



AVIATION



HIGHWAY



MARINE



RAILROAD



PIPELINE

Aviation Investigation Final Report

Location:	Rosamond, California	Accident Number:	WPR16LA047
Date & Time:	January 2, 2016, 14:30 Local	Registration:	N133SV
Aircraft:	KEVIN METZLER Velocity STD RG	Aircraft Damage:	Substantial
Defining Event:	Loss of engine power (partial)	Injuries:	1 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

Shortly after departure on the local flight, the private pilot observed that the engine temperature was higher than it had been on the previous day's flight. After reducing power, the engine began to surge, which prompted the pilot to return to the airport. Unable to maintain altitude, the pilot elected to land in a vacant field. The left wing sustained substantial damage during the landing. A postaccident examination of the engine revealed that the No. 1 connecting rod assembly had failed. Although the reason for the failure could not be determined, the fracture surfaces exhibited signatures of fatigue consistent with a malfunction of the connecting rod bearing, such as improper bearing size, rotation of the bearing during service, or operation of a severely worn bearing. Such conditions would result in higher-than-normal operating stress, and likely contributed to the propagation of the fatigue cracking.

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 failure of the No. 1 connecting rod as a result of multiple fatigue cracks for reasons that could not be determined during on postaccident examination.

Findings

Aircraft	Recip engine power section - Failure
Aircraft	Recip eng cyl section - Fatigue/wear/corrosion

Factual Information

History of Flight

Enroute-cruise	Loss of engine power (partial) (Defining event)
Emergency descent	Loss of engine power (partial)
Emergency descent	Off-field or emergency landing

On January 2, 2016, about 1430 Pacific standard time, a Kevin Metzler Velocity STD RG experimental amateur-built airplane, N133SV, was substantially damaged following a loss of engine power and subsequent forced landing about 1 mile northwest of the Rosamond Skypark Airport (L00), Rosamond, California. The private pilot, who was the owner and sole occupant of the airplane, was not injured. Visual meteorological conditions prevailed for the local flight, which was being operated in accordance with 14 Code of Federal Regulations Part 91, and a flight plan was not filed. The local flight departed L00 about 5 minutes prior to the accident.

In a report submitted to the National Transportation Safety Board (NTSB) investigator-in-charge (IIC), the pilot reported after taking off he climbed with the engine rpm set at about 4,500, "...which was well below the engines rated redline of 5,400 rpm." The pilot stated that when he reached an altitude of 7,000 ft, he noticed that the [engine] temperature was much higher than it had been the previous day, which prompted him to level off and reduce power. Shortly after the power reduction the engine began to surge; at this time the pilot decided to return to the departure airport, about 10 miles to the east of his location. The pilot reported that he attempted to maintain as much altitude as possible, and while en route the engine began to lose power, which made altitude more difficult to maintain. The pilot opined that when he realized that he would not be able to make it to the airport, he elected to land in a vacant field about one and one-half miles west of L00. After landing with the gear retracted, the airplane came to rest in an upright position.

The airplane, which was equipped with a Subaru EG-33 engine, serial number 007708, rated at 230 horsepower, had accumulated a total of 6.8 hours since its most recent overhaul; the total engine time was unknown. The pilot reported that the most recent condition inspection was performed on December 1, 2015, at a total airframe time of 66.8 hours.

An initial postaccident examination of the engine revealed that the No. 1 connecting rod assembly had failed, which resulted in the loss of power. The NTSB IIC took possession of the connecting rod assembly, in addition to two pieces that had separated from the assembly. The retained parts were shipped to the NTSB Materials Laboratory in Washington, D.C., for examination and analysis by a Senior Metallurgist. As a result of his examination, the metallurgist reported that the connecting rod assembly had fractured in four areas. An attachment bolt and nut remained attached to a fractured piece of the arm and cap portion. The second attachment bolt, a portion of the second arm, and a portion of the cap had separated from the connecting rod assembly, however, were not recovered during the investigation. Additionally, examination of the fracture faces revealed fatigue cracks emanated from multiple origins at the machined cut out area adjacent to the through-hole for each attachment bolt.

Fatigue cracks with multiple origins were also observed on the mating fracture faces. The fatigue crack origin areas were aligned and parallel to circumferential machine marks. The rough texture of the fatigue crack features was consistent with a fatigue crack that had propagated under high stress. The fatigue crack in each mating fracture propagated through at least 50% of the wall. Further, the fracture faces outside of the fatigue regions exhibited rough dimple texture features consistent with overstress separation. The round surfaces that corresponded to the location of the bearings showed evidence of rough circumferential gouge marks, but no evidence of heat tinting was observed. (Refer to the NTSB Materials Laboratory factual report, which is appended to the docket for this accident.)

On January 26, 2016, under the supervision of the NTSB IIC, an examination of the engine was performed at the facilities of Outfront Motorsport, located in Santa Ana, California. With the exception of the engine's No. 1 connecting rod assembly which had failed, and the stuck piston of the pressure relief valve on the oil pump, there were no anomalies observed with the engine that would have precluded normal operation. According to the Outfront Motorsport general manager, during normal operations the pressure relief valve opens to relieve oil pressure when it is too high, and remains closed in order to build and sustain oil pressure. When observed during the postaccident examination, the piston portion of the valve was stuck closed. When the component was liquid tested to check for leakage past the piston, the valve retained liquid, which indicated that the valve was not stuck in the open position. After the piston was forced to the open position, debris was observed in the component which had kept it closed. The debris was consistent with bearing material that had invaded the area subsequent to the engine failure.

Pilot Information

Certificate:	Private	Age:	54,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 With waivers/limitations	Last FAA Medical Exam:	August 28, 2014
Occupational Pilot:	No	Last Flight Review or Equivalent:	August 25, 2014
Flight Time:	847 hours (Total, all aircraft), 67 hours (Total, this make and model), 807 hours (Pilot In Command, all aircraft), 11 hours (Last 90 days, all aircraft), 9 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	KEVIN METZLER	Registration:	N133SV
Model/Series:	Velocity STD RG	Aircraft Category:	Airplane
Year of Manufacture:	2014	Amateur Built:	Yes
Airworthiness Certificate:	Experimental (Special)	Serial Number:	SFE-012
Landing Gear Type:	Retractable - Tricycle	Seats:	4
Date/Type of Last Inspection:	December 1, 2015 Condition	Certified Max Gross Wt.:	2500 lbs
Time Since Last Inspection:	7 Hrs	Engines:	1 Reciprocating
Airframe Total Time:	66.8 Hrs at time of accident	Engine Manufacturer:	Subaru
ELT:	C91 installed, not activated	Engine Model/Series:	EG-33
Registered Owner:	On file	Rated Power:	230 Horsepower
Operator:	On file	Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Day
Observation Facility, Elevation:	WJF,2351 ft msl	Distance from Accident Site:	8 Nautical Miles
Observation Time:	14:55 Local	Direction from Accident Site:	185°
Lowest Cloud Condition:	Clear	Visibility	10 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	8 knots / None	Turbulence Type Forecast/Actual:	/ None
Wind Direction:	60°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30.11 inches Hg	Temperature/Dew Point:	11°C / -11°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Rosamond, CA (L00)	Type of Flight Plan Filed:	None
Destination:	Rosamond, CA (L00)	Type of Clearance:	None
Departure Time:	14:25 Local	Type of Airspace:	Class E

Wreckage and Impact Information

Crew Injuries:	1 None	Aircraft Damage:	Substantial
Passenger Injuries:		Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 None	Latitude, Longitude:	34.884166,-118.211669

Administrative Information

Investigator In Charge (IIC):	Little, Thomas
Additional Participating Persons:	Anthony Miller; Federal Aviation Administration; Van Nuys, CA
Original Publish Date:	March 6, 2017
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=92533

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).