National Transportation Safety Board
Aviation Accident Final Report

Location:	Russellville, OH	**Accident Number:**	CEN16LA306
Date & Time:	08/04/2016, 2004 EDT	**Registration:**	N10770
Aircraft:	CESSNA 150L	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (total)	**Injuries:**	1 Minor, 1 None
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis

As the private pilot was descending the airplane for landing, he heard a loud "bang," and the engine subsequently began running rough. Unable to maintain altitude, the pilot conducted a forced landing to a soybean field, during which the airplane impacted a ditch and nosed over. Examination of the engine revealed that the No. 2 cylinder was completely separated between the flange and the head. Examination of the cylinder revealed a fatigue crack that initiated at a cooling fin valley on the exterior surface. The fatigue crack grew around 40% of the circumference of the cylinder, and overstress led to the eventual cylinder fracture. A metallographic cross-section of the cylinder revealed corrosion pits under the paint and primer. The alloy is not necessarily susceptible to pitting, but crevice corrosion near an unpainted area or exposure to salt environments can lead to similar corrosion features.

Probable Cause and Findings

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

A partial loss of engine power due to a fatigue crack of the No. 2 cylinder cooling fin, which resulted in failure of the No. 2 cylinder.

Findings

Aircraft	Recip eng cyl section - Failure (Cause)

Factual Information

On August 4, 2016, at 2004 eastern daylight time, the pilot of a Cessna 150L, N10770, impacted terrain in a soybean field near Russellville, Ohio, after a loss of engine power. The private pilot on board sustained a minor injury and the pilot-rated passenger was not injured. The airplane was substantially damaged. The airplane was registered to and operated by a private individual under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. Visual meteorological conditions prevailed at the time of the accident, and no flight plan had been filed. The local flight originated from Brown County Airport (KGEO), Georgetown, Ohio, about 1945.

The pilots told an FAA inspector that while they were descending for landing, they heard a loud "bang" and the engine began running rough. Unable to maintain altitude, they made a forced landing in a soybean field. The airplane struck a ditch and nosed over. Examination of the engine revealed the number 2 cylinder had completely separated between the flange and the head.

The pilot was instructed to ship the cylinder halves to the National Transportation Safety Board's (NTSB) Materials Laboratory for examination. According to the Materials Laboratory's Factual Report (16-110), the cylinder had fractured about the circumference of the seventh cooling fin valley through approximately 40% of the cross section. The fracture was relatively flat, exhibited a reflective luster, and was oriented in the direction of piston movement. The fracture surface revealed the presence of crack arrest marks, which were consistent with progressive cracking due to fatigue. Additionally, several cooling fin flange surfaces exhibited small circular features consistent with pitting. An initial thumbnail crack was present adjacent to the crack initiation site, with radial marks and crack arrest marks propagating outward. Fatigue striations were present, consistent with fatigue crack propagation. The crack initiation site on the head side of the fracture surface consisted of three stepped features containing ratchet marks between the steps, consistent with multiple crack initiation sites that had coalesced as the fatigue cracks grew and propagated inward. The mating (open piston side) fracture surface exhibited three ridge shapes, consistent with the previously observed ratchet marks on the head side fracture surface.

According to the engine maintenance records, cylinder number 2 (serial number 0049), manufactured by Superior Air Parts, Coppell, Texas, was overhauled on April 14, 2000. The overhaul included grounding the intake and exhaust valve seats, grounding the intake valve, replacing the intake and exhaust guides, and replacing the exhaust valve. The cylinder was then pressure checked and returned to service.

History of Flight

Enroute-descent	Loss of engine power (total) (Defining event)
Emergency descent	Off-field or emergency landing
Landing-landing roll	Nose over/nose down

Pilot Information

Certificate:	Private	**Age:**	46, Male
Airplane Rating(s):	Single-engine Land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Lap Only
Instrument Rating(s):	None	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 Without Waivers/Limitations	**Last FAA Medical Exam:**	09/03/2015
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	09/08/2015
Flight Time:	(Estimated) 195 hours (Total, all aircraft), 195 hours (Total, this make and model), 140 hours (Pilot In Command, all aircraft), 20 hours (Last 90 days, all aircraft), 10 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Pilot-Rated Passenger Information

Certificate:	Airline Transport	**Age:**	44, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	**Seat Occupied:**	Right
Other Aircraft Rating(s):		**Restraint Used:**	Lap Only
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):		**Toxicology Performed:**	No
Medical Certification:	Class 1 With Waivers/Limitations	**Last FAA Medical Exam:**	
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	8000 hours (Total, all aircraft), 1 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	CESSNA	**Registration:**	N10770
Model/Series:	150L	**Aircraft Category:**	Airplane
Year of Manufacture:	1973	**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	15075023
Landing Gear Type:	Tricycle	**Seats:**	2
Date/Type of Last Inspection:	04/16/2016, Annual	**Certified Max Gross Wt.:**	1600 lbs
Time Since Last Inspection:	11 Hours	**Engines:**	1 Reciprocating
Airframe Total Time:	6358 Hours as of last inspection	**Engine Manufacturer:**	Continental
ELT:	C91 installed, not activated	**Engine Model/Series:**	O-200-A
Registered Owner:	On file	**Rated Power:**	100 hp
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	**Condition of Light:**	Day
Observation Facility, Elevation:		**Distance from Accident Site:**	
Observation Time:		**Direction from Accident Site:**	
Lowest Cloud Condition:	Clear	**Visibility**	10 Miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	Calm /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:		**Temperature/Dew Point:**	
Precipitation and Obscuration:			
Departure Point:	Russellville, OH (GEO)	**Type of Flight Plan Filed:**	None
Destination:	Russellville, OH (GEO)	**Type of Clearance:**	None
Departure Time:	1945 EDT	**Type of Airspace:**	Class E

Airport Information

Airport:	Brown County (KGEO)	**Runway Surface Type:**	Asphalt
Airport Elevation:	958 ft	**Runway Surface Condition:**	Dry
Runway Used:	N/A	**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	Forced Landing

Wreckage and Impact Information

Crew Injuries:	1 Minor	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Minor, 1 None	**Latitude, Longitude:**	38.881944, -83.882778 (est)

Administrative Information

Investigator In Charge (IIC):	Arnold W Scott	**Report Date:**	06/20/2017
Additional Participating Persons:	Robert Craig; FAA Flight Standards District Office; Columbus, OH Matthew D Meyer; FAA Flight Standards District Office; Coulmbus, OH		
Publish Date:	06/20/2017		
Note:	The NTSB did not travel to the scene of this accident.		
Investigation Docket:	http://dms.ntsb.gov/pubdms/search/dockList.cfm?mKey=93773		