</b>	Airport structure - Contributed to outcome
<b>Personnel issues</b>	Fabrication - Other

## Factual Information

### History of Flight

<b>Maneuvering-low-alt flying</b>	Low altitude operation/event
<b>Maneuvering</b>	Controlled flight into terr/obj (CFIT) (Defining event)

On September 12, 2018, about 1245 mountain daylight time, a RotorWay Exec 90 experimental amateur-built helicopter, N166LC, was substantially damaged when it was involved in an accident at Billings Logan International Airport (BIL), Billings, Montana. The nonrated rotorcraft-helicopter pilot was fatally injured. The helicopter was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

An acquaintance of the pilot, who occupied the hangar directly behind the accident pilot's hangar, reported that the pilot had purchased the helicopter about 3 years before the accident, but the acquaintance did not know the helicopter's condition or stage of assembly at that time. The acquaintance stated that the pilot hover-taxied the helicopter frequently on airport property to perform testing but that he "had not really flown" the helicopter. The acquaintance stated that, on the morning of the accident, the pilot hover-taxied around the airport area to perform testing, landed in front of his hangar, shut down the engine, and exited the helicopter. The acquaintance also stated that he and the pilot spoke for about 15 minutes, during which time the pilot told him how well the helicopter was flying and that he had no issues with it. Afterward, the pilot boarded the helicopter and started the engine. The pilot then hover-taxied the helicopter to the west and parallel to the row of hangars. The helicopter made a 90° left turn to the south and a 180° turn to the north, and the pilot then hover-taxied the helicopter north along the west end of the hangar row. The acquaintance stated that he did not witness the accident but heard the helicopter impact a hangar.

### Pilot Information

<b>Certificate:</b>	Airline transport; Commercial; Flight instructor; Remote	<b>Age:</b>	74, Male
<b>Airplane Rating(s):</b>	Single-engine land; Multi-engine land	<b>Seat Occupied:</b>	Right
<b>Other Aircraft Rating(s):</b>	Balloon	<b>Restraint Used:</b>	4-point
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	No
<b>Instructor Rating(s):</b>	Airplane multi-engine; Airplane single-engine; Instrument airplane	<b>Toxicology Performed:</b>	Yes
<b>Medical Certification:</b>	Class 3 With waivers/limitations	<b>Last FAA Medical Exam:</b>	June 22, 2016
<b>Occupational Pilot:</b>	No	<b>Last Flight Review or Equivalent:</b>	
<b>Flight Time:</b>	10025 hours (Total, all aircraft)		

A check of Federal Aviation Administration (FAA) records revealed that the pilot did not possess a rotorcraft-helicopter pilot certificate. No records were recovered regarding the pilot's flight time in rotorcraft-helicopter.

#### Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	ROBERT L Coons	<b>Registration:</b>	N166LC
<b>Model/Series:</b>	RotorWay RW 1	<b>Aircraft Category:</b>	Helicopter
<b>Year of Manufacture:</b>	2015	<b>Amateur Built:</b>	Yes
<b>Airworthiness Certificate:</b>	Experimental (Special)	<b>Serial Number:</b>	001
<b>Landing Gear Type:</b>	Skid	<b>Seats:</b>	2
<b>Date/Type of Last Inspection:</b>	June 18, 2018 Condition	<b>Certified Max Gross Wt.:</b>	1500 lbs
<b>Time Since Last Inspection:</b>	12 Hrs	<b>Engines:</b>	1 Turbo shaft
<b>Airframe Total Time:</b>	89.6 Hrs at time of accident	<b>Engine Manufacturer:</b>	SOLAR
<b>ELT:</b>	Not installed	<b>Engine Model/Series:</b>	T62-32
<b>Registered Owner:</b>	On file	<b>Rated Power:</b>	150 Horsepower
<b>Operator:</b>	On file	<b>Operating Certificate(s) Held:</b>	None

The accident helicopter was constructed with an aluminum tail and a full fiberglass cockpit enclosure. The engine had a centrifugal compressor and a radial inflow turbine.

The most recent FAA certificate of registration for the helicopter was issued on June 28, 2015. In addition, the FAA issued a special airworthiness certificate on December 8, 2015, which authorized operation as an amateur-built helicopter in the experimental category.

The accident pilot purchased the helicopter in September 2015. A build ledger for the helicopter, which was found in the pilot's hangar, revealed that the anti-torque pedals had been fabricated in December 1996.

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Visual (VMC)	<b>Condition of Light:</b>	Day
<b>Observation Facility, Elevation:</b>	BIL,3662 ft msl	<b>Distance from Accident Site:</b>	1 Nautical Miles
<b>Observation Time:</b>	12:46 Local	<b>Direction from Accident Site:</b>	90°
<b>Lowest Cloud Condition:</b>	Unknown	<b>Visibility</b>	10 miles
<b>Lowest Ceiling:</b>	Broken / 12000 ft AGL	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	4 knots /	<b>Turbulence Type Forecast/Actual:</b>	None / None
<b>Wind Direction:</b>	80°	<b>Turbulence Severity Forecast/Actual:</b>	N/A / N/A
<b>Altimeter Setting:</b>	29.78 inches Hg	<b>Temperature/Dew Point:</b>	21°C / 6°C
<b>Precipitation and Obscuration:</b>	No Obscuration; No Precipitation		
<b>Departure Point:</b>	Billings, MT (BIL )	<b>Type of Flight Plan Filed:</b>	None
<b>Destination:</b>	Billings, MT (BIL )	<b>Type of Clearance:</b>	None
<b>Departure Time:</b>		<b>Type of Airspace:</b>	Class D

## Airport Information

<b>Airport:</b>	Billings Logan International KBIL	<b>Runway Surface Type:</b>	
<b>Airport Elevation:</b>	3662 ft msl	<b>Runway Surface Condition:</b>	Dry
<b>Runway Used:</b>		<b>IFR Approach:</b>	None
<b>Runway Length/Width:</b>		<b>VFR Approach/Landing:</b>	None

## Wreckage and Impact Information

<b>Crew Injuries:</b>	1 Fatal	<b>Aircraft Damage:</b>	Substantial
<b>Passenger Injuries:</b>		<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	1 Fatal	<b>Latitude, Longitude:</b>	45,-108

The helicopter's main rotor blades impacted the top of a 25-ft-tall hangar, and the fuselage then impacted the hangar's forward door section. The helicopter came to rest partially inside the hangar and facing upward on an angle of about 30° and against the front of the hangar on a magnetic heading of about 280°.

There was a presence of fuel but no postcrash fire. The top and both sides of the cabin/cockpit were

destroyed due to impact forces. All components necessary for flight were accounted for at the accident site. Flight control continuity was confirmed throughout the helicopter.

Both main rotor blades remained attached to their respective hubs at all attach points. The inboard 40 inches of one blade remained attached to its hub, and the outboard 100 inches of the blade was bent aft about 180°. The trailing edge of the other blade was separated and had opened starting about 15 inches from the hub; skin separation was observed to the top and bottom of the blade. The entire span of the blade exhibited areas that were bent, twisted, and deformed. Moderate leading-edge damage was observed.

The swashplate and scissors remained intact and undamaged. The lower engine mount was broken and deformed. All primary connections from both main rotor blades were intact and not compromised. Additionally, all connections from the swashplate to the main rotor hub were intact and not compromised.

The tail rotor and gearbox assembly was intact at all connection points and undamaged. Both tail rotor blades remained intact and secure, with no damage observed to either blade. The tail rotor driveshaft remained intact and undamaged.

The transmission remained in place and was not compromised. The aft spine coupling was separated from the engine coupling and undamaged. The transmission belt remained in place and was intact and tight.

The vertical stabilizer was bent and twisted at its midspan. The stinger was not damaged. The tailboom was found on the ground directly behind the helicopter. The tailboom remained attached to the aft airframe but was almost entirely severed at the aft engine mount area.

The left and right skids had separated from the helicopter and were found about 18 ft from the main wreckage.

The right horizontal stabilizer was bent slightly inboard, and the left stabilizer was bent, twisted, and deformed from its outboard to midsection.

The engine was intact and not compromised. It remained attached to the airframe at all attach points with no deformation observed. An on-site examination of the engine revealed no evidence of a catastrophic event before the accident. Further examination of the engine included an inspection of the fuel control unit, engine-driven fuel pump, all fuel lines, and the compressor inlet screen, which had no anomalies. The engine was disassembled to examine the internal components. The examination found some damage to the stationary power turbine vanes but no significant mechanical anomalies.

The cyclic and collective at both seat positions were not damaged. All connections were intact and not compromised.

The anti-torque pedals for the left-seat position and the right anti-torque pedal for the right-seat position were not damaged. The left anti-torque pedal for the right-seat position was found separated at the weld point of the vertical and horizontal tubes. The right seat separated vertical and horizontal pieces of the

left anti-torque pedal, as well as the intact right anti-torque pedal, were examined by the National Transportation Safety Board's Materials Laboratory.

The results of the examination revealed that both anti-torque tube assemblies consisted of a parallel tube with flanges on both ends that was joined to a perpendicular tube at the midpoint. The flanged ends of the parallel tube from the fractured assembly were closed, whereas the ends of the intact assembly were open to the interior.

The left tube assembly had fractured at the joint. The right tube assembly, which was intact, had a bolt and nut through one of the holes. Measurements of the two anti-torque tube assemblies were inconsistent with each other, as was the material used for their respective joining processes.

The anti-torque tube assembly fractures were consistent with a fillet joint that exhibited a lack of complete fusion. These areas either had not bonded to the parallel tube surface or had disbanded.

Holes had been drilled in the perpendicular tubes; the holes were oriented parallel to the parallel tube direction. The perpendicular tube of the intact assembly contained three holes, whereas the corresponding tube of the fractured assembly included two holes. These two holes exhibited elongation and loss of material in the direction of the tube, consistent with wear.

Except for the right-seat left anti-torque pedal, no mechanical anomalies with the airframe or the engine were found that would have precluded normal operation of the helicopter.

## **Medical and Pathological Information**

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The Montana State Department of Justice Forensic Science Division, Missoula, Montana, performed an autopsy of the pilot. His cause of death was multiple blunt force injuries.

Toxicological testing performed at the FAA Forensic Sciences Laboratory detected naproxen, an over-the-counter medication to reduce fever and to relieve mild pain; rosuvastatin a prescription medication used to reduce blood cholesterol and triglycerides; doxylamine, an over-the-counter antihistamine medication to relieve symptoms caused by the common cold and allergies, and metoprolol for hypertension. No carbon monoxide and ethanol were detected.





## Administrative Information

<b>Investigator In Charge (IIC):</b>	Little, Thomas
<b>Additional Participating Persons:</b>	Robert A Radtke; Federal Aviation Administration; Helena, MT
<b>Original Publish Date:</b>	August 11, 2020
<b>Last Revision Date:</b>	
<b>Investigation Class:</b>	<a href="#">Class</a>
<b>Note:</b>	The NTSB traveled to the scene of this accident.
<b>Investigation Docket:</b>	<a href="https://data.nts.gov/Docket?ProjectID=98287">https://data.nts.gov/Docket?ProjectID=98287</a>

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