Aviation Investigation Final Report

Location:	Sedona, Arizona	**Accident Number:**	LAX05LA002
Date & Time:	October 2, 2004, 10:25 Local	**Registration:**	N43064
Aircraft:	Classic Aircraft Corp WACO YMF	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	3 None
Flight Conducted Under:	Part 91: General aviation - Other work use		

Analysis

The engine lost partial power during flight, and the airplane collided with a vehicle during a forced landing on a road. The pilot was performing a local for hire sightseeing flight for two passengers. Approximately 15 minutes into the flight, a loud "popping" noise was heard coming from the engine. The pilot was unable to maintain altitude and force landed on a city street. During the landing roll, the right wing impacted a car on the road. Post accident examination of the engine revealed that the number 7 cylinder exhaust valve rocker arm had failed in fatigue. The surface fracture initiation marks were consistent with a grinding operation during manufacture. The grinding operation is performed to remove any flash remaining at the mold parting line, after the casting operation, and is normally carried out by holding the part by hand and guiding it on a large grinding wheel.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: a loss of engine power due to the fatigue fracture of the number 7 cylinder exhaust rocker arm as a result of a grinding operation during manufacture.

Findings

Occurrence #1: LOSS OF ENGINE POWER(PARTIAL) - MECH FAILURE/MALF
Phase of Operation: CRUISE - NORMAL

Findings

1. (C) ENGINE ASSEMBLY,ROCKER ARM/TAPPET - FATIGUE
2. (C) PROCEDURE INADEQUATE - MANUFACTURER
3. (C) ENGINE ASSEMBLY,ROCKER ARM/TAPPET - FRACTURED

Occurrence #2: FORCED LANDING
Phase of Operation: DESCENT - EMERGENCY

Occurrence #3: ON GROUND/WATER COLLISION WITH OBJECT
Phase of Operation: EMERGENCY LANDING

Findings
4. OBJECT - VEHICLE

Factual Information

On October 2, 2004, at 1025 mountain standard time, a Classic Aircraft Corporation WACO YMF biplane, N43064, lost engine power and collided with a vehicle during a forced landing on a city street in Sedona, Arizona. Solid Edge Aviation, d.b.a. Red Rock Biplane Tours/Safari Air Tours, was operating the for hire sightseeing flight under the provisions of 14 CFR Part 91. The airline transport pilot and two passengers were not injured; the airplane sustained substantial damage. The airplane departed from the Sedona Airport about 1000 for the local area sightseeing flight. Visual meteorological conditions prevailed, and no flight plan had been filed.

According to the pilot, the tour was to be 30 minutes in duration. After approximately 10 minutes, the pilot heard a loud backfire and the airplane would not maintain altitude. The pilot glided down to a city street and prepared for landing. During the landing roll, the right wing struck a vehicle.

The airplane was equipped with an onboard video recording system that was used to provide customers with a video record of their sightseeing flight. The video was sent to the National Transportation Safety Board Vehicle Recorder Division for review. Two cameras were mounted under the left wing. One was facing rearward with a view of the passengers, and the other camera had a view straight ahead of the airplane. One camera view was recorded at one time, and the video switched between the views approximately every 12 seconds. Audio was recorded through the airplane's intercom system. Approximately 15 minutes into the video recording, the engine made "popping" sounds. The pilot's narration of the flight ends mid-sentence and his voice was not heard for the remainder of the flight. The pilot proceeded toward a town [Sedona] and prepared for landing on a four-lane road with traffic. The engine continued "popping" as the airplane touched down. During the landing roll, the airplane appeared to strike an object, turned 90 degrees to the right, and then came to a full stop.

Post accident examination of the airplane's engine revealed that the number 7 cylinder exhaust valve rocker arm was fractured. The rocker arm was sent to the Safety board Materials Laboratory for further examination. The rocker is constructed of a boss, which contains a bearing into which a rocker shaft is inserted, into two arms. One arm, identified as the pushrod arm, has a spherical seat into which the matching end of a pushrod is located, and the other arm, identified as the valve arm, has a roller that contacts the stem portion of the valve. The fracture was inboard of the pushrod arm portion where it connects to the rocker boss. Examination of the pushrod arm and boss portion displayed crack arrest marks of fatigue that matched each other. The metallurgist determined that the fracture surface marks were consistent with a grinding operation used to remove extra material (commonly referred to as flash) that can occur at the mold parting line. The mold parting line is the centerline of a part that is uniform on both sides of it. The full metallurgical report is included in the docket.

Pilot Information

Certificate:	Airline transport; Commercial	**Age:**	51,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Rear
Other Aircraft Rating(s):	Glider	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	June 1, 2004
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	December 1, 2003
Flight Time:	3500 hours (Total, all aircraft), 1300 hours (Total, this make and model), 3300 hours (Pilot In Command, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Classic Aircraft Corp	**Registration:**	N43064
Model/Series:	WACO YMF	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	FS-062
Landing Gear Type:	Tailwheel	**Seats:**	3
Date/Type of Last Inspection:	September 1, 2004 100 hour	**Certified Max Gross Wt.:**	2900 lbs
Time Since Last Inspection:	50 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	2985 Hrs at time of accident	**Engine Manufacturer:**	Jacobs
ELT:	Installed, not activated	**Engine Model/Series:**	R755-B2M
Registered Owner:	Dakota Territory Tours	**Rated Power:**	205 Horsepower
Operator:	Solid Edge Aviation dba Red Rock Biplane Tours	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	PRC,5045 ft msl	**Distance from Accident Site:**	32 Nautical Miles
Observation Time:	10:53 Local	**Direction from Accident Site:**	69°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	3 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.27 inches Hg	**Temperature/Dew Point:**	22°C / -1°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Sedona, AZ (SEZ)	**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	None
Departure Time:	10:00 Local	**Type of Airspace:**	

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	2 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	3 None	**Latitude, Longitude:**	34.852222,-111.795555

Administrative Information

Investigator In Charge (IIC):	Dunks, Kristi
Additional Participating Persons:	John Eller; Federal Aviation Administration; Scottsdale, AZ
Original Publish Date:	February 28, 2006
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=60277

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.