



AVIATION



HIGHWAY



MARINE



RAILROAD



PIPELINE

Aviation Investigation Final Report

Location:	Katy, Texas	Accident Number:	CEN18LA276
Date & Time:	July 17, 2018, 08:30 Local	Registration:	N228Q
Aircraft:	Beech V35	Aircraft Damage:	Substantial
Defining Event:	Loss of engine power (total)	Injuries:	1 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The private pilot reported that, as he approached the destination airport, he noted "a sudden and severe noise and vibration" and "a...stream of gray smoke from under the right side of the [engine] cowling," followed by a loss of engine power. The pilot subsequently conducted a forced landing, during which the airplane sustained substantial damage to the fuselage and right wing.

Postaccident engine examination revealed two holes in the top of the crankcase near the Nos. 3 and 4 cylinders. A teardown examination of the engine revealed that the No. 4 connecting rod had failed due to oil starvation, which resulted in a catastrophic engine failure. Foreign debris, which was similar to a paper towel, was recovered from the engine oil sump and the oil pickup screen. Most of the screen area was obstructed by the debris, which had interrupted the oil flow from the sump to the engine.

The airplane maintenance records noted that the alternator and alternator drive gear were replaced about 8 weeks before the accident. The engine had been operated about 24 hours since the alternator replacement. The starter and starter adapter were replaced the day before the accident flight. The engine had been operated about 15 minutes since the most recent maintenance work was performed. It is likely that maintenance personnel left the paper towel in the engine during the recent maintenance work, which resulted in oil starvation, the failure of the connecting rod, and the catastrophic engine failure and subsequent total loss of engine power.

Probable Cause and Findings

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

Maintenance personnel's failure to remove a paper towel from the engine during recent maintenance, which resulted in oil starvation, the failure of a connecting rod, and a catastrophic engine failure and subsequent total loss of engine power.

Findings

Aircraft	Recip eng cyl section - Failure
Personnel issues	Lack of action - Maintenance personnel
Aircraft	Oil - Fluid level

Factual Information

History of Flight

Prior to flight	Aircraft maintenance event
Enroute-cruise	Loss of engine power (total) (Defining event)
Emergency descent	Off-field or emergency landing

On July 17, 2018, about 0830 central daylight time, a Beech V35 airplane, N228Q, was substantially damaged during a forced landing following a loss of engine power near Katy, Texas. The pilot was not injured. The airplane was registered to Pivot Group LLC and operated by the pilot as a Title 14 *Code of Federal Regulations* Part 91 personal flight. Day visual meteorological conditions prevailed. The flight was not operated on a flight plan. The flight originated from the Fair Weather Field Airport (TX42), Monaville, Texas, about 0820 and was destined for the West Houston Airport (IWS), Houston, Texas.

The pilot reported that "a sudden and severe noise and vibration" and "a brief stream of gray smoke from under the right side of the [engine] cowling" preceded a loss of engine power as he approached the destination airport. He subsequently executed a forced landing to a residential development under construction. The airplane "bounced and skidded" before coming to rest upright. The airplane sustained substantial damage to the fuselage and right wing.

A postrecovery engine examination was conducted under oversight of the National Transportation Safety Board (NTSB) investigator-in-charge. A visual examination revealed two holes in the top of the crankcase near the No. 3 and No. 4 cylinders. The crankcase appeared to be otherwise intact. A teardown examination determined that the No. 4 connecting rod had separated from crankshaft journal. The connecting rod remained attached to the piston. The end of the connecting rod common to the crankshaft was deformed consistent with secondary mechanical damage. The No. 4 crankshaft journal was discolored consistent with oil starvation. The No. 4 piston was wedged in the cylinder and portions of the piston skirt had separated. The oil sump contained foreign debris that appeared to be a paper-based shop towel. The oil pickup screen was obstructed by similar debris. Approximately 7 quarts of oil were recovered from the sump in addition to the debris. At the time of the examination, the hour (Hobbs) meter and tachometer indicated 1,414.3 hours and 5,959.54 hours, respectively.

The debris recovered from the oil sump and the pickup screen was forwarded to the NTSB materials lab. Microscopic examination revealed that the debris consisted of a fibrous material with the appearance of a textured paper product similar to paper towels. A sample was washed with acetone to remove the engine oil and analyzed using a spectrometer. The cleaned sample displayed a spectrum with a strong match to cellulose, which is found in natural plant fibers such as cotton and wood. Paper products are manufactured with cellulosic material.

A review of the airplane maintenance records revealed that the most recent annual inspection was completed on September 22, 2017, at 5,815.4 hours tachometer time. On June 6, 2018, the alternator and alternator drive gear were replaced. The corresponding hour meter and tachometer times were 1,390.3 and 5,935.7 hours, respectively. On July 16, 2018, the starter and starter adapter were replaced. The

corresponding hour meter and tachometer times were 5,959.33 hours and 1,414.0 hours, respectively. The records contained no subsequent entries.

Pilot Information

Certificate:	Private	Age:	56, Male
Airplane Rating(s):	Single-engine land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	3-point
Instrument Rating(s):	None	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 3 With waivers/limitations	Last FAA Medical Exam:	April 11, 2018
Occupational Pilot:	No	Last Flight Review or Equivalent:	July 2, 2018
Flight Time:	441 hours (Total, all aircraft), 149 hours (Total, this make and model), 406 hours (Pilot In Command, all aircraft), 29 hours (Last 90 days, all aircraft), 5 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	Registration:	N228Q
Model/Series:	V35	Aircraft Category:	Airplane
Year of Manufacture:	1966	Amateur Built:	
Airworthiness Certificate:	Utility	Serial Number:	D-8135
Landing Gear Type:	Retractable - Tricycle	Seats:	4
Date/Type of Last Inspection:	September 22, 2017 Annual	Certified Max Gross Wt.:	3400 lbs
Time Since Last Inspection:	140 Hrs	Engines:	1 Reciprocating
Airframe Total Time:	5959 Hrs at time of accident	Engine Manufacturer:	Continental
ELT:	C91 installed, activated, did not aid in locating accident	Engine Model/Series:	IO-520-BA
Registered Owner:		Rated Power:	285 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:	TME,166 ft msl	Distance from Accident Site:	7 Nautical Miles
Observation Time:	08:35 Local	Direction from Accident Site:	231°
Lowest Cloud Condition:	Scattered / 600 ft AGL	Visibility	5 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	4 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	250°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30.1 inches Hg	Temperature/Dew Point:	26°C / 26°C
Precipitation and Obscuration:	N/A - None - Mist		
Departure Point:	Monaville, TX (TX42)	Type of Flight Plan Filed:	None
Destination:	Houston, TX (IWS)	Type of Clearance:	None
Departure Time:	08:20 Local	Type of Airspace:	Class G

Airport Information

Airport:	West Houston IWS	Runway Surface Type:	
Airport Elevation:	111 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:	29.868055,-95.794998(est)

Administrative Information

Investigator In Charge (IIC):	Sorensen, Timothy
Additional Participating Persons:	Thomas C Fowles; FAA Flight Standards; Houston, TX John Kent; Continental Motors Inc.; Mobile, AL
Original Publish Date:	November 6, 2019
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=97809

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).