Aviation Investigation Final Report

Location:	Bethel, Alaska	**Accident Number:**	ANC19LA016
Date & Time:	April 11, 2019, 16:08 Local	**Registration:**	N4466T
Aircraft:	Piper PA-32-300	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (total)	**Injuries:**	4 None
Flight Conducted Under:	Part 135: Air taxi & commuter - Non-scheduled		

Analysis

The pilot reported that, while in cruise flight, the engine lost partial power, then total power, and the propeller stopped turning.

During the subsequent off-airport forced landing on the tundra meadow, the main landing gear separated from the airplane, resulting in substantial damage to the right wing.

Examination of the engine revealed a crankshaft failure that was likely a result of fatigue cracking that emanated from the surface of the main journal.

The engine was overhauled at a certified repair station about 14 flight hours before the accident. The engine manufacturer overhaul manual stated that the crankshaft was to be inspected using a magnetic particle inspection procedure as part of the overhaul; however, the crankshaft was not inspected as part of the overhaul. It is likely that if the crankshaft had been inspected as indicated, the fatigue cracking would have been detected and corrected during overhaul.

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. A contributing factor was the inadequate inspection during the engine's last overhaul.

Findings

Aircraft	(general) - Fatigue/wear/corrosion
Aircraft	(general) - Failure
Personnel issues	Scheduled/routine maintenance - Maintenance personnel

Factual Information

History of Flight

Enroute	Loss of engine power (total) (Defining event)
Enroute	Emergency descent initiated
Landing	Off-field or emergency landing
Landing	Landing gear collapse

On April 11, 2019, about 1608 Alaska daylight time, a Piper PA-32-300 airplane, N4466T, sustained substantial damage when it was involved in an accident near Bethel, Alaska. The pilot and three passengers were not injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 135 domestic passenger flight.

The pilot reported that, while en route from Aniak Airport (ANI), Aniak, Alaska, to Bethel Airport (BET), Bethel, Alaska, the engine began to sound "different," and he observed a loss of engine oil pressure below the green arc. The engine rpm decreased to about 2,000 rpm, and the oil pressure continued to decrease to the yellow arc. As he turned the airplane toward Akiak Airport (AKI), Akiak, Alaska, the closest airport, and while adjusting the propeller rpm, the engine lost all power.

During the subsequent off-airport forced landing on the tundra-covered meadow, the main landing gear separated from the airplane, resulting in substantial damage to the right wing.

Examination revealed that the engine was seized and could not be rotated. The case halves were separated, revealing a failure of the crankshaft on the No. 3 main bearing journal. The failure showed signs of thermal damage and twisting. The engine valves were all set correctly and properly installed. The oil pan contained large amounts of copper and metal flake. The oil pan screen was removed, and heavily fragmented metal shavings were found.

The fractured crankshaft and two halves of a bearing from main journal No. 3 were sent to the NTSB Materials Laboratory. The examination revealed that crack arrest marks typical of fatigue cracking emanated from multiple origins at the surface of the main journal. The fatigue origin area was located near the center of the main journal. The fracture face at the fatigue origin area exhibited evidence of blue, grey, and red tinting consistent with heat exposure. The fracture features at the origin of the fatigue crack and other portions of the fracture were obliterated by post-fracture relative movement between mating fracture faces. The fatigue crack propagated toward the core of the main journal, where it split into two fatigue cracks. The surface of the main journal exhibited evidence of severe mechanical damage such as circumferential abrasion, wear, galling and heat tinting. The surface also contained evidence of ladder cracking.

The overhauled engine was installed in April 2019 and had accumulated about 14 hours of operation before the accident.

Section 7 of the Lycoming Overhaul Manual for direct drive engines, page 7-4 section 7-28A states:

Crankshaft (Magnetic Particle Inspection). Inspect the crankshaft using a magnetic particle inspection procedure performed by a certified operator.

The work order for the engine overhaul indicated that a magnaflux and zyglo inspection was completed, but the inspection did not include the case or crankshaft.

The owner of the certified repair station stated that they perform all non-destructive testing (NDT) inspections, magna flux, and measurements for the overhauled engines at their location. After they NDT inspect the parts, "NDT" was stamped on the part. Components without an NDT stamp indicated that NDT inspection was not completed. The accident crankshaft had no visible NDT stamp.

Pilot Information

Certificate:	Commercial	**Age:**	38,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Unknown
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane single-engine	**Toxicology Performed:**	No
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	April 9, 2018
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	November 18, 2018
Flight Time:	(Estimated) 16800 hours (Total, all aircraft), 80 hours (Last 90 days, all aircraft), 40 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N4466T
Model/Series:	PA-32-300	**Aircraft Category:**	Airplane
Year of Manufacture:	1972	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	32-7240067
Landing Gear Type:	Tricycle	**Seats:**	6
Date/Type of Last Inspection:	April 7, 2019 100 hour	**Certified Max Gross Wt.:**	3400 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	19991.3 Hrs at time of accident	**Engine Manufacturer:**	Lycoming
ELT:	C126 installed, activated, did not aid in locating accident	**Engine Model/Series:**	IO-540 -K1A5
Registered Owner:		**Rated Power:**	300 Horsepower
Operator:		**Operating Certificate(s) Held:**	Commuter air carrier (135)
Operator Does Business As:	Yute Commuter Service	**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	PAKI,30 ft msl	**Distance from Accident Site:**	9 Nautical Miles
Observation Time:	15:56 Local	**Direction from Accident Site:**	200°
Lowest Cloud Condition:	Unknown	**Visibility**	10 miles
Lowest Ceiling:	Broken / 6500 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	18 knots /	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:	50°	**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	29.04 inches Hg	**Temperature/Dew Point:**	6°C / 2°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Aniak, AK (ANI)	**Type of Flight Plan Filed:**	Company VFR
Destination:	Bethel, AK (BET)	**Type of Clearance:**	None
Departure Time:	15:40 Local	**Type of Airspace:**	Class G

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	3 None	**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	4 None	**Latitude, Longitude:**	61.033332,-161.13333(est)

Administrative Information

Investigator In Charge (IIC):	Swenson, Eric		
Additional Participating Persons:	Erik Wilson; FAA; Anchorage, AK Miles France; Paklook Air Inc; Kodiak, AK Mark W Platt; Lycoming Engines; Williamsport, PA		
Original Publish Date:	January 20, 2022	**Investigation Class:**	3
Note:	The NTSB did not travel to the scene of this accident.		
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=99260		