Aviation Investigation Final Report

Location:	Mesquite, Texas	**Accident Number:**	FTW02LA187
Date & Time:	June 23, 2002, 17:30 Local	**Registration:**	N14VK
Aircraft:	Lidster Wittman Tailwind W-8	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The homebuilt airplane was destroyed following an in-flight separation of the left wing in level flight, and the subsequent uncontrolled flight into terrain. The outboard 2 feet of the left wing with the left wing spar was found approximately 300 yards from the main wreckage. The NTSB Metallurgist examination of the wing revealed fracture features indicating that the main spar failed in an overload event. The fracture on the left wing appeared to initiate at the root end, and the root fractures were created by compression loads, indicative of upward aerodynamic loading. No evidence of preexisting cracks or deteriorated wood was found and the spars were manufactured from the specified material. The comparison with the design revealed that the wings were 16 inches (2 ribs voids) short and the location and angle of the wing support strut had been adjusted to account for the shorter wing. The misalignment of the strut attachment fittings and the root attachment fittings on the spar suggest that the holes had been drilled before the wing was fitted for the aircraft. The location of the remaining root attachment hole suggest that the wing was built for a different aircraft and installed on the accident aircraft. The effect of the improper wing, wing overall length, improper attachment at the wing strut locations, and improper root configuration and attachments on the wing failures is unknown. However, since the fractures appear to have started at the root, the out-of-specification features associated with the root may have had the most effect. The airplane was built from 1995 to 1999. On December 2, 1999, the FAA Registration Certificate was issued to the builder/pilot. There were no builder or maintenance records available to the Safety Board, and the history of the left wing and spar could not be determined.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The in-flight separation of the outboard portion of the left wing due to the failure of the wing

spar resulting from the builder's improper installation of a wing that did not meet the drawing specifications.

Findings

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

Findings
1. (C) MAINTENANCE - INADEQUATE - OWNER/BUILDER
2. (C) WING,SPAR - FAILURE,TOTAL
3. (C) WING - SEPARATION

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

Findings
4. AIRCRAFT CONTROL - NOT POSSIBLE - PILOT IN COMMAND
5. TERRAIN CONDITION - GROUND

Factual Information

On June 23, 2002, approximately 1730 central daylight time, a Lidster Wittman Tailwind W-8, experimental amateur-built airplane, N14VK, was destroyed following an in-flight separation of the left wing during cruise flight near Mesquite, Texas. The airplane was owned and operated by the builder/pilot under Code of Federal Regulations Part 91. The private pilot received fatal injuries. Visual meteorological conditions prevailed, and a flight plan was not filed for the local flight. The personal flight departed the Mesquite Metro Airport at an unknown time.

Local authorities and the FAA inspector, who responded to the site, found the airplane resting nose down on the ground at the base of 30-foot trees. The engine was found in a crater near the main wreckage. The outboard 2 feet of the left wing and the left wing spar were found approximately 300 yards from the main wreckage. The outboard portion of the left wing and spar were forwarded to the NTSB Materials Laboratory for examination.

On May 12, 1987, the pilot was issued the FAA Private Pilot Certificate with the airplane single-engine land rating. The most recent third class medical certificate was issued to the pilot on October 25, 2000, with the limitation "Must have available glasses for near vision." On the medical application form, the pilot's accumulated flight time was reported as 1,875 hours.

A review of the FAA records revealed that in 1995, the pilot purchased the plans for building the airplane. On December 2, 1999, the FAA Registration Certificate for the Lidster Wittman Tailwind W-8 airplane N14VK, serial number 14808, was issued. On December 21, 1999, the Continental TSIO-200 engine and the Clark Lydick 3-blade propeller were installed. The FAA Special Airworthiness Certificate with operating limitations was issued to the builder/pilot on October 1, 2001, by a FAA Designated Airworthiness Representative (DAR). The operating limitations required 40 hours of flight conducted within a described geographical area from HQZ. On October 5, 2002, the FAA Repairman Experimental Aircraft Builder Certificate with the limitation "inspection certificate for experimental aircraft make Lidster/Wittman Model W-8 tailwind, serial number 14808, certification date: 01 October 2001" was issued to the builder/pilot. There were no builder or maintenance records available to the Safety Board, and the history of the left wing and spar could not be determined.

According to the FAA inspector, the "aircraft had been repaired after a mishap during an initial high speed taxi test which resulted in damage to one wing and landing gear. The builder/pilot did not have the aircraft re-inspected [by the FAA] prior to the accident flight."

The autopsy for the pilot was performed by the Southwest Institute of Forensic Sciences at Dallas, Texas. Toxicological testing was performed by the FAA Civil Aeromedical Institute's (CAMI) Forensic Toxicology and Accident Research Center at Oklahoma City, Oklahoma. The toxicological tests were positive for ethanol, acetaldehyde, N-propanol, and N-butanol. The

FAA Southwest Regional Flight Surgeon stated that these toxicological findings were "not significant."

The NTSB metallurgist examined the left wing main spar, left wing tip, and right wing main spar. Measurements indicated that all the rib centers were located 8-inches apart, and the rib voids (spaces between adjacent ribs) totaled 12. Examination of the Tailwind W-8 wing drawings revealed that the wing is specified to have 14 rib voids with the rib centers located 8-inches apart. This indicates that the accident aircraft's wing, with 12 rib voids, was short by 2 rib voids or 16 inches. The Tailwind W-8 wing drawing indicates a rounded forward corner at the wing tip and a right-angled rear corner at the wing tip. The wing tip from the accident airplane displayed a diagonal forward corner and a notched rear corner. The Tailwind W-8 drawings indicate the specified location, in rib void 6. Differences in attachment hole locations, fitting locations, and construction were revealed when the strut areas of both main spars were compared to the Tailwind W-8 drawings.

The distance between the fitting mounting holes was specified on the drawing as 3 3/8 inches, and on the main spar the same distance was measured at 2.2 inches. The distance from the upper mounting hole to the adjacent rib was specified on the drawing as 5/8 inch, and on the main spar the same distance was measured at 1.0-inch. The alignment angle of the mounting holes was specified as "approx. 35 degrees, align perfectly with strut". Measurement on the main spar indicate that the alignment angle was 35-degrees but, the strut fitting had left a pattern indicating that the holes in the fitting were not along its centerline and, therefore, not aligned with the strut. The drawing specified that the triangular blocks on both sides of the fitting were to be left out, but they had been installed on the accident aircraft's main spar.

The main spar root fitting details were extracted from the Tailwind W-8 drawing. The distance between the center of the outboard root fitting attachment hole and the lower edge of the spar was specified in the drawing as 1 11/16 inches, and the distance on the main spar was measured at 1.23 inches. Calculations, using dimensions from Tailwind W-8 drawings, indicated that the same hole was 15/16-inch from the center of the adjacent rib, and same distance on the main spar was measured at 2.04 inches. The upper edge of the root attachment fitting which, due to its tapered design, was inclined (by calculation) at 1.4-degrees downward relative to the horizontal axis of the spar. Measurements on the spar indicated that the upper edge was inclined 12-dgrees upward.

The examination revealed that there were no indications of any preexisting cracks or deterioration of the wood.

The spar pieces and the wing tip were shipped to the US Department of Agriculture, Forest Products Laboratory in Madison, Wisconsin, for identification and fracture examination. Before the failure surfaces were examined, shavings were removed from the spars to prepare section slides. Utilizing a light microscope to identify the wood species, it was determined that the characteristics of the cellular structure were consistent with those of Sitka Spruce (Picea sitchensis).

Examination of the failure surfaces of the left main wing spars (forward and aft) exhibited features consistent with the bottom forward portion being in compression and the top aft portion being in tension. The failure surface on the examined portion of the top inboard left wing spar suggest that the spar was split, failing perpendicular to the grain. No evidence of preexisting cracks or deteriorating wood was found and the spars were manufactured from the specified material.

Pilot Information

Certificate:	Private	**Age:**	56,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	
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--w/ waivers/lim	**Last FAA Medical Exam:**	October 25, 2000
Occupational Pilot:	UNK	**Last Flight Review or Equivalent:**	May 18, 2002
Flight Time:	1875 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Lidster	**Registration:**	N14VK
Model/Series:	Wittman Tailwind W-8	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	Yes
Airworthiness Certificate:	Experimental (Special)	**Serial Number:**	14808
Landing Gear Type:	Tailwheel	**Seats:**	2
Date/Type of Last Inspection:	September 21, 2001 Condition	**Certified Max Gross Wt.:**	1552 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:		**Engine Manufacturer:**	Continental
ELT:		**Engine Model/Series:**	TSIO-200
Registered Owner:	Richard E. Lidster	**Rated Power:**	200 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:	TRL,474 ft msl	**Distance from Accident Site:**	15 Nautical Miles
Observation Time:	16:53 Local	**Direction from Accident Site:**	105°
Lowest Cloud Condition:	Few / 10000 ft AGL	**Visibility**	8 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	0 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	0°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	32°C / 17°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Mesquite, TX (HQZ)	**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	
Departure Time:		**Type of Airspace:**	

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	32.746944,-96.530555

Administrative Information

Investigator In Charge (IIC):	Roach, Joyce
Additional Participating Persons:	Horace O Abbott; FAA FSDO; Dallas, TX
Original Publish Date:	March 2, 2004
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=55022