Aviation Investigation Final Report

Location:	Rockford, Ohio	**Incident Number:**	CEN18IA273
Date & Time:	July 12, 2018, 16:47 Local	**Registration:**	N2483J
Aircraft:	Cessna A188B	**Aircraft Damage:**	Minor
Defining Event:	Loss of engine power (total)	**Injuries:**	1 None
Flight Conducted Under:	Part 137: Agricultural		

Analysis

The commercial pilot of the aerial application flight reported that the airplane was at 350 ft above ground level when the engine started running roughly and then lost total power. He executed a forced landing to a field, which resulted in minor damage to the right wing.

A review of the engine maintenance logbooks indicated that the accident occurred 107.6 hours after all six cylinders were replaced. The engine teardown examination revealed a large hole in the crankcase near the No. 2 cylinder. The crankcase bearing supports exhibited signs consistent with bearing shift. The No. 2 and No. 3 lock tabs exhibited elongation, and all bearing support mating surfaces exhibited varying amounts of fretting, with the No. 2 and No. 3 surfaces displaying the most fretting. The No. 3 bearing had shifted a significant amount, and part of the bearing was separated. The No. 2 connecting rod bearings exhibited a significant amount of thermal damage consistent with heat distress. The No. 2 connecting rod was separated from its journal and exhibited damage consistent with lubrication distress. The No. 2 piston was separated from the connecting rod and remained in the cylinder.

It is likely that, when all six cylinders were replaced, the engine's through-bolts did not have sufficient clamping force, which resulted in movement of the crankcase halves as evidenced by the fretting on the crankcase bearing supports. This led to the crankcase main bearings shifting, which resulted in oil starvation to the No. 2 connecting rod journal, failure of the No. 2 connecting rod, and the subsequent total loss of engine power.

Probable Cause and Findings

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

The total loss of engine power, which resulted from the separation of the No. 2 connecting rod due to oil starvation as a result of insufficient clamping force of the engine's through-bolts.

Findings

Aircraft	Recip engine power section - Incorrect service/maintenance
Aircraft	Oil - Fluid level
Aircraft	Recip engine power section - Damaged/degraded

Factual Information

History of Flight

Maneuvering-low-alt flying	Miscellaneous/other
Maneuvering-low-alt flying	Loss of engine power (total) (Defining event)
Emergency descent	Off-field or emergency landing
Landing-flare/touchdown	Collision with terr/obj (non-CFIT)

On July 12, 2018, about 1647 eastern daylight time, a Cessna A188B, N2483J, made a forced landing after a loss of engine power near Rockford, Ohio. The pilot was not injured; the airplane sustained minor damage. The airplane was owned and operated by the pilot under the provisions of Title 14 *Code of Federal Regulations* Part 137 as an aerial-application flight. Visual meteorological conditions prevailed at the time of the flight, which was not on a flight plan. The airplane departed about 1620 from the Lakefield Airport (CQA), Celina, Ohio, on a local flight.

The pilot reported that he was flying at 350 ft above ground level when the engine started running rough and then stopped producing power. He executed a forced landing to a bean field, which resulted in minor damage to the right wing. The examination of the engine revealed that there was a hole in the engine case near the No. 2 cylinder.

The engine was a 300-horsepower six-cylinder Continental IO-550-D engine. A review of the engine maintenance logbooks indicated that the last major overhaul was performed on February 2, 2014 and was installed on the airplane on April 1, 2014. All six cylinders were replaced on September 9, 2017 at a tachometer time of 1,225.8 hours. The logbook entry did not provide a reason for why all six cylinders were replaced. The last annual maintenance inspection was performed on April 2, 2018, at a tachometer time of 1,262.0 hours. The last oil change was performed on July 8, 2018, at a tachometer time of 1,315.6 hours. The tachometer time at the time of the accident was 1,333.4 hours, which as 107.6 hours since all six cylinders were replaced.

The engine was shipped to Continental Motors for an engine teardown examination under the oversight of the National Transportation Safety Board. There were no signs of external impact to the engine. All six cylinders remained attached to their cylinder bays and there was no damaged noted to the cylinders. The crankcase bearing supports exhibited signs consistent with bearing shift. The No. 2 and No. 3 lock tabs exhibited elongation, and all bearing support mating surfaces exhibited varying amounts of fretting with the No. 2 and No. 3 surfaces displaying the most fretting. The No. 3 bearing had shifted a significant amount and a portion of the bearing was separated. It was noted that the crankshaft gear was improperly safety wired.

The No. 2 connecting rod was separated from its journal and exhibited damage consistent with lubrication distress, and portions of the connecting rod were in the sump. The No. 2 connecting rod bearings exhibited a significant amount of thermal damage consistent with heat distress. The No. 2 piston was separated from the connecting rod and remained in the cylinder.

The induction system remained attached to the engine; however, several induction coupling clamps were missing, and all the induction riser bolts that go on the inside portion of the attach flange were not installed.

Pilot Information

Certificate:	Commercial	**Age:**	61,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 With waivers/limitations	**Last FAA Medical Exam:**	February 6, 2018
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	7200 hours (Total, all aircraft), 2500 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N2483J
Model/Series:	A188B	**Aircraft Category:**	Airplane
Year of Manufacture:	1979	**Amateur Built:**	
Airworthiness Certificate:	Restricted (Special)	**Serial Number:**	18803467T
Landing Gear Type:	Tailwheel	**Seats:**	1
Date/Type of Last Inspection:	April 2, 2018 Annual	**Certified Max Gross Wt.:**	
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	7641 Hrs as of last inspection	**Engine Manufacturer:**	Continental
ELT:		**Engine Model/Series:**	IO-550-D
Registered Owner:		**Rated Power:**	300 Horsepower
Operator:		**Operating Certificate(s) Held:**	Agricultural aircraft (137)

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	FWA,814 ft msl	**Distance from Accident Site:**	30 Nautical Miles
Observation Time:	15:54 Local	**Direction from Accident Site:**	305°
Lowest Cloud Condition:		**Visibility**	10 miles
Lowest Ceiling:	Broken / 25000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	6 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	140°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.19 inches Hg	**Temperature/Dew Point:**	29°C / 16°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Celina, OH (CQA)	**Type of Flight Plan Filed:**	None
Destination:	Celina, OH (CQA)	**Type of Clearance:**	None
Departure Time:	16:20 Local	**Type of Airspace:**	

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Minor
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 None	**Latitude, Longitude:**	40.698333,-84.63639

Administrative Information

Investigator In Charge (IIC):	Silliman, James
Additional Participating Persons:	Todd Caruso; Columbus FSDO; Columbus, OH
Original Publish Date:	November 19, 2019
Note:	The NTSB did not travel to the scene of this incident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=97800

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.