



National Transportation Safety Board Aviation Accident Final Report

Location:	Westphalia, KS	Accident Number:	CEN17LA372
Date & Time:	09/28/2017, 1716 CDT	Registration:	N7336Z
Aircraft:	PIPER PA 25-235	Aircraft Damage:	Substantial
Defining Event:	Loss of engine power (total)	Injuries:	1 None
Flight Conducted Under:	Part 137: Agricultural		

Analysis

The commercial pilot reported that he departed in the airplane with full fuel and chemical for the aerial application flight. After spraying a field for about 20 minutes, the engine experienced a total loss of power. The pilot jettisoned the chemical load and initiated a forced landing to a field. About 5 ft above the field, as the pilot tried to bleed off airspeed, the airplane stalled and impacted terrain.

Disassembly and examination of the engine revealed that the crankshaft was fractured, and the main bearings displayed thermal damage and smearing. Material examination of the crankshaft showed features consistent with a subsurface crack initiation and fatigue crack propagation. The fatigue striations, particularly near the initiation site, were consistent with high-cycle fatigue. The forward main bearings exhibited spalling, displacement, and cracking consistent with bearing wear fatigue. All the bearing damage was typical of similar bearings that had been operated at elevated temperatures using inadequate lubrication. The main bearing damage was likely the result of main bearing shift and a blockage of the lubrication paths. The blockage resulted in a lack of lubrication, main bearing failure, and a fatigue failure of the crankshaft. The reason for the main bearing shift could not be determined based on the available information.

Probable Cause and Findings

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

A total loss of engine power due to a fatigue failure of the crankshaft that resulted from main bearing shift and lack of lubrication.

Findings

Aircraft

Recip engine power section - Failure (Cause)

Recip engine power section - Fatigue/wear/corrosion (Cause)

Factual Information

On September 28, 2017, at 1716 central daylight time, a Piper PA-25-235 airplane, N7336Z, impacted terrain following a loss of engine power while maneuvering at low altitude near Westphalia, Kansas. The commercial pilot, who was the sole occupant, was not injured, and the airplane sustained substantial damage. The airplane was registered to and operated by a private individual under the provisions of 14 *Code of Federal Regulations* Part 137 as an aerial application flight. Visual meteorological conditions prevailed, and no flight plan had been filed for the flight. The local flight departed the Garnett Municipal Airport (K68), Garnett, Kansas, about 1630.

According to the pilot, the airplane departed K68 with full fuel and chemical for the aerial application flight. After spraying a field for about 20 minutes, the engine lost power. The pilot jettisoned his chemical load and initiated a forced landing to a field. About 5 feet above the field as the pilot tried to bleed off airspeed, the airplane stalled and impacted terrain. The airplane sustained substantial damage to the left wing. The Lycoming O-540-B2B5 engine was removed from the airframe for further examination.

A review of the maintenance records showed the engine underwent a field major overhaul on January 28, 2016, about 218 hours prior to the accident.

On October 25, 2017, the engine was disassembled under the supervision of the Federal Aviation Administration inspectors. Disassembly of the engine revealed the crankshaft was fractured, and the main bearings displayed thermal damage and smearing. The crankshaft and main bearings were retained for further examination.

The fractured crankshaft and forward main journal bearings were examined by the National Transportation Safety Board Materials Laboratory. Examination of the crankshaft showed a fracture across a web located between the second cylinder (C2) journal and the second main (M2) journal. Approximately 60% of the fracture surface exhibited a general flat portion with crack arrest marks. The crack arrest marks appeared to emanate out from near the corner of the web near the M2 journal. The crack arrest features were not consistent with having progressed from a surface or from an internal feature, but were consistent with a subsurface crack initiation, and fatigue crack propagation. The fatigue striations, particularly near the initiation site, were consistent with high-cycle fatigue.

The forward main bearing (M1) journal displayed discoloration and dark circumferential wear marks on the aft most two inches. One aft bearing surface revealed spalling, displacement, and cracking consistent with bearing wear fatigue. The other aft bearing surface exhibited spalling, material displacement, and smearing. Much of the spalled and smeared material was found accumulated in the lubrication groove. All the bearing damage was typical of similar bearings that operated at elevated temperatures with inadequate lubrication.

History of Flight

Maneuvering-low-alt flying	Loss of engine power (total) (Defining event) Collision with terr/obj (non-CFIT)
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Pilot Information

Certificate:	Commercial	Age:	43, Male
Airplane Rating(s):	Single-engine Land	Seat Occupied:	Center
Other Aircraft Rating(s):	None	Restraint Used:	4-point
Instrument Rating(s):	None	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 2 Without Waivers/Limitations	Last FAA Medical Exam:	05/11/2017
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	01/05/2017
Flight Time:	463 hours (Total, all aircraft), 233 hours (Total, this make and model), 408 hours (Pilot In Command, all aircraft), 96 hours (Last 90 days, all aircraft), 32 hours (Last 30 days, all aircraft), 5 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	PIPER	Registration:	N7336Z
Model/Series:	PA 25-235 UNDESIGNAT	Aircraft Category:	Airplane
Year of Manufacture:	1965	Amateur Built:	No
Airworthiness Certificate:	Restricted	Serial Number:	25-3285
Landing Gear Type:	Tailwheel	Seats:	1
Date/Type of Last Inspection:	01/01/2017, Annual	Certified Max Gross Wt.:	2299 lbs
Time Since Last Inspection:	110 Hours	Engines:	1 Reciprocating
Airframe Total Time:		Engine Manufacturer:	LYCOMING
ELT:	Not installed	Engine Model/Series:	O-540-B2B5
Registered Owner:	DAVISON LYNN L	Rated Power:	260 hp
Operator:	On file	Operating Certificate(s) Held:	Agricultural Aircraft (137)

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	KIXD, 1087 ft msl	Distance from Accident Site:	36 Nautical Miles
Observation Time:	1653 CDT	Direction from Accident Site:	45°
Lowest Cloud Condition:	Clear	Visibility	10 Miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	6 knots /	Turbulence Type Forecast/Actual:	/ None
Wind Direction:	360°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30.2 inches Hg	Temperature/Dew Point:	23° C / 12° C
Precipitation and Obscuration:	No Precipitation		
Departure Point:	Garnett, KS (K68)	Type of Flight Plan Filed:	None
Destination:	Garnett, KS (K68)	Type of Clearance:	None
Departure Time:	1630 CDT	Type of Airspace:	Class G

Wreckage and Impact Information

Crew Injuries:	1 None	Aircraft Damage:	Substantial
Passenger Injuries:	N/A	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 None	Latitude, Longitude:	38.185000, -95.483611 (est)

Administrative Information

Investigator In Charge (IIC):	Aaron M Sauer	Report Date:	05/29/2019
Additional Participating Persons:	Bobby Warren; Federal Aviation Administration; Wichita, KS		
Publish Date:	05/29/2019		
Note:	The NTSB did not travel to the scene of this accident.		
Investigation Docket:	http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=96129		

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](#).