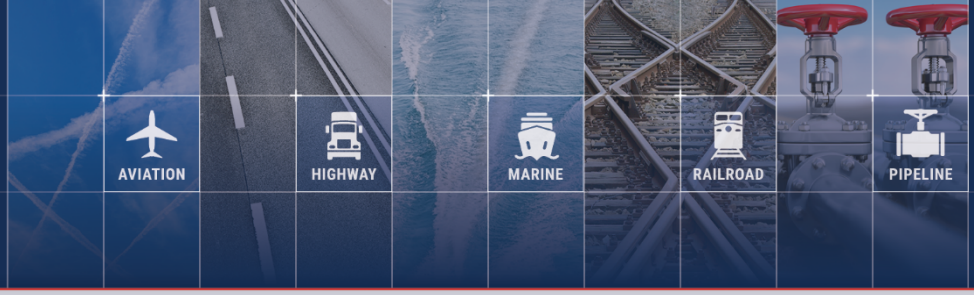

Aviation Investigation Final Report

Location:	Phoenix, Arizona	**Accident Number:**	WPR18LA181
Date & Time:	June 26, 2018, 10:20 Local	**Registration:**	N154ME
Aircraft:	Cessna 172S	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (total)	**Injuries:**	1 Minor, 2 None
Flight Conducted Under:	Part 91: General aviation		

Analysis

While maneuvering during a local instructional flight, the engine began running rough, and the instructor decided to return to the airport. The engine subsequently lost total power and the propeller stopped rotating. The instructor performed a forced landing to a clearing where the airplane nosed over, resulting in substantial damage.

Examination of the engine revealed that the crankshaft was fractured at the No. 4 connecting rod journal. The fracture surface was flat and crack arrest lines were consistent with a fatigue fracture which initiated subsurface. No flaws or embedded particles were observed at the site of the fatigue initiation.

The engine was overhauled about 3 years before the accident and had accumulated 2,798 hours of operation since the overhaul.

Probable Cause and Findings

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

A total loss of engine power due to crankshaft failure as the result of a subsurface fatigue crack.

Findings

Aircraft	(general) - Fatigue/wear/corrosion

Factual Information

History of Flight

Maneuvering	Loss of engine power (total) (Defining event)
Landing-landing roll	Collision during takeoff/land

On June 26, 2018, about 1020 mountain standard time, a Cessna 172SP airplane, N154ME, was substantially damaged when it was involved in an accident near Phoenix, Arizona. The pilot received minor injuries; the student pilot and one student pilot passenger were not injured. The airplane was operated as a Title 14 *Code of Federal Regulations Part 91* instructional flight.

The flight instructor reported that, while maneuvering about 5,000 ft mean sea level (msl), the vacuum annunciator light illuminated, and he immediately experienced engine roughness. The pilot decided to depart the practice area and return to the airport but did not declare an emergency or report the engine roughness to the tower controller, because he "didn't anticipate" an engine failure. The instructor positioned the fuel mixture to full rich and turned on the fuel boost pump switch; however, the engine continued to run rough during the return flight. About 8 miles northwest of the airport, the tower controller instructed the pilot to perform a left 360° turn. After completing the turn, the engine lost all power and the propeller stopped rotating. The instructor configured the airplane for best glide and located a forced landing site. During the landing roll, the airplane impacted rocks and vegetation and nosed over.

An examination of the engine revealed that the crankshaft fractured separated at the No. 4 connecting rod journal. The No. 4 connecting rod was separated at the I-beam near the piston attachment and moved freely on the crankshaft. The fractured crankshaft was examined at the NTSB Materials Laboratory. The fracture surface was relatively flat, with crack arrest lines extending from close to the outer diameter of the journal on the web side. The crack arrest lines propagated from a subsurface location about 0.05 inches inboard of the outer diameter. The flat fracture surface and crack arrest lines were consistent with fatigue fracture. No flaws or embedded particles were observed at the site of the fatigue initiation.

The engine was overhauled and installed on the accident airplane in May 2015. At the time of the accident, the engine had 2,798 hours of operation since the overhaul.

Pilot Information

Certificate:	Commercial; Flight instructor	**Age:**	31,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane single-engine; Instrument airplane	**Toxicology Performed:**	No
Medical Certification:	Class 1 With waivers/limitations	**Last FAA Medical Exam:**	July 27, 2015
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	June 21, 2018
Flight Time:	584 hours (Total, all aircraft), 484 hours (Total, this make and model), 453 hours (Pilot In Command, all aircraft), 72 hours (Last 90 days, all aircraft), 45 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N154ME
Model/Series:	172S S	**Aircraft Category:**	Airplane
Year of Manufacture:	2000	**Amateur Built:**	
Airworthiness Certificate:	Normal; Utility	**Serial Number:**	172S8534
Landing Gear Type:	Tricycle	**Seats:**	4
Date/Type of Last Inspection:		**Certified Max Gross Wt.:**	2299 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:		**Engine Manufacturer:**	
ELT:		**Engine Model/Series:**	
Registered Owner:		**Rated Power:**	180 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	Pilot school (141)

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KDVT,1455 ft msl	**Distance from Accident Site:**	6 Nautical Miles
Observation Time:		**Direction from Accident Site:**	154°
Lowest Cloud Condition:	Clear	**Visibility**	
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.92 inches Hg	**Temperature/Dew Point:**	34°C / 1°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Phoenix, AZ (DVT)	**Type of Flight Plan Filed:**	None
Destination:	Phoenix, AZ (DVT)	**Type of Clearance:**	None
Departure Time:	09:20 Local	**Type of Airspace:**	Class G

Airport Information

Airport:	Phoenix Deer Valley DVT	**Runway Surface Type:**	
Airport Elevation:	1478 ft msl	**Runway Surface Condition:**	Unknown
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Minor	**Aircraft Damage:**	Substantial
Passenger Injuries:	2 None	**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	1 Minor, 2 None	**Latitude, Longitude:**	33.784168,-112.137779(est)

Administrative Information

Investigator In Charge (IIC):	Swick, Andrew		
Additional Participating Persons:	John Schroeder; FAA-FSDO; Scottsdale, AZ		
Original Publish Date:	July 15, 2021	**Investigation Class:**	3
Note:	The NTSB did not travel to the scene of this accident.		
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=97625		