# Aviation Investigation Final Report

| | | | |
|---|---|---|---|
| **Location:** | Edgerton, Indiana | **Accident Number:** | CEN11LA315 |
| **Date & Time:** | April 29, 2011, 19:30 Local | **Registration:** | N9561F |
| **Aircraft:** | Hughes 269B | **Aircraft Damage:** | Substantial |
| **Defining Event:** | Sys/Comp malf/fail (non-power) | **Injuries:** | 1 None |
| **Flight Conducted Under:** | Part 137: Agricultural | | |

## Analysis

The pilot reported a vibration in the helicopter antitorque pedals and a subsequent loss of directional control. The pilot initiated an autorotation to a field, and the helicopter sustained damage to the left landing skid and fuselage. A postaccident examination revealed that the tail rotor drive shaft failed due to an overstress fracture that resulted from contact with the tailboom bulkhead. Examination of the tailboom support structure was unable to determine the underlying cause of the contact between the tailboom and drive shaft. The operator reported that he was not aware of any events prior to the accident that would have compromised the tailboom support structure.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: A loss of clearance between the tail rotor drive shaft and the tailboom bulkhead for undetermined reasons, which resulted in the overstress failure of the drive shaft.

### Findings

| | |
|---|---|
| **Aircraft** | Tail rotor drive shaft - Failure |
| **Aircraft** | Rotorcraft tail boom - Damaged/degraded |
| **Not determined** | (general) - Unknown/Not determined |

# Factual Information

## History of Flight

| | |
|---|---|
| **Maneuvering-hover** | Sys/Comp malf/fail (non-power) (Defining event) |
| **Maneuvering-hover** | Loss of control in flight |
| **Autorotation** | Off-field or emergency landing |

On April 29, 2011, about 1930 eastern daylight time, a Hughes 269B, N9561F, experienced an in-flight loss of directional control and the pilot executed an autorotation to a field near Edgerton, Indiana. The pilot reported no injuries. The helicopter sustained substantial damage to the fuselage. The aircraft was registered to and operated by Heartland Helicopters, LLC, under the provisions of 14 Code of Federal Regulations Part 137 as an aerial application flight. Visual meteorological conditions prevailed for the flight, which operated without a flight plan. The local flight originated from a field near Edgerton, Indiana, about 1900.

The pilot had reportedly finished spraying a field and was about 30 feet above ground level (agl) when he felt a vibration in the antitorque pedals. The helicopter subsequently started to yaw and rotated one full revolution before the pilot initiated an autorotation to a field. The helicopter came to rest upright, with damage to the left landing skid and fuselage.

A postaccident examination revealed that the tail rotor drive shaft failed at the forward end of the tail boom, where the drive shaft passed through the tail boom bulkhead. Metallurgical examination determined that the drive shaft was deformed inward at the fracture, and the paint was cracked and flaked off the outer surface. Circumferential paint transfer was observed on the drive shaft in a color and shade matching the tail boom bulkhead. The fracture surface exhibited features consistent with overstress fracture that progressed under rotating bending stresses.

A postaccident visual examination of the fuselage aft cluster fittings did not reveal any anomalies. The fittings appeared to be intact and the mating struts securely attached. One tail boom support strut was fractured midspan; however, the fracture appeared consistent with overstress failure due to the hard landing after the autorotation. Continuity of the tail rotor transmission was confirmed through simultaneous rotation of the aft drive shaft section and the tail rotor blades. The drive shaft-to-transmission input splines appeared intact.

At the time of the accident, the helicopter had accumulated about 4,454 hours total time. Maintenance records indicated that the most recent annual inspection was completed on March 16, 2011, at 4,428.3 hours. The tail rotor drive shaft was installed on the helicopter in December 1997. At the time of the accident, it had accumulated about 2,648 hours.

The operator stated that he was not aware of any hard landings or other events that might

have compromised the tail boom support structure prior to the accident, and brought the tail boom into contact with the drive shaft. The operator noted that prior to the annual inspection, a pilot noted paint chipping from the drive shaft at the location the shaft passed through the tail boom bulkhead. Further examination by a mechanic did not reveal any damage to the drive shaft itself and the helicopter was returned to service. According to the operator, pilots who flew the helicopter after the annual inspection did not report any anomalies related to the tail boom or drive shaft.

## Pilot Information

| | | | |
|---|---|---|---|
| **Certificate:** | Commercial; Flight instructor | **Age:** | 40,Male |
| **Airplane Rating(s):** | None | **Seat Occupied:** | Left |
| **Other Aircraft Rating(s):** | Helicopter | **Restraint Used:** | |
| **Instrument Rating(s):** | None | **Second Pilot Present:** | No |
| **Instructor Rating(s):** | Helicopter | **Toxicology Performed:** | No |
| **Medical Certification:** | Class 2 With waivers/limitations | **Last FAA Medical Exam:** | April 19, 2011 |
| **Occupational Pilot:** | Yes | **Last Flight Review or Equivalent:** | October 14, 2009 |
| **Flight Time:** | 462 hours (Total, all aircraft), 315 hours (Total, this make and model), 368 hours (Pilot In Command, all aircraft), 36 hours (Last 90 days, all aircraft), 22 hours (Last 30 days, all aircraft), 6 hours (Last 24 hours, all aircraft) | | |

## Aircraft and Owner/Operator Information

| | | | |
|---|---|---|---|
| **Aircraft Make:** | Hughes | **Registration:** | N9561F |
| **Model/Series:** | 269B | **Aircraft Category:** | Helicopter |
| **Year of Manufacture:** | | **Amateur Built:** | |
| **Airworthiness Certificate:** | Normal | **Serial Number:** | 200450 |
| **Landing Gear Type:** | | **Seats:** | 3 |
| **Date/Type of Last Inspection:** | March 16, 2011 Annual | **Certified Max Gross Wt.:** | 1670 lbs |
| **Time Since Last Inspection:** | 25 Hrs | **Engines:** | 1 Reciprocating |
| **Airframe Total Time:** | 4454 Hrs at time of accident | **Engine Manufacturer:** | LYCOMING |
| **ELT:** | Not installed | **Engine Model/Series:** | HIO-360-A1A |
| **Registered Owner:** | Heartland Helicopters LLC | **Rated Power:** | 180 Horsepower |
| **Operator:** | Heartland Helicopters LLC | **Operating Certificate(s) Held:** | |

## Meteorological Information and Flight Plan

| | | | |
|---|---|---|---|
| **Conditions at Accident Site:** | Visual (VMC) | **Condition of Light:** | Day |
| **Observation Facility, Elevation:** | FWA,826 ft msl | **Distance from Accident Site:** | 19 Nautical Miles |
| **Observation Time:** | 19:54 Local | **Direction from Accident Site:** | 260° |
| **Lowest Cloud Condition:** | Few / 25000 ft AGL | **Visibility** | 10 miles |
| **Lowest Ceiling:** | None | **Visibility (RVR):** | |
| **Wind Speed/Gusts:** | 5 knots / | **Turbulence Type Forecast/Actual:** | / |
| **Wind Direction:** | 310° | **Turbulence Severity Forecast/Actual:** | / |
| **Altimeter Setting:** | 30.02 inches Hg | **Temperature/Dew Point:** | 14°C / 8°C |
| **Precipitation and Obscuration:** | No Obscuration; No Precipitation | | |
| **Departure Point:** | Edgerton, IN (NONE) | **Type of Flight Plan Filed:** | None |
| **Destination:** | Edgerton, IN (NONE) | **Type of Clearance:** | None |
| **Departure Time:** | 19:00 Local | **Type of Airspace:** | |

## Airport Information

| | | | |
|---|---|---|---|
| **Airport:** | Van Wert County VNW | **Runway Surface Type:** | |
| **Airport Elevation:** | 785 ft msl | **Runway Surface Condition:** | |
| **Runway Used:** | | **IFR Approach:** | None |
| **Runway Length/Width:** | | **VFR Approach/Landing:** | Forced landing |

## Wreckage and Impact Information

| | | | |
|---|---|---|---|
| **Crew Injuries:** | 1 None | **Aircraft Damage:** | Substantial |
| **Passenger Injuries:** | | **Aircraft Fire:** | None |
| **Ground Injuries:** | N/A | **Aircraft Explosion:** | None |
| **Total Injuries:** | 1 None | **Latitude, Longitude:** | 41.073055,-84.806114(est) |

## Administrative Information

| | |
|---|---|
| **Investigator In Charge (IIC):** | Sorensen, Timothy |
| **Additional Participating Persons:** | Randy Stromski; FAA – South Bend Flight Standards; South Bend, IN<br>Steven L Gleason; Schwiezer Aircraft Corp.; Horseheads, NY |
| **Original Publish Date:** | March 27, 2012 |
| **Last Revision Date:** | |
| **Investigation Class:** | Class |
| **Note:** | |
| **Investigation Docket:** | https://data.ntsb.gov/Docket?ProjectID=79011 |