Aviation Investigation Final Report

Location:	Mehama, Oregon	**Accident Number:**	WPR20LA224
Date & Time:	July 17, 2020, 08:54 Local	**Registration:**	N2297W
Aircraft:	Hiller UH 12D	**Aircraft Damage:**	Destroyed
Defining Event:	Part(s) separation from AC	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 137: Agricultural		

Analysis

The pilot was performing an aerial application flight. No radar information was available for the flight. The support truck operator reported that the helicopter departed from the truck and flew toward a field. Shortly after the helicopter departed, the truck operator heard the pilot report over the radio that he was “going down.” A witness reported that the engine noise changed pitch and became loud before impact. A postcrash fire ensued.

The helicopter struck several large trees and came to rest inverted at the base of a large tree. Postaccident examination of the engine revealed no anomalies that would have precluded normal operations. However, the tail rotor assembly was found fractured and separated from the tailboom with parts scattered in the initial part of the debris field. One tail rotor blade remained secured at the hub, and the other blade was fractured and separated.

The tension-torsion straps for that blade extended outward from the hub and were fractured and splayed. Metallurgical examination revealed that 10 of the 11 straps fractured from fatigue cracking followed by overstress. The fatigue cracking initiated at multiple locations along the bores in contact with the cylindrical plain bearing. Wear, in the form of smearing, gouging, spalling, and galling of the faying surfaces, led to the fatigue crack initiation. The fatigue cracks then propagated perpendicular to the area with the highest tensile stresses and at the thinnest locations along the bearing bore. No indications of corrosion were observed. Thus, the tail rotor blade separated during flight due to fatigue cracking and overstress.

According to the component replacement schedule, the tension-torsion strap bundles are to be replaced every 12,500 flight hours and were set to be removed in 1,383.3 flight hours from the time of the accident.

Probable Cause and Findings

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

An in-flight separation of a tail rotor blade due to fatigue cracking and overstress, which resulted in a loss of directional control and subsequent ground impact.

Findings

Aircraft	(general) - Fatigue/wear/corrosion
Aircraft	Tail rotor blade - Fatigue/wear/corrosion

Factual Information

History of Flight

Maneuvering	Part(s) separation from AC (Defining event)
Maneuvering-low-alt flying	Loss of control in flight

On July 17, 2020, about 0854 Pacific daylight time, a Hiller UH-12D helicopter, N2297W, was destroyed when it was involved in an accident near Mehama, Oregon. The pilot was fatally injured. The helicopter was operated as a Title 14 *Code of Federal Regulations* Part 137 aerial application flight.

No radar information was available for the flight. The support truck operator reported that the helicopter departed from the truck and flew toward a field. Shortly after the helicopter departed, the truck operator heard the pilot report over the radio that he was "going down." Witnesses reported that the engine noise changed pitch and became loud before impact and that there was heavy smoke and fire at the accident location.

Pilot Information

Certificate:	Commercial	**Age:**	65,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	3-point
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	January 16, 2020
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	April 12, 2020
Flight Time:	11884 hours (Total, all aircraft), 10334 hours (Total, this make and model), 11753 hours (Pilot In Command, all aircraft)		

The operator reported that the pilot had flown agricultural helicopters for about 50 years. The operator also reported that the pilot sprayed the fields where the accident occurred for many years and that he knew the fields well.

Aircraft and Owner/Operator Information

Aircraft Make:	Hiller	**Registration:**	N2297W
Model/Series:	UH 12D No Series	**Aircraft Category:**	Helicopter
Year of Manufacture:	1960	**Amateur Built:**	
Airworthiness Certificate:	Normal; Restricted (Special)	**Serial Number:**	1206
Landing Gear Type:	Skid	**Seats:**	3
Date/Type of Last Inspection:	July 14, 2020 100 hour	**Certified Max Gross Wt.:**	2750 lbs
Time Since Last Inspection:	16 Hrs	**Engines:**	1 Turbo shaft
Airframe Total Time:	4243 Hrs as of last inspection	**Engine Manufacturer:**	Rolls Royce
ELT:	Not installed	**Engine Model/Series:**	250-C20B
Registered Owner:	Bank of Utah Trustee	**Rated Power:**	420 Horsepower
Operator:	Western Helicopter Service Inc	**Operating Certificate(s) Held:**	Agricultural aircraft (137)

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	SLE,213 ft msl	**Distance from Accident Site:**	18 Nautical Miles
Observation Time:	08:56 Local	**Direction from Accident Site:**	291°
Lowest Cloud Condition:	Scattered / 2000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Overcast / 3800 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	4 knots /	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:	320°	**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	30.09 inches Hg	**Temperature/Dew Point:**	19°C / 13°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Brooks, OR (OR38)	**Type of Flight Plan Filed:**	None
Destination:	Brooks, OR (OR38)	**Type of Clearance:**	None
Departure Time:	05:30 Local	**Type of Airspace:**	Class G

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	On-ground
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	44.794723,-122.61916

The helicopter struck several large trees and came to rest inverted at the base of a large tree. The cabin area sustained extensive crush damage and was consumed by postimpact fire. The fuel tank was also consumed by postimpact fire, and the bottom of the transmission was exposed. The forward portion of the tailboom exhibited thermal damage, and the aft portion of the tailboom had fractured and separated just forward of the tail rotor assembly. A portion of a main rotor blade was located about 360 ft north of the main wreckage, and just northeast of the main rotor blade was a tail rotor blade; both came to rest in a tree field. The stabilizer and a tail rotor blade with its hub attached were located farther northeast in an area of large trees.

During a postaccident examination, significant crush damage was noted on the right side of the engine. Fuel was found in the line to the fuel nozzle and within the fuel control unit. The fuel control arm/lever was found in the “off” position. Engine control continuity was unable to be established from the collective twist grip to the engine due to extensive cockpit and airframe damage. The control cables remained secured at their respective arms on the power turbine governor and fuel control units.

The six-stage axial compressor was seized; its housing exhibiting thermal and crush damage. Once the housing was removed, the compressor rotated smoothly. Some dirt and debris were noted on the compressor guide vanes. The gas producer and power turbine rotated smoothly. Light circumferential scoring was noted on the gas producer turbine housing. The accessory gearbox housing was removed; all components were oily and unremarkable. The fuel control unit, power turbine governor, bleed valve, fuel spray nozzle and fuel pump assembly were bench tested and found to function normally.

The tailboom had fractured and separated just forward of the tail rotor assembly. The tail rotor gearbox was found fractured and separated, and no anomalies were noted. The gearbox drive to the tail rotor hub remained intact, but its grooves displayed some rotational damage. No corresponding rotational damage was noted on the hub. One tail rotor blade remained attached to the tail rotor hub, and the other tail rotor blade was found fractured and separated. The tension-torsion straps for fractured/separated blade extended from the tail rotor hub and were fractured and splayed.

The tail rotor assembly was provided to the National Transportation Safety Board Materials Laboratory for further examination. The examination revealed that 10 of the 11 tension-torsion straps had fractured from fatigue cracking followed by overstress fracture. The fatigue cracking

initiated at multiple locations along the bores in contact with the cylindrical plain bearing. Wear, in the form of smearing, gouging, spalling, and galling of the faying surfaces, led to the fatigue crack initiation. The fatigue cracks then propagated perpendicular to the area with the highest tensile stresses and at the thinnest locations along the bearing bore. No indications of corrosion were found, and the fit tightness of the joint was unable to be determined.

Administrative Information

Investigator In Charge (IIC):	Link, Samantha
Additional Participating Persons:	Elaine Soule; Federal Aviation Administration; Hillsboro, OR Nick Shepler; Rolls-Royce Corporation; Indianapolis, IN Michael Tragarz; Hiller Aircraft; Firebaugh, CA
Original Publish Date:	September 7, 2022
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=101619