Aviation Investigation Final Report

Location:	Chandler, Arizona	**Accident Number:**	LAX02FA188
Date & Time:	June 8, 2002, 07:30 Local	**Registration:**	N8205H
Aircraft:	Fisher Celebrity	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

During cruise flight, both of the left wings of the amateur built experimental biplane separated in flight. The airplane fuselage was a metal frame, and the empennage and wings were fabric covered wood. The pilot had contacted a friend, who was also constructing a Celebrity, a few weeks before the accident concerning loose fabric on the airplane's wings. The friend told the pilot not to fly the airplane until the loose fabric issue had been addressed. According to the friend, the pilot washed the airplane, let it dry in the sun, and noted that the loose fabric tightened up. The pilot believed that the loose fabric issue had been resolved. Various wing components were examined and compared with the building instructions and plan drawings. The examination revealed fracture features indicating that the wings failed in a positive overload event. No evidence of preexisting cracks or deteriorated wood was found. However, the comparison with the design revealed that the construction of the spars did not comply with their design drawings. In particular, the spars did not contain stiffener blocks adjacent to the upper and lower caps, and the filler blocks ended abruptly in a vertical line instead of tapering to the upper and lower caps. The filler blocks were thinner than specified in the plans and occupied 50 percent of the space between the spar caps instead of all the void. The filler blocks were also shorter than plan specification and did not taper according to the plan. Both of these conditions would reduce the load carrying capacity of the wing, especially in compression. The failure location was primarily at the outboard end of the filler blocks. No material defects were found during the examination.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: failure of the wing spars and the in-flight separation of the aircraft wing due to the builder's inadequate manufacture of this experimental aircraft. Also causal was the current

owner/pilot's continued flight with known mechanical discrepancies.

Findings

Occurrence #1: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION
Phase of Operation: CRUISE

Findings
1. (C) WING,SPAR - INADEQUATE
2. (C) AIRCRAFT/EQUIPMENT INADEQUATE - OWNER/BUILDER
3. WING,SKIN - LOOSE
4. (C) OPERATION WITH KNOWN DEFICIENCIES IN EQUIPMENT - CONTINUED - PILOT IN COMMAND
5. WING - FAILURE

Occurrence #2: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Findings
6. TERRAIN CONDITION - GROUND

Factual Information

HISTORY OF FLIGHT

On June 8, 2002, about 0730 mountain standard time, a single engine experimental Fisher Celebrity biplane, N8205H, impacted flat desert terrain after the left wings separated from the fuselage near Chandler, Arizona. The airplane, owned and operated by the pilot under the provisions of 14 CFR Part 91, was destroyed. The private pilot and one passenger were fatally injured. Visual meteorological conditions prevailed for the local area flight that departed the Stellar Airpark Airport (P19), Chandler, at an unknown time. No flight plan had been filed. The flight was scheduled to terminate at P19.

Witnesses in the area indicated that they heard a "pop" and sputtering of an engine. When they looked up into the air, they saw the accident airplane with the left wings folded back. Witness also stated that the airplane was disintegrating in the air.

According to a witness, who was outside her house, the airplane was flying in a southerly direction. She looked up because she heard the airplane fly overhead and it sounded like it was really close to the ground. She saw the airplane in a nose high attitude, with one of the wings parallel to the airplane. The witness stated that she saw the nose drop; the wings folded, and then she watched the airplane spiral to the ground.

PERSONNEL INFORMATION

A review of Federal Aviation Administration (FAA) airman records revealed the pilot held a private pilot certificate with an airplane single engine land rating. The pilot received his private pilot certificate on June 5, 2002.

The pilot held a third-class medical certificate issued on December 26, 2001. It had no limitations or waivers.

No personal flight records were located for the pilot. The aeronautical experience listed was obtained from a review of the airmen FAA records on file in the Airman and Medical Records Center, Oklahoma City, Oklahoma. On his Airman Certificate and/or Rating Application (FAA Form 8710), dated June 5, 2002, the pilot reported a total time of 65 hours.

AIRCRAFT INFORMATION

The airplane was a Fisher Celebrity, serial number AVI001, and was first issued an experimental airworthiness certificate in 1989. A Teledyne Continental Motors A & C65 Series engine was installed on the airplane. The airplane logbooks were not available for review.

A witness submitted a written statement indicating that the pilot had purchased the airplane around October 2001. The witness was in the process of building the same airplane. The pilot did not receive original construction plans with the airplane, so he would call the witness, and ask him questions about the airplane. About 3 weeks prior to the accident the witness received a call from the pilot. The pilot wanted to know what guidance the new kit owners (Fisher Flying Products) provided with regards to rib stitching of the wing fabric.

The witness stated that the pilot informed him that the wing fabric was delaminating. The witness told the pilot that Fisher Flying Products only required that the fabric be glued to the wing ribs. The witness also gave him the telephone number to Fisher Flying Products technical support, and recommended that he ground the airplane until he had the matter resolved.

About 4 days later the witness contacted the pilot to ask if he had spoken to anyone at the factory. The pilot replied that he had washed the airplane and "it looked a lot better." The witness told him that washing the airplane would not tighten the fabric. The witness also told him that he had left over fabric from his kit and could help him [the pilot] recover the wings and help him rib stitch the fabric. The witness reported that the accident occurred a week later.

Another witness reported that he felt the fabric covering was not as tight as it could have been near the front horizontal stabilizer. He also indicated that he was not comfortable flying it, but did not believe that the "cover presented a danger."

WRECKAGE AND IMPACT INFORMATION

The airplane impacted terrain in an open field. An FAA inspector examined the airplane on-scene. He noted paint chips and leading edge rib pieces from one of the wings were located 1/4-mile north of the accident site. A portion of a wing spar came to rest about 30 feet from the accident site. Pieces of the airplane were also found on the rooftops of houses that were along the airplane's route of flight. The FAA inspector noted that both of the left wings separated from the airplane and from each other. Both of the right wings remained connected to the fuselage as well as to each other. The flight control cables for the right wings, rudder, and elevator remained connected to the cockpit controls.

MEDICAL AND PATHOLOGICAL INFORMATION

The Pima County Coroner conducted an autopsy on the pilot on June 10, 2002. The FAA Toxicology and Accident Research Laboratory, Oklahoma City, performed a toxicological analysis from samples obtained during the autopsy. The results of the analysis of the specimens were negative for carbon monoxide, cyanide, volatiles, and tested drugs.

TESTS AND RESEARCH

The Safety Board investigator-in-charge (IIC) inspected the airplane at Air Transport on June 13, 2002. Flight control continuity was established from the cabin to the rudder and elevator. The fuselage structure was constructed of metal, while the empennage, tail section, and wings were predominately comprised of wood.

During the inspection the IIC noted that the paint on the fabric of the upper and lower left and right wings was chipped. The inner fabric of the wings was painted with a silver dope. The silver dope is utilized to protect the wings from ultra violet rays and strengthens the fabric.

The upper and lower left wings, connected together via an interplane strut, had separated, and both wings separated from the fuselage. The fabric for both of the upper and lower left wings separated in numerous places. A majority of the wing ribs and wing spar was not present in the upper left wing. The leading edge spar of the lower left wing remained attached to the fabric; however, wing ribs and portions of the wing spar were missing.

The interplane strut for the upper and lower right wings remained connected. Both wings remained attached to their respective fuselage attachment struts. The bottom portion of the upper right wing was split open at the trailing edge. The upper right wing also split open at the leading edge and retained its spar as well as pieces of the rib. Some of the ribs were detached and lying on the inside of the wing; other ribs remained attached to the wing skin.

A portion of one of the propeller blades remained attached to the propeller hub. The blade was broken in several places with jagged and splintered breaks. The other propeller blade was missing; however, there were splintered pieces of the blade still attached to the propeller hub. The propeller assembly remained connected to the crankshaft. The engine remained attached to the engine mounts.

Inboard pieces of the four wooden spars, a portion of an upper wing, portions of the upper wing attachment framework, and a portion of wing tip with attached fabric were sent to the National Transportation Safety Board Materials Laboratory, Washington, D.C., for further examination. The examination and a review of the kit drawings revealed that the only common components were the spar cap, the web, and the attachment fittings. The kit drawing indicated that the spar cap stiffeners were to be rectangular in shape and run the full length of the spar. The accident airplane's spar cap stiffeners were triangular in shape and terminated at the outer end of the filler blocks. According to the drawing, the filler blocks were to fill all of the space between the spar cap stiffeners. The filler blocks on the accident aircraft were thinner and occupied approximately 50 percent of the space between the spar caps. The filler blocks were also shorter than specified and did not taper at the upper and lower spar cap stiffeners as specified. A ply cap specified in the kit drawings was not installed on the accident airplane. The failure location was primarily at the outboard end of the filler blocks.

According to the Safety Board materials laboratory engineer, the spar fracture surfaces were jagged in appearance and were consistent with an overload event. He further reported that there was no discoloration of the fracture surfaces, which could have indicated a preexisting

condition.

The drawings revealed that there was no specification of wood type to be used for the solid components of the spars; however, most of the other components were specified as plywood. The comparison of the kit drawings with the accident airplane's spars showed that the construction of the spars did not comply with the design drawings for the airplane. According to the Safety Board materials laboratory engineer, the lack of stiffener blocks adjacent to the upper and lower caps, the reduced amount of filler blocks and the filler blocks not tapering at the upper and lower caps, would reduce the load carrying capacity of the wing, especially in the compression (upwards) direction.

The upper spar pieces and wing tip frame were also sent to the United States Department of Agriculture Forest Product Laboratory (FPL), Madison, Wisconsin, for fracture evaluation and wood identification.

According to the FPL the wood for the wing tip was white pine. The plywood sheets (webs and filler blocks) were birch, and the flanges (spar caps) and core material (spar cap stiffeners) for the spars were Sitka Spruce.

The Research General Engineer for FPL reported that the fracture surfaces of the spars were consistent with the left wing "being forced back up and inward," and the right wing "being forced down," with the front spar "being twisted counter clockwise looking inboard from the tip." The wing tip failures appeared to have "failed in a number of different directions."

ADDITIONAL INFORMATION

The IIC released the wreckage to the owner's representative on July 9, 2002. Components retained for further examination were released to the owner's representative on November 20, 2003.

Pilot Information

Certificate:	Private	**Age:**	39,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Rear
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	December 26, 2001
Occupational Pilot:	UNK	**Last Flight Review or Equivalent:**	June 5, 2002
Flight Time:	65 hours (Total, all aircraft), 24 hours (Pilot In Command, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Fisher	**Registration:**	N8205H
Model/Series:	Celebrity	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	Yes
Airworthiness Certificate:	Experimental (Special)	**Serial Number:**	AVI001
Landing Gear Type:	Tailwheel	**Seats:**	2
Date/Type of Last Inspection:	Unknown	**Certified Max Gross Wt.:**	1230 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:		**Engine Manufacturer:**	Continental
ELT:	Installed, not activated	**Engine Model/Series:**	A&C65 Series
Registered Owner:	Joseph P. Carter	**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:	CHD,1243 ft msl	**Distance from Accident Site:**	5 Nautical Miles
Observation Time:	07:50 Local	**Direction from Accident Site:**	150°
Lowest Cloud Condition:	Clear	**Visibility**	35 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	5 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.7 inches Hg	**Temperature/Dew Point:**	29°C / 8°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Chandler, AZ (P19)	**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	None
Departure Time:		**Type of Airspace:**	Class G

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	1 Fatal	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	33.205276,-111.752502

Administrative Information

Investigator In Charge (IIC):	Cornejo, T.
Additional Participating Persons:	Steve D'Urso; Federal Aviation Administration; Scottsdale, AZ
Original Publish Date:	September 13, 2005
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=54899