Aviation Investigation Final Report

Location:	Lakeland, Florida	**Accident Number:**	ERA19LA078
Date & Time:	December 22, 2018, 10:12 Local	**Registration:**	N587BL
Aircraft:	BRM Aero Bristell S-LSA	**Aircraft Damage:**	Destroyed
Defining Event:	Aerodynamic stall/spin	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Instructional		

Analysis

The solo student pilot had completed two touch-and-go landings at his home airport in crosswind conditions. During the approach for the third touch-and-go landing, the air traffic controller instructed the pilot to fly a right closed traffic pattern, rather than a standard left traffic pattern (which was performed during the two previous touch-and-go landings), to avoid a potential conflict with another airplane. The pilot acknowledged the instruction. Surveillance video showed that, after the third touch-and-go landing, the airplane began a steep climb along the runway heading, gained altitude rapidly, entered a rapidly descending left turn, and impacted terrain in a near-vertical pitch-down attitude. Although a postcrash explosion and fire consumed most of the airplane, examination of the remaining airplane wreckage found no evidence of a preimpact mechanical malfunction or failure that would have precluded normal operation.

The airplane's increased angle of attack and high rate of climb likely led to an exceedance of the critical angle of attack, causing an aerodynamic stall at low altitude from which the student pilot was unable to recover. The investigation could not determine, based on the available evidence, why the pilot did not mitigate the airplane's rapidly increasing angle of attack and climb rate shortly after takeoff given that the airplane was equipped with an angle-of-attack audio and visual stall warning indicator.

The autopsy of the pilot found that he had early coronary artery disease. As a result, the pilot might have been at increased risk of a sudden cardiac event that could have caused symptoms such as palpitations, shortness of breath, chest pain, or fainting, but there was no evidence that such an event occurred. Therefore, it is unlikely that the pilot's heart disease contributed to this accident. Toxicology testing detected ethanol in one tissue at a very low level; no ethanol was found in the pilot's brain. The identified ethanol was most likely from postmortem production and therefore did not contribute to the accident circumstances. Although cetirizine, which is sedating and can affect decision-making and performance, was identified in the pilot's liver and muscle specimens, the amount of cetirizine in the pilot's blood, and thus the effects of the pilot's use of this drug, could not be determined.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The student pilot's exceedance of the airplane's critical angle of attack during the initial climb, resulting in an aerodynamic stall from which the pilot did not recover.

Findings

Aircraft	Airspeed - Not attained/maintained
Aircraft	Angle of attack - Capability exceeded
Aircraft	Climb rate - Capability exceeded
Personnel issues	Aircraft control - Student/instructed pilot

Factual Information

History of Flight

Initial climb	Aerodynamic stall/spin (Defining event)
Initial climb	Loss of control in flight
Uncontrolled descent	Collision with terr/obj (non-CFIT)
Post-impact	Fire/smoke (post-impact)

On December 22, 2018, at 1012 eastern standard time, a BRM Aero Bristell special light-sport airplane, N587BL, was destroyed when it impacted terrain shortly after takeoff from Lakeland Linder International Airport (LAL), Lakeland, Florida. The solo student pilot was fatally injured. The airplane was registered to Industrial Mobile Cranes, Inc., and operated by the student pilot as a Title 14 Code of Federal Regulations Part 91 training flight. Visual meteorological conditions prevailed at the time of the accident, and no flight plan was filed for the flight, which originated about 0945.

According to a friend of the student pilot who lived with him, the evening before and the morning of the accident were routine. The friend reported that the student pilot told her that he planned to stay in the traffic pattern and practice touch-and-go landings at LAL, which was his home airport.

The student pilot's flight instructor reported that he had not been contacted by the student before the accident flight and was thus unaware that the student had planned to undertake a solo flight. The flight instructor reported that the student pilot had contacted him before all of the student's past solo flights and that they would normally discuss weather conditions and other aspects of planned flights.

Air traffic control communications revealed that the student pilot had completed two touch-and-go landings on runway 27 in a left traffic pattern. Before the third landing, the tower controller instructed the student to fly a right traffic pattern after departure to avoid a potential conflict with another airplane. The student responded, "affirmative, right traffic after this touch and go," which was the last radio transmission from the student.

A surveillance video from a building located at LAL showed the accident airplane shortly after liftoff from runway 27 following the airplane's third touch-and-go landing. After the takeoff rotation and a brief climb, the airplane maintained a level attitude over the runway for about 4 seconds and then resumed a normal climb for about 14 seconds. The video showed that, as the airplane climbed, its pitch attitude further increased, causing the airplane to rapidly gain altitude. The airplane was then out of the view of the camera; when the airplane reappeared, it was in a steep, descending left turn heading about the opposite of the takeoff heading. A surveillance video from a second airport camera showed the airplane impact terrain on the airport in a near-vertical attitude, which was followed by a postimpact explosion and fire.

Student pilot Information

Certificate:	Student	**Age:**	64,Male
Airplane Rating(s):	None	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Unknown
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Sport pilot None	**Last FAA Medical Exam:**	
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	108.8 hours (Total, all aircraft), 32.7 hours (Total, this make and model), 6.4 hours (Pilot In Command, all aircraft), 8.6 hours (Last 90 days, all aircraft), 1.3 hours (Last 30 days, all aircraft)		

According to Federal Aviation Administration (FAA) records, the pilot held a student pilot certificate. He did not hold a medical certificate and was not required to do so while operating under sport pilot provisions. A review of his logbook revealed that his flight training began in October 2015 and that he had accumulated 108.8 hours of total flight experience. The student's first flight in the accident airplane was on November 16, 2017. He had accumulated 32.8 flight hours in the accident airplane at the time of the accident, of which 6.4 hours were accumulated during solo flights. During the preceding 90 days, the student had logged 8.6 hours, all of which were in the accident airplane. The pilot's logbook contained a valid 90-day solo endorsement, issued on October 18, 2018, for the accident airplane model, with a crosswind limitation of less than 11 knots.

Aircraft and Owner/Operator Information

Aircraft Make:	BRM Aero	**Registration:**	N587BL
Model/Series:	Bristell S-LSA	**Aircraft Category:**	Airplane
Year of Manufacture:	2014	**Amateur Built:**	
Airworthiness Certificate:	Special light-sport (Special)	**Serial Number:**	087/2014
Landing Gear Type:	Tricycle	**Seats:**	2
Date/Type of Last Inspection:	April 1, 2018 Annual	**Certified Max Gross Wt.:**	1320 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	390.8 Hrs as of last inspection	**Engine Manufacturer:**	Rotax
ELT:		**Engine Model/Series:**	912 ULS
Registered Owner:		**Rated Power:**	100 Horsepower
Operator:		**Operating Certificate(s) Held:**	None

According to FAA airworthiness records, the single-engine, low-wing airplane was powered by a Rotax 912 ULS engine that drove a three-blade, fixed-pitch propeller. According to airplane logbook entries, an annual and a 100-hour condition inspection were completed in April 2018. The airplane had accumulated a total of 390.8 hours of flight time at the time of that inspection.

The aerodynamic stall speeds listed on flight test documents included stall speeds of 45 knots indicated airspeed (KIAS) with no flaps and 38 KIAS with fully extended flaps.

According to the student pilot's flight instructor, the airplane was equipped with a Dynon Skyview primary flight display with an audio and a visual angle-of-attack stall warning indicator.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KLAL,142 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	09:50 Local	**Direction from Accident Site:**	360°
Lowest Cloud Condition:	Scattered / 1800 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Broken	**Visibility (RVR):**	
Wind Speed/Gusts:	5 knots /	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:	360°	**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	30.18 inches Hg	**Temperature/Dew Point:**	12°C / 8°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Lakeland, FL (LAL)	**Type of Flight Plan Filed:**	None
Destination:	Lakeland, FL (LAL)	**Type of Clearance:**	VFR
Departure Time:	09:45 Local	**Type of Airspace:**	Class D

The LAL weather conditions reported at 0950 (about 22 minutes before the accident) included wind from 360° at 5 knots, visibility 10 statute miles, scattered clouds at 1,800 ft above ground level, temperature 12°C, dew point 8°C, and an altimeter setting of 30.18 inches of mercury. The wind reported at 1053 (about 41 minutes after the accident) was from 310° at 12 knots gusting to 16 knots.

Airport Information

Airport:	Lakeland Linder Rgnl LAL	**Runway Surface Type:**	Asphalt
Airport Elevation:	142 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	27	**IFR Approach:**	None
Runway Length/Width:	8499 ft / 150 ft	**VFR Approach/Landing:**	Touch and go;Traffic pattern

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	On-ground
Total Injuries:	1 Fatal	**Latitude, Longitude:**	27.986665,-82.023887(est)

A review of photographs provided by LAL airport operations personnel showed that the airplane impacted an open field on the airport about 800 ft south of runway 27 and that the airplane came to rest in an upright position. A postcrash fire consumed most of the cockpit, avionics, and the fuselage. The left and right leading edges of the wings displayed significant aft crushing. The empennage remained intact and showed minimal fire damage. The engine, which was located with the fuselage, was impact and fire damaged. All three propeller blades were fragmented.

Postaccident examination of the airplane established control cable continuity from the cockpit area to the respective control surfaces. When the propeller hub was manually rotated, all pistons rotated, and engine continuity was confirmed. The ignition harness was consumed by fire. Both carburetors were examined; one had some foreign material that appeared consistent with extensive postcrash fire damage, and the other was free of debris.

Additional Information

The National Transportation Safety Board investigator-in-charge was unable to travel to the accident site due to the lapse in appropriations funding that occurred from December 22, 2018, to January 25, 2019.

Medical and Pathological Information

An autopsy of the student pilot was performed by the Office of the District Medical Examiner, Winter Haven, Florida. The autopsy results found that the pilot's cause of death was blunt impact to the head and torso. The autopsy results also showed that the pilot had early coronary artery disease.

Toxicology testing performed at the FAA Forensic Sciences Laboratory identified 0.015 gm/dl of ethanol in the student pilot's muscle specimens; no ethanol was identified in the pilot's brain specimens. In addition, cetirizine was identified in the pilot's liver and muscle specimens; no blood was available for testing. Ethanol is primarily a social drug and a central nervous system depressant that is absorbed by and quickly distributed throughout the body. Ethanol can also be produced in the body after death. Cetirizine is a sedating antihistamine that is available over the counter.

Preventing Similar Accidents

Prevent Aerodynamic Stalls at Low Altitude

While maneuvering an airplane at low altitude in visual meteorological conditions, many pilots fail to avoid conditions that lead to an aerodynamic stall, recognize the warning signs of a stall onset, and apply appropriate recovery techniques. Many stall accidents result when a pilot is momentarily distracted from the primary task of flying, such as while maneuvering in the airport traffic pattern, during an emergency, or when fixating on ground objects.

An aerodynamic stall can happen at any airspeed, at any altitude, and with any engine power setting. Pilots need to be honest with themselves about their knowledge of stalls and preparedness to recognize and handle a stall situation. Training can help pilots fully understand the stall phenomenon, including angle-of-attack concepts and how weight, center of gravity, turbulence, maneuvering loads and other factors can affect an airplane's stall characteristics. The stall characteristics may be different in each type of plane, so learn them before you fly.

The stall airspeeds marked on the airspeed indicator (for example, the bottom of the green arc and the bottom of the white arc) typically represent steady flight speeds at 1G at the airplane's maximum gross weight in the specified configuration. Maneuvering loads and other factors can increase the airspeed at which the airplane will stall. For example, increasing bank angle can increase stall speed exponentially.

Reducing angle of attack by lowering the airplane's nose at the first indication of a stall is the most important immediate response for stall avoidance and stall recovery. This may seem counterintuitive at low altitudes, but is a necessary first step.

See http://www.ntsb.gov/safety/safety-alerts/documents/SA_019.pdf for additional resources.

The NTSB presents this information to prevent recurrence of similar accidents. Note that this should not be considered guidance from the regulator, nor does this supersede existing FAA Regulations (FARs).

Administrative Information

Investigator In Charge (IIC):	Gerhardt, Adam
Additional Participating Persons:	Ric Riccardi; FAA/ FSDO; Orlando, FL
Original Publish Date:	April 13, 2020
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=98855