



Aviation Investigation Final Report

Location:	Lebanon, Illinois	Accident Number:	CEN12LA309
Date & Time:	May 19, 2012, 18:00 Local	Registration:	N3521A
Aircraft:	Quicksilver Sprint II	Aircraft Damage:	Substantial
Defining Event:	Loss of engine power (total)	Injuries:	2 Minor
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot reported that there were no anomalies during the before-takeoff engine run-up or when he applied power for takeoff. He stated that during the initial climb, about 35 feet above the ground, the engine suddenly lost power. The pilot reported that he reduced pitch in order to maintain airspeed but that the airplane impacted the ground in a nose-low attitude. The airplane immediately nosed over at impact, coming to rest inverted. A postaccident examination of the engine revealed that the crankshaft had fractured at the flywheel/crankshaft interface as a result of fatigue. The fracture originated from a single initiation point on the outer crankshaft surface that coincided with circumferential wear marks indicative of fretting. The observed wear marks matched those found on the flywheel and were likely the result of relative movement between the crankshaft and flywheel. The engine had accumulated 152.9 hours since new.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The total loss of engine power due to a fatigue failure of the crankshaft, attributed to the relative movement between the crankshaft and flywheel assembly.

Findings	
Aircraft	Recip engine power section - Failure
Aircraft	Recip engine power section - Fatigue/wear/corrosion
Environmental issues	Rough terrain - Contributed to outcome

Factual Information

History of Flight	
Initial climb	Loss of engine power (total) (Defining event)
Landing	Off-field or emergency landing
Landing-flare/touchdown	Roll over

On May 19, 2012, at 1800 central daylight time, a Quicksilver Sprint II experimental light-sport airplane, N3521A, was substantially damaged during a forced landing following a loss of engine power shortly after a takeoff from a private airstrip near Lebanon, Illinois. The sport pilot and passenger sustained minor injuries. The airplane was registered to and operated by the pilot under the provisions of 14 Code of Federal Regulations Part 91. Day visual meteorological conditions prevailed for the personal flight, which was operated without a flight plan. The local flight was originating at the time of the accident.

The pilot reported that there were no anomalies with the engine operation during a beforetakeoff engine check or when he applied power for takeoff. He stated that during initial climb, about 35 feet above the ground, the engine suddenly lost power. The pilot reported that he reduced pitch in order to maintain airspeed, but the airplane impacted the terrain in a nose low attitude. The airplane immediately nosed over at impact, coming to rest inverted. The fuselage, empennage, and wings were substantially damaged during the accident sequence.

The closest weather observing station was at the Scott Air Force Base/MidAmerica Airport (KBLV), located about 5 miles south-southeast of the accident site. At 1755, the KBLV automated surface observing system reported the following weather conditions: wind 180 degrees at 9 knots; visibility 10 miles; clear skies; temperature 30 degrees Celsius; dew point 15 degrees Celsius; altimeter setting 29.97 inches of mercury.

The non-certificated Hirth model 3202 engine, serial number 900607, was manufactured by Göbler-Hirth Engines Ltd in Benningen, Germany, and imported into the United States by their authorized distributor, Recreational Power Engineering of Tiffin, Ohio. The engine was sold to the owner-of-record on July 16, 2007, as a short-block engine assembly that did not include a gearbox, exhaust, electric starter, or fuel injection system. The owner reportedly transferred the additional components from another engine. The engine was installed on the accident airplane on July 30, 2007. The last conditional inspection of the airplane and engine was completed on May 20, 2011. When the accident occurred, the engine had accumulated 152.9 hours since new.

On June 01, 2012, the engine was disassembled by the owner/pilot under the supervision of inspectors with the Federal Aviation Administration. The engine disassembly revealed that the crankshaft had fractured at the flywheel/crankshaft interface. The crankshaft and flywheel

assemblies were sent to the National Transportation Safety Board's (NTSB) Materials Laboratory Division for metallurgical examination. The crankshaft fracture surface contained crack arrest marks and tear ridges indicative of fatigue. The direction of the observed crack arrest marks revealed a single initiation point on the outer crankshaft surface. The location of the fracture origin coincided with wear marks, consistent with fretting, in a circumferential manner on the outer surface of the crankshaft. The observed wear marks matched those found on the flywheel female taper, consistent with relative movement between the crankshaft and flywheel. Mechanical smearing and chipping damage precluded further examination of the fracture origin. The fatigue fracture propagated through about 90-percent of the crankshaft cross-section. The remaining 10-percent of the crankshaft cross-section exhibited features consistent with overstress. Circumferential wear patterns were noted on the inner surface of the flywheel cylindrical magnet, which also contained accumulated metallic debris.

Pilot Information

Certificate:	Sport Pilot	Age:	51,Male
Airplane Rating(s):	Single-engine land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	
Instrument Rating(s):	None	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Sport pilot None	Last FAA Medical Exam:	
Occupational Pilot:	No	Last Flight Review or Equivalent:	May 22, 2010
Flight Time:	225 hours (Total, all aircraft), 89 hours (Total, this make and model), 205 hours (Pilot In Command, all aircraft), 2 hours (Last 90 days, all aircraft), 1 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Quicksilver	Registration:	N3521A
Model/Series:	Sprint II	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	
Airworthiness Certificate:	Experimental light sport (Special)	Serial Number:	A10KAS
Landing Gear Type:	Tricycle	Seats:	2
Date/Type of Last Inspection:	May 20, 2011 Condition	Certified Max Gross Wt.:	1080 lbs
Time Since Last Inspection:		Engines:	1 Reciprocating
Airframe Total Time:	956 Hrs at time of accident	Engine Manufacturer:	Hirth
ELT:	Installed, activated, did not aid in locating accident	Engine Model/Series:	3203
Registered Owner:	On file	Rated Power:	65 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:	KBLV,459 ft msl	Distance from Accident Site:	5 Nautical Miles
Observation Time:	17:55 Local	Direction from Accident Site:	165°
Lowest Cloud Condition:	Clear	Visibility	10 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	9 knots / None	Turbulence Type Forecast/Actual:	/
Wind Direction:	180°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	29.96 inches Hg	Temperature/Dew Point:	30°C / 15°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Lebanon, IL (PVT)	Type of Flight Plan Filed:	None
Destination:	Lebanon, IL (PVT)	Type of Clearance:	None
Departure Time:	18:00 Local	Type of Airspace:	Class G

Airport Information

Airport:	Private Airstrip PVT	Runway Surface Type:	Grass/turf
Airport Elevation:	500 ft msl	Runway Surface Condition:	Dry
Runway Used:	09	IFR Approach:	None
Runway Length/Width:	980 ft / 40 ft	VFR Approach/Landing:	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 Minor	Aircraft Damage:	Substantial
Passenger Injuries:	1 Minor	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	2 Minor	Latitude, Longitude:	38.610279,-89.871391(est)

Administrative Information

Investigator In Charge (IIC):	Fox, Andrew
Additional Participating Persons:	Douglas Makurat; Federal Aviation Administration - St. Louis FSDO; St. Ann, MO
Original Publish Date:	August 29, 2012
Last Revision Date:	
Investigation Class:	<u>Class</u>
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=83716

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 <u>here</u>.