



Aviation Investigation Final Report

Location:	Hartford, Connecticut	Accident Number:	ERA23LA121
Date & Time:	January 28, 2023, 15:42 Local	Registration:	N550LX
Aircraft:	RICHARD BRINKMAN LANCAIR 4P	Aircraft Damage:	Substantial
Defining Event:	Loss of control in flight	Injuries:	1 Serious
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot of the turbine-powered, experimental amateur-built airplane had ongoing issues with fuel migrating from the right wing fuel tank to the left wing tank when the airplane sat in the hangar for several days or more. Multiple witnesses at the airport on the day of the accident observed the airplane sitting with its left-wing low while parked in the hangar and on the ramp; however, the pilot did not notice the leaning during his preflight inspection nor did he visually check the fuel tanks before flight. The pilot recalled that before takeoff both fuel gauges indicated 38 gallons of fuel was present in each fuel tank.

The pilot taxied for takeoff and performed a rejected takeoff due to “something not feeling right” with the airplane. The pilot returned to the ramp environment and taxied around briefly, before deciding to return to the runway for another takeoff attempt. During the second takeoff, at rotation, the airplane briefly climbed but immediately began a roll and turn to the left. The pilot attempted to correct the left roll by applying right roll with the flight controls and by reducing engine power; however, the left roll and turn continued. The airplane impacted terrain in a left turn with the left wing impacting the ground first. Subsequently, the airplane cartwheeled and an explosion and postcrash fire immediately ensued. The pilot was ejected from the airframe during the impact and was rescued by first responders.

Data recovered from the primary flight display (PFD) found that the last indicated fuel quantity recorded, during the second taxi for departure, was 82 gallons in the left tank and 39 gallons in the right tank, resulting in an imbalance of 43 gallons.

During initial flight testing of the accident airplane make and model, it was found to have a lack of roll control with an imbalance of fuel of 30 gallons below 100 knots airspeed. The accident flight’s takeoff was likely initiated with an imbalance of nearly 43 gallons of fuel, and once the

airplane lifted off around 65 knots, the airplane likely lacked the roll authority to stop the left rolling tendencies due to the imbalance.

The most recent fuel system maintenance work involved the replacement of an on/off cross-feed valve. The valve was found in the wreckage mostly closed and it had seized; however, it displayed a slight angle towards the open position. It is likely that the slight opening allowed for fuel to migrate from the right wing to the left wing over the course of the 30 days the airplane sat between flights.

The pilot had multiple opportunities to notice the fuel imbalance. He could have checked the fuel filler caps during preflight or observed that the PFD displayed a significant fuel imbalance. Furthermore, two witnesses at the airport observed that the airplane was leaning to the left before flight. Given the airplane's history with a fuel imbalance, the pilot should have checked the airplane's overall disposition during preflight inspection. Lastly, he performed a rejected takeoff due to something not feeling right with the airplane, but performed no meaningful troubleshooting nor did he exit the airplane before deciding to take off again. Had the pilot ended the flight after the rejected takeoff and checked the fuel, or called for maintenance to examine the airplane, the fuel imbalance likely could have been discovered.

Further exacerbating rolling tendency was a gusting crosswind from the airplane's right side, which likely added to the left rolling tendency the pilot experienced.

Probable Cause and Findings

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

The pilot's takeoff with a significant fuel imbalance, which resulted in the airplane lacking the roll authority to overcome the left rolling tendency and subsequently impacting terrain. Contributing to the accident was the pilot's inadequate preflight inspection and the gusting crosswind.

Findings

Personnel issues	Identification/recognition - Pilot
Aircraft	Fuel - Inadequate inspection
Aircraft	Fuel - Fluid level
Aircraft	Fuel distribution - Malfunction
Environmental issues	Crosswind - Contributed to outcome

Factual Information

History of Flight

Prior to flight	Preflight or dispatch event
Takeoff	Loss of control in flight (Defining event)

On January 28, 2023, about 1542 eastern standard time, an experimental amateur-built Lancair 4P airplane, N550LX, was destroyed when it was involved in an accident at the Hartford-Brainard Airport (HFD), Hartford, Connecticut. The private pilot was seriously injured. The airplane was operated by the pilot as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

According to the pilot, he planned to fly to Groton-New London Airport (GON), Groton, Connecticut, to conduct instrument approaches. He did not notice any abnormalities with the airplane during preflight and taxied for departure. The pilot reported that he aborted the first takeoff because “something was not feeling right” with the airplane. After returning to the ramp and taxiing around briefly, he decided to attempt another takeoff because he did not observe anything obviously wrong with the airplane.

The pilot reported that, during the second takeoff, the airplane immediately rolled left after rotation. He reported that the first thing through his mind was, “I gotta get this plane on the ground.” He recalled that engine power was normal and, due to the left banking tendency, he started pulling back on the power to reduce thrust. Subsequently, he attempted to complete a landing in the grass to the left of the runway, but “the plane just kept going to left” despite his attempts to lower the right wing with the flight controls. He recalled that the left wing hit the ground first; he saw sparks and then was ejected from the airplane. The pilot crawled away from the postimpact fire and was rescued by first responders.

Review of airport surveillance video found that the airplane taxied from the ramp to runway 20 before taking off. The airplane accelerated with the pilot subsequently aborting the takeoff before becoming airborne. The airplane returned to the ramp and completed a 360° right taxiing turn before proceeding back to runway 20 a few minutes later.

During the second takeoff, the airplane accelerated and rotated near the runway’s 1,000 ft markers. Immediately after rotation the airplane entered a left roll, climbed momentarily, and then entered a steep left roll and left turn toward the terrain to the left of the runway. The airplane continued in a 90° left roll and subsequently impacted terrain in a left turn when the airplane cartwheeled and an explosion and postcrash fire immediately ensued.

A Federal Aviation Administration (FAA) inspector performed a visual examination of the airplane and photographed the accident site. The initial impact ground scar was about 475 ft from the runway and the fuselage came to rest about 260 ft from the initial impact point. A postimpact fire consumed a majority of the composite airframe structure.

According to the FAA airworthiness and registration records, the airplane was an experimental amateur-built Lancair 4P. It was issued an airworthiness certificate in 1999 and originally configured with a Continental Motors TSIO-550 piston engine. In August 2019, the airframe, engine, and its systems were heavily modified into an RDD Enterprises LLC model LX7-20 turbine airplane. The wings were lengthened, the airplane was about one foot longer, and its tail height was about 2 ft taller. A Pratt & Whitney Canada T74-CP-700 turbine engine was also installed.

According to the company who performed the modifications (RDD Enterprises, LLC), the LX7-20 was a pressurized, 4-seat composite airplane with retractable landing gear and a turboprop engine.

Examination of the engine and propeller found no evidence of preimpact mechanical malfunction or failure. The propeller blades exhibited s-bending, torsional twisting, and chordwise scratches, consistent with the engine operating at power during the impact with terrain.

All of the control cable breaks exhibited evidence of tensile overload consistent with separation during the impact. All fuel pumps sustained thermal and impact damage. The on/off cross-feed valve was found in its normal installation area and displayed thermal damage and melting. The valve was found mostly closed and it had seized; however, it displayed a slight angle towards the open position.

The PFD and multi-function display (MFD) were recovered from the wreckage and contained flight data from the accident flight. The accident takeoff was not recorded in the data; however, data was obtained from engine start up through the second taxi for departure. The engine parameters were nominal throughout the ground operations. The left and right fuel quantity indications displayed an imbalance throughout the entire accident flight.

During power-up, the left tank quantity was 85 gallons indicated and the right tank was 39 gallons indicated. Throughout the ground operations, the gallons indicated per each side fluctuated by a few gallons, but the imbalance was observed throughout the entirety of the recorded data. The last indicated fuel quantity recorded, during the second taxi for departure, was 82 gallons in the left tank and 39 gallons in the right tank.

The pilot reported that during preflight inspection he did not notice any abnormalities with the airplane. He did not visually check the fuel levels via the fuel filler caps. He recalled that the PFD fuel indications showed that both wings had 38 gallons. This fuel level was consistent with his recollection that he last landed with less than 45 gallons per tank during a flight about 30 days before the accident.

The pilot reported that in the past the airplane had an issue with fuel migrating from the right tank to the left tank. He recalled that during past preflight inspections he had noticed that the left tank appeared to be nearly topped off when he could not see any fuel when looking into the right tank.

A fixed-based-operator (FBO) employee who towed the airplane from the hangar before the accident noticed that the airplane was leaning a little to the left (left-wing low). He was aware that the airplane had an ongoing issue with fuel migrating from one wing to another when it sat for periods of time in the hangar. He recalled that the left lean that he saw on the day of the accident was not as bad as past instances that he had observed.

Another individual who worked at a business located at the airport had seen jacks placed under the left wing to prevent the airplane from tipping over and to prevent fuel leaking from the left side fuel vents. He saw the airplane in the hangar the day of the accident and it was left-wing low, but the leaning was not as extreme as other instances and no jacks were under the left wing.

The maintenance records were located in the airplane and were destroyed. According to copies of maintenance records, during a condition inspection on April 21, 2022, the left and right fuel pump and fuel filter assemblies were replaced.

According to the pilot, during the summer of 2022, additional work was performed on the fuel system to troubleshoot the fuel migration issue by a mechanic not affiliated with RDD Enterprises, the company who performed the airframe modifications. According to the mechanic who performed this work, he no longer possessed copies of the maintenance endorsements, but he stated that the on/off cross-feed valve was replaced. The valve used was supplied by RDD Enterprises.

According to the POH, the airplane had two 90-gallon fuel tanks incorporated into wet-wing fuel tanks. Fuel balance was designed to be maintained through electronic fuel level sensing that varied the output of each individual fuel boost pump. The fuel system had a pilot selectable on/off cross-feed valve that could allow fuel to move from one tank to the other. The fuel sensors located in the wings provided actual fuel levels to the cockpit displays.

The POH stated that if tanks are not filled to capacity, each tank should be refilled so that each tank quantity is as equal as possible. It further stated that if the fuel imbalance increased beyond 10 gallons that pilot should make a precautionary landing. There was no explicit warning not to depart with a fuel imbalance beyond 10 gallons.

According to RDD Enterprises, there had been reports of fuel migration between tanks while on the ground with the LX7-20 make and model with the original design of the fuel system. According to RDD, the migration issue was resolved when the fuel system was updated in 2021. According to RDD, the accident airplane was equipped with the most recent fuel system design/fuel pumps.

According to RDD, the fuel system design incorporated check valves to prevent the migration of fuel from one wing to another, even in temperature changes as well as sloped parking conditions. However, if a check valve developed a seep or the cross-feed on/off valve was cracked open, it was possible for fuel to migrate from one wing tank to another while the airplane was on the ground.

According to RDD, during the original design and testing of the LX7-20, they determined that for any speed below 100 knots a roll control deficiency would occur at an imbalance of 30 gallons between the left and right tanks. The maximum imbalance of fuel that had been flight tested during takeoff was 10 gallons.

According to the pilot's operating handbook, the rotation speed (Vr) was 65 knots. The maximum demonstrated crosswind component was 25 knots.

Based upon a review of the windsock captured on the airport's surveillance video, during the accident takeoff, about a 10-15 knot gusting westerly crosswind (from the right) was present.

Pilot Information

Certificate:	Private	Age:	55, Male
Airplane Rating(s):	Single-engine land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	Unknown
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	
Medical Certification:	Class 3 Without waivers/limitations	Last FAA Medical Exam:	February 1, 2021
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:	(Estimated) 1400 hours (Total, all aircraft), 120 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	RICHARD BRINKMAN	Registration:	N550LX
Model/Series:	LANCAIR 4P NO SERIES	Aircraft Category:	Airplane
Year of Manufacture:	2019	Amateur Built:	Yes
Airworthiness Certificate:	Experimental (Special)	Serial Number:	006
Landing Gear Type:	Retractable - Tricycle	Seats:	4
Date/Type of Last Inspection:	April 21, 2022 Condition	Certified Max Gross Wt.:	3850 lbs
Time Since Last Inspection:		Engines:	1 Turbo prop
Airframe Total Time:	121 Hrs as of last inspection	Engine Manufacturer:	Pratt & Whitney Canada
ELT:	Installed, not activated	Engine Model/Series:	T74-CP-700
Registered Owner:	On file	Rated Power:	
Operator:	On file	Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Day
Observation Facility, Elevation:	HFD, 13 ft msl	Distance from Accident Site:	0 Nautical Miles
Observation Time:	15:46 Local	Direction from Accident Site:	245°
Lowest Cloud Condition:		Visibility	10 miles
Lowest Ceiling:	Overcast / 20000 ft AGL	Visibility (RVR):	
Wind Speed/Gusts:	5 knots / 15 knots	Turbulence Type Forecast/Actual:	None / None
Wind Direction:	270°	Turbulence Severity Forecast/Actual:	N/A / N/A
Altimeter Setting:	30.21 inches Hg	Temperature/Dew Point:	10°C / -6°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Hartford, CT	Type of Flight Plan Filed:	IFR
Destination:	Groton, CT (GON)	Type of Clearance:	IFR
Departure Time:		Type of Airspace:	Class D

Airport Information

Airport:	Hartford-Brainard Airport HFD	Runway Surface Type:	Asphalt
Airport Elevation:	18 ft msl	Runway Surface Condition:	Dry
Runway Used:	20	IFR Approach:	None
Runway Length/Width:	4417 ft / 150 ft	VFR Approach/Landing:	None

Wreckage and Impact Information

Crew Injuries:	1 Serious	Aircraft Damage:	Substantial
Passenger Injuries:	N/A	Aircraft Fire:	On-ground
Ground Injuries:	N/A	Aircraft Explosion:	On-ground
Total Injuries:	1 Serious	Latitude, Longitude:	41.736503,-72.646673

Administrative Information

Investigator In Charge (IIC):	Gerhardt, Adam
Additional Participating Persons:	Brett Sartain; FAA/FSDO; Enfield, CT Beverley Harvey; Transportation Safety Board of Canada ; Gatineau , OF William Jeffrey Edwards; Lancair Owners & Builders Organization; McCall, ID David Mcrae; RDD Enterprises LLC; Redmond, OR
Original Publish Date:	May 2, 2024
Last Revision Date:	
Investigation Class:	Class 3
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=106650

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