



Aviation Investigation Final Report

Location:	McClure, Ohio	Accident Number:	CEN19LA047
Date & Time:	December 16, 2018, 15:30 Local	Registration:	N3165V
Aircraft:	Rans S12	Aircraft Damage:	Substantial
Defining Event:	Loss of engine power (partial)	Injuries:	2 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot warmed the engine to 120°F before taxiing to the runway for departure on a personal flight. While the airplane was climbing through 50 to 100 ft above ground level, the engine lost partial power. He ensured the throttle control was full forward and pumped the throttle control twice, but the engine speed continued to decrease. The pilot performed an off-airport landing on a field, during which the airplane stuck a power line pole and the right wing impacted the ground. After the accident, the pilot reported the engine had low cylinder compression and scoring on the piston and cylinder walls. There were also aluminum fragments within the cylinder. He said that the engine was overhauled about 1 year before his purchase of the airplane by the previous owner. He stated that he was "fairly certain" that the engine did not have any problems before the accident flight. He said the engine radiator was not covered for cold weather operation. He believed the piston failure was due to cold seizure. According to the Rotax 2-Stroke Maintenance Schedule, the engine had a minimum coolant temperature of 150°F. Given the available information, it is likely that the engine lost partial power due to a cold seizure of the cylinder/piston.

Probable Cause and Findings

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

The cold seizure of the cylinder/piston due to the pilot's failure to adequately warm the engine before takeoff, which resulted in a loss of engine power during a departure climb.

Findings

Aircraft	Recip eng cyl section - Fatigue/wear/corrosion
Personnel issues	Use of equip/system - Pilot
Environmental issues	Pole - Contributed to outcome

Factual Information

History of Flight

Prior to flight	Miscellaneous/other
Enroute-climb to cruise	Powerplant sys/comp malf/fail
Enroute-climb to cruise	Loss of engine power (partial) (Defining event)
Emergency descent	Loss of engine power (partial)
Landing	Collision with terr/obj (non-CFIT)

On December 16, 2018, at 1530 eastern standard time, a Rans Inc. S-12XL experimental light sport airplane, N3165V, experienced a partial loss of engine power during a departure climb from the pilot's private airstrip near McClure, Ohio. The pilot subsequently performed a forced landing to a field about 100 ft north of departure end of the runway after the airplane was unable to maintain a positive climb rate. The private pilot and a passenger were uninjured and the airplane was substantially damaged on impact with terrain. The airplane was registered to and operated by the pilot under Title 14 *Code of Federal Regulations* Part 91 as a personal flight that was not operating on a flight plan. The local flight was originating at the time of the accident.

The pilot stated that after he performed a walk around inspection of the airplane and loaded the passenger and pushed the airplane outside. He started the airplane in front of hanger and allowed the engine to warm up to 120°F using an engine speed of 3,000 rpm. He taxied about 1,500 feet to the southern end of the north runway, where he performed an engine runup, checked both ignitions, and checked the flight controls. During the takeoff roll, the airplane lifted off the runway about 500 feet down the runway and climbed 50 - 100 ft above ground level at which point engine sound "backed off gradually." He ensured the throttle control was full forward and pumped the throttle control twice, but the engine speed continued to decrease. The pilot decided to perform an off-airport landing on a field which the airplane stuck a powerline pole and the right wing impacted the ground.

Following the accident, the pilot reported the engine, Rotax 582, had low cylinder compression and scoring on the piston and cylinder walls. There were also aluminum fragments within the cylinder. He said that the engine was overhauled about one year prior to his purchase of the airplane by the previous owner. He was "fairly certain" that the engine did not have any problems before the accident flight. The pilot installed a heater that used the engine's cooling system, and on the following flight after the installation, there was a differential exhaust gas temperature between two cylinders, one was high in temperature and the other cylinder was low in temperature. He said that the engine runup after the installation was normal.

The pilot stated a thermostat was installed on the coolant system and coolant was used for cabin heat. He said the engine radiator was not covered for cold weather operation. He felt the piston failure was due to cold seizure.

According to the Rotax 2-Stroke Maintenance Schedule, the Rotax 582 engine had a minimum coolant temperature of 150°F.

An Ultralight News article discussed cold seizures occurring in Rotax 532/582 engines by coolant having been cooling in the radiator, in winter in cold temperatures, which can mean that the temperature is down below 100°F. The engine on the other hand is under load and is creating heat, the pistons are expanding. As the cold liquid enters the area around the cylinders, the cylinder shrink and this causes a cold seizure.

The Federal Aviation Administration Aviation (FAA) Safety Inspector from the Cleveland Flight Standards District Office stated the pilot reported that an engine cylinder compression check was not performed when he purchased the airplane, and a cylinder compression check was not performed during the last condition inspection of the airplane. The engine was not examined by the FAA, and the engine manufacturer declined to attend an examination.

Pilot Information

Certificate:	Private	Age:	51, 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 Without waivers/limitations	Last FAA Medical Exam:	November 24, 2017
Occupational Pilot:	No	Last Flight Review or Equivalent:	March 30, 2018
Flight Time:	192 hours (Total, all aircraft), 30 hours (Total, this make and model), 192 hours (Pilot In Command, all aircraft), 9 hours (Last 90 days, all aircraft), 2 hours (Last 30 days, all aircraft)		

Passenger Information

Certificate:		Age:	Male
Airplane Rating(s):		Seat Occupied:	Right
Other Aircraft Rating(s):		Restraint Used:	
Instrument Rating(s):		Second Pilot Present:	No
Instructor Rating(s):		Toxicology Performed:	No
Medical Certification:		Last FAA Medical Exam:	
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:			

Aircraft and Owner/Operator Information

Aircraft Make:	Rans	Registration:	N3165V
Model/Series:	S12 XL	Aircraft Category:	Airplane
Year of Manufacture:	2000	Amateur Built:	
Airworthiness Certificate:	Experimental (Special)	Serial Number:	04284
Landing Gear Type:	Tricycle	Seats:	2
Date/Type of Last Inspection:	May 1, 2018 Condition	Certified Max Gross Wt.:	975 lbs
Time Since Last Inspection:		Engines:	1 Reciprocating
Airframe Total Time:	115 Hrs at time of accident	Engine Manufacturer:	Rotax
ELT:	Not installed	Engine Model/Series:	582
Registered Owner:		Rated Power:	65 Horsepower
Operator:		Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Day
Observation Facility, Elevation:	USE, 781 ft msl	Distance from Accident Site:	12 Nautical Miles
Observation Time:	13:30 Local	Direction from Accident Site:	145°
Lowest Cloud Condition:	Clear	Visibility	9 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	3 knots /	Turbulence Type Forecast/Actual:	None / None
Wind Direction:		Turbulence Severity Forecast/Actual:	N/A / N/A
Altimeter Setting:	30.01 inches Hg	Temperature/Dew Point:	6°C / 6°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	MCCLURE, OH (PVT)	Type of Flight Plan Filed:	None
Destination:	MCCLURE, OH (PVT)	Type of Clearance:	None
Departure Time:	20:30 Local	Type of Airspace:	

Airport Information

Airport:	Private PVT	Runway Surface Type:	Grass/turf
Airport Elevation:	677 ft msl	Runway Surface Condition:	Dry
Runway Used:	36	IFR Approach:	None
Runway Length/Width:	1200 ft / 60 ft	VFR Approach/Landing:	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 None	Aircraft Damage:	Substantial
Passenger Injuries:	1 None	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	2 None	Latitude, Longitude:	41.371112,-83.942222(est)

Administrative Information

Investigator In Charge (IIC):	Gallo, Mitchell
Additional Participating Persons:	Richard Pottinger; Federal Aviation Administration; Cleveland FSDO; North Olmsted, OH
Original Publish Date:	June 29, 2020
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=98794

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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](#).