Aviation Investigation Final Report

Location:	Indiantown, Florida	**Accident Number:**	ERA12LA379
Date & Time:	June 4, 2012, 09:55 Local	**Registration:**	N427AL
Aircraft:	Bell 427	**Aircraft Damage:**	Substantial
Defining Event:	Birdstrike	**Injuries:**	5 Minor
Flight Conducted Under:	Part 91: General aviation - Executive/Corporate		

Analysis

The pilot reported that, about 25 minutes into the flight, he maneuvered the helicopter to avoid large birds. The pilot felt something impact the upper right side of the helicopter near the main rotor mast area. The helicopter began shaking violently and became difficult to control. He immediately decided to abort the flight. During the landing attempt, helicopter control was lost; the helicopter entered a left spin, impacted the ground, and rolled over. The main and tail rotor systems and the fuselage sustained substantial damage. The immediate decision to abort the flight after impact with the birds most likely aided the pilot in executing an emergency landing.

Evidence of bird remains were present on components of the rotor head, two of the four pitch change rods, and the tail rotor. Both pitch change rods with bird remains were separated from one of their attach points. The bird remains were removed and sent to the Smithsonian Institute for identification. According to the report, male and female Black Vulture DNA was found on the pitch control rods, pitch control linkages, and the tail rotor.

Examination of the rotor head parts found two pitch change links failed in tensile overstress; one of these exhibited an inward bending that could have been caused by a bird strike. The damage to the other pitch change link was most likely caused by the dynamic rollover as the rotor blades impacted the ground or other helicopter components. The accident sequence most likely initiated when the birds struck the pitch change rods.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The inflight collision with birds, resulting in damage to the rotor head assembly and a subsequent forced landing and rollover.

Findings

Aircraft	Main rotor blade system - Damaged/degraded
Environmental issues	Animal(s)/bird(s) - Contributed to outcome

Factual Information

History of Flight

Enroute-cruise	Birdstrike (Defining event)
Enroute-cruise	Flight control sys malf/fail
Emergency descent	Off-field or emergency landing
Landing-flare/touchdown	Hard landing
Landing-flare/touchdown	Roll over

On June 4, 2012, about 0955 eastern daylight time, a Bell 427, N427AL, sustained substantial damage after an inflight bird strike, main rotor vibration, and hard landing near Indiantown, Florida. The private pilot, commercial copilot, and three passengers received minor injuries. The helicopter was registered to Southern Aviation Systems, LLC, and operated by a private individual. Visual meteorological conditions prevailed and no flight plan was filed for the 14 Code of Federal Regulations Part 91, executive/corporate flight, destined for Ocala International Airport-Jim Taylor Field (KOCF) Ocala, Florida. The flight originated from the Palm Beach International Airport (PBI), West Palm Beach, Florida, about 0930.

According to the pilot, approximately 25 minutes into the flight, while on a heading of 330 degrees and at an altitude of 800 feet mean sea level (msl), he maneuvered the helicopter to avoid colliding with several large birds. The pilot felt something impact the upper right side of the helicopter near the main rotor mast area. Immediately following the impact, the helicopter started shaking violently, and became difficult to control. The pilot elected to land in an open field. Descending through 300 feet msl, the shaking became more pronounced and the helicopter became uncontrollable. At 50 feet msl, the aircraft went into a left spin and impacted the ground and rolled over on its left side. All onboard were able to exit the helicopter on their own.

Examination of the helicopter by a FAA inspector and a representative of the airframe manufacturer revealed that the tail boom separated about three feet aft of the attachment point to the fuselage. The collapse of the left mail landing gear and subsequent tail boom departure from the airframe was consistent with a dynamic rollover by the helicopter.

Pitch change links connected the swash plate at the lower end to the main rotor blade pitch horns at the upper end. According to a NTSB metallurgy laboratory report, the orange square and red triangle-coded links were fractured approximately 1.25 inches from the end closest to the pitch horns where the tube was internally threaded. The fracture surfaces were oriented approximately 45 degree to the longitudinal axis of the tube and had a rough appearance, consistent with tensile overstress fractures. The orange tube had an inward dent approximately 0.75 inch below the fracture. The rod ends that connected the blue diamond and green circle-coded links to the swash plate were bent forward in the direction of rotation

(clockwise direction as viewed beneath the mast looking up) and fractured in the thread roots. The fracture surfaces had a rough irregular appearance. The deformation and appearance of the fracture surfaces were consistent with bending overstress fracture. The main rotor blade pitch horns were fractured and twisted on the blue diamond and green circle-coded blades. The ends of the pitch horns were still connected to the upper fittings of the pitch links. The fracture surfaces were at approximately 45° angles to the longitudinal axis of the arm and they had a rough appearance, consistent with an overstress fracture.

All four main rotor blades separated from the hub due to contact with the ground or other helicopter components. Ground scars by the main rotor blades were verified through paint marks and gouges in the dirt.

Evidence of bird remains were present on components of the rotor head, two of the four pitch change rods, and the tail rotor. Each pitch change rod with bird remains was separated from one of their attach points respectively. The bird remains were removed and sent to the Smithsonian Institute for bird identification. According to the report, male and female Black Vulture DNA was found on the pitch control rods, pitch control linkages, and the tail rotor.

Pilot Information

Certificate:	Private	**Age:**	60,Male
Airplane Rating(s):	None	**Seat Occupied:**	Right
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	October 24, 2011
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	February 15, 2011
Flight Time:	2132 hours (Total, all aircraft), 427 hours (Total, this make and model), 25 hours (Last 90 days, all aircraft)		

Other flight crew Information

Certificate:	Commercial	**Age:**	42,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	
Instrument Rating(s):	Airplane; Helicopter	**Second Pilot Present:**	Yes
Instructor Rating(s):		**Toxicology Performed:**	No
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	August 10, 2010
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	February 3, 2011
Flight Time:	(Estimated) 4000 hours (Total, all aircraft), 427 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	Bell	**Registration:**	N427AL
Model/Series:	427	**Aircraft Category:**	Helicopter
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	56018
Landing Gear Type:	Skid	**Seats:**	8
Date/Type of Last Inspection:	May 7, 2012 Annual	**Certified Max Gross Wt.:**	6550 lbs
Time Since Last Inspection:	15 Hrs	**Engines:**	2 Turbo shaft
Airframe Total Time:	1345 Hrs at time of accident	**Engine Manufacturer:**	Pratt & Whitney
ELT:	C91A installed, activated, did not aid in locating accident	**Engine Model/Series:**	PW207D
Registered Owner:	On file	**Rated Power:**	572 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:	SUA,16 ft msl	**Distance from Accident Site:**	13 Nautical Miles
Observation Time:	09:47 Local	**Direction from Accident Site:**	37°
Lowest Cloud Condition:	Scattered / 2000 ft AGL	**Visibility**	7 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	12 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	260°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.96 inches Hg	**Temperature/Dew Point:**	29°C / 23°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Palm Beach, FL (PBI)	**Type of Flight Plan Filed:**	Company VFR
Destination:	Ocala, FL (OCF)	**Type of Clearance:**	VFR
Departure Time:	09:35 Local	**Type of Airspace:**	Class G

Wreckage and Impact Information

Crew Injuries:	2 Minor	**Aircraft Damage:**	Substantial
Passenger Injuries:	3 Minor	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	5 Minor	**Latitude, Longitude:**	27.031389,-80.35083(est)

Administrative Information

Investigator In Charge (IIC):	Obregon, Jose
Additional Participating Persons:	John R Stephenson; FAA/FSDO; Miramar, FL
Original Publish Date:	September 5, 2013
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=83847