



AVIATION



HIGHWAY



MARINE



RAILROAD



PIPELINE

# Aviation Investigation Final Report

<b>Location:</b>	Lansing, Michigan	<b>Accident Number:</b>	CEN21LA384
<b>Date &amp; Time:</b>	August 24, 2021, 18:58 Local	<b>Registration:</b>	N1GG
<b>Aircraft:</b>	CIRRUS DESIGN CORP SF50	<b>Aircraft Damage:</b>	Destroyed
<b>Defining Event:</b>	Runway excursion	<b>Injuries:</b>	4 None
<b>Flight Conducted Under:</b>	Part 91: General aviation - Business		

## Analysis

The airport tower controller initially assigned the pilot to take off from runway 28L, which presented a 7-knot headwind. Shortly afterward, the controller informed the pilot of “a storm rolling in . . . from west to east,” and offered runway 10R. The pilot accepted the opposite direction runway for departure and added, “we’re ready to go when we get to the end . . . before the storm comes.” About 4 seconds after the airplane began accelerating during takeoff, the controller advised the pilot of a wind shear alert of plus 20 knots (kts) at a 1-mile final for runway 28L, and the pilot acknowledged the alert.

In a postaccident statement, the pilot stated that departing with a 7-kt tailwind was within the operating and performance limitations of the airplane. The pilot reported that after a takeoff ground roll of about 4,000 ft “the left rudder didn’t seem to be functioning properly” and he decided to reject the takeoff. However, when he applied full braking, the airplane tended to turn to the right. He used minimal braking consistent with maintaining directional control of the airplane. The airplane ultimately overran the runway, impacted the airport perimeter fence, and encountered a ditch before it came to a rest. A postimpact fire ensued and consumed a majority of the fuselage.

An examination of the runway revealed skid marks beginning about 4,700 ft from the arrival end of runway 10R. The initial set of skid marks were about 300 ft long. Skid marks resumed about 300 ft further down the runway and continued until they departed the left side of the pavement near the departure threshold. The skid marks associated with the left tire were consistent with heavy braking from the left main landing gear. The skid marks associated with the right tire were consistent with light braking from the right main landing gear.

A postrecovery airframe examination did not reveal any anomalies consistent with a preimpact failure or malfunction.

Data revealed that as the airplane began to accelerate during takeoff the airspeed lagged the ground speed, which was consistent with a tailwind condition at the time. The heading began to oscillate about the same time that the airspeed stagnated. During this time, the ground speed continued to increase consistent with an encounter with a tailwind gust. A few seconds later, the pilot initiated the rejected takeoff.

About the time of the accident, the airport was impacted from the west by a gust front that caused low-level wind shear and surface winds increased from about 10 kts from the west-southwest to about 30 kts from the northwest. Weather forecasts and advisories in effect at the time of the accident noted the possibility of severe thunderstorms and strong wind gusts. The airport's low-level wind shear alert system display, located in the control tower, presented numerous wind shear alerts applicable to the east side of the airport at the time of the accident takeoff.

The tailwind gust likely reduced the effectiveness of the flight controls and resulted in the pilot's perception that they were not functioning properly. In addition, the reduced flight control effectiveness, combined with the lack of nose wheel steering in the airplane model, resulted in a reduction of directional stability as evidenced by the heading oscillations. While the distinct runway skid marks indicated that the brakes were operating, the pilot was unable to stop on the remaining runway available.

## **Probable Cause and Findings**

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

The pilot's decision to depart with a tailwind as a thunderstorm approached, which resulted in a loss of airplane performance due to an encounter with a significant tailwind gust and a subsequent runway excursion.

## Findings

<b>Personnel issues</b>	Decision making/judgment - Pilot
<b>Environmental issues</b>	Tailwind - Effect on operation
<b>Environmental issues</b>	Gusts - Effect on operation
<b>Environmental issues</b>	Windshear - Effect on operation

# Factual Information

## History of Flight

Takeoff-rejected takeoff	Runway excursion (Defining event)
Takeoff-rejected takeoff	Collision with terr/obj (non-CFIT)

On August 24, 2021, at 1858 eastern daylight time, a Cirrus Design Corp. SF50 “Vision Jet” airplane, N1GG, was destroyed when it was involved in an accident near Lansing, Michigan. The pilot and 3 passengers were not injured. The airplane was operated as a Title 14 *Code of Federal Regulations (CFR)* Part 91 business flight.

The flight was departing from Capital Region International Airport (LAN). At 1854:51, the pilot was cleared to taxi to runway 28L. Shortly afterward, the tower controller informed the pilot of “a storm rolling in . . . from west to east,” and offered runway 10R, the opposite direction runway. The controller advised that the wind was from 280° at 7 knots at the time, and the pilot accepted runway 10R for departure. At 1856:13, the controller informed the pilot that information Oscar was current and added, “we got some new weather on this one.” The pilot acknowledged, “we’ll get Oscar” and “we’re ready to go when we get to the end . . . before the storm comes.” At 1856:26, the pilot was cleared for takeoff, and data indicated the accident takeoff began about 1857:15. At 1857:19, the controller advised the pilot of a windshear alert of plus 20 kts at a 1-mile final for runway 28L. The pilot acknowledged the alert.

The pilot stated that departing from an 8,000 ft long runway with a 7-knot tailwind was within the operating and performance limitations of the airplane. The pilot noted after a ground roll of about 4,000 ft that “the left rudder didn’t seem to be functioning properly” and that he decided to reject the takeoff. However, when he applied full braking, the airplane tended to turn to the right. He subsequently used minimal braking to control the airplane. The airplane ultimately overran the runway, impacted the chain link airport perimeter fence, and encountered a ditch before it came to a rest.

An examination of the runway revealed skid marks beginning about 4,700 ft from the arrival end of runway 10R which were about 300 ft long. The skid marks resumed about 300 ft further down the runway and continued about 3,200 ft until they departed the left side of the pavement near the departure threshold. The skid marks associated with the left tire were pronounced and appeared consistent with heavy braking from the left main landing gear. The skid marks associated with the right tire were defined but faint and appeared consistent with light braking from the right main landing gear.

## Pilot Information

<b>Certificate:</b>	Private	<b>Age:</b>	52, Male
<b>Airplane Rating(s):</b>	Single-engine land	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	3-point
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	No
<b>Instructor Rating(s):</b>	None	<b>Toxicology Performed:</b>	
<b>Medical Certification:</b>	Class 3 With waivers/limitations	<b>Last FAA Medical Exam:</b>	September 30, 2020
<b>Occupational Pilot:</b>	No	<b>Last Flight Review or Equivalent:</b>	July 28, 2021
<b>Flight Time:</b>	2000 hours (Total, all aircraft), 600 hours (Total, this make and model), 60 hours (Last 30 days, all aircraft)		

The pilot completed a Cirrus Aircraft SF50 recurrent training course on July 30, 2021. This met the requirement for a pilot proficiency check under 14 *CFR* 61.58 and a flight review under 14 *CFR* 61.56.

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	CIRRUS DESIGN CORP	<b>Registration:</b>	N1GG
<b>Model/Series:</b>	SF50	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>	2020	<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	0202
<b>Landing Gear Type:</b>	Retractable - Tricycle	<b>Seats:</b>	7
<b>Date/Type of Last Inspection:</b>	May 25, 2021 Annual	<b>Certified Max Gross Wt.:</b>	6000 lbs
<b>Time Since Last Inspection:</b>	22 Hrs	<b>Engines:</b>	1 Turbo fan
<b>Airframe Total Time:</b>	293 Hrs as of last inspection	<b>Engine Manufacturer:</b>	Williams
<b>ELT:</b>	Installed	<b>Engine Model/Series:</b>	FJ33-5A
<b>Registered Owner:</b>	N1GG LLC	<b>Rated Power:</b>	1846 Lbs thrust
<b>Operator:</b>	N1GG LLC	<b>Operating Certificate(s) Held:</b>	None

The airplane was equipped with retractable, tricycle landing gear. The nose landing gear was a full castoring configuration, and independent nose wheel steering was not available. During

taxi, takeoff roll, and landing rollout, directional control was maintained through differential braking of the main landing gear. With sufficient airspeed, the ruddervators become effective and also provide directional control. The main landing gear brake assemblies were hydraulically operated and individually activated by floor-mounted toe pedals located at both pilot stations. The brakes were not equipped with an anti-skid/anti-lock functionality.

The airplane flight manual (AFM) specified a maximum 10-knot tailwind for takeoff or landing. Review of the AFM determined that at the airplane accident weight of 5,756 lbs (obtained from recoverable data module [RDM] data), the expected takeoff ground roll with a calm wind was 2,885 ft, and with a 10-knot tailwind was 4,090 ft.

### Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Visual (VMC)	<b>Condition of Light:</b>	Day
<b>Observation Facility, Elevation:</b>	KLAN, 859 ft msl	<b>Distance from Accident Site:</b>	1 Nautical Miles
<b>Observation Time:</b>	18:53 Local	<b>Direction from Accident Site:</b>	255°
<b>Lowest Cloud Condition:</b>	Few / 4900 ft AGL	<b>Visibility</b>	9 miles
<b>Lowest Ceiling:</b>		<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	8 knots / None	<b>Turbulence Type Forecast/Actual:</b>	/
<b>Wind Direction:</b>	250°	<b>Turbulence Severity Forecast/Actual:</b>	/
<b>Altimeter Setting:</b>	29.98 inches Hg	<b>Temperature/Dew Point:</b>	31°C / 24°C
<b>Precipitation and Obscuration:</b>	In the vicinity - Thunderstorm - Unknown precipitation		
<b>Departure Point:</b>	Lansing, MI (LAN)	<b>Type of Flight Plan Filed:</b>	IFR
<b>Destination:</b>	Melbourne, FL (MLB)	<b>Type of Clearance:</b>	IFR
<b>Departure Time:</b>	18:58 Local	<b>Type of Airspace:</b>	Class C

At 1755, a convective significant meteorological information (SIGMET) was issued for an area of severe thunderstorms with tops to flight level 450 and the possibility of 1-inch diameter hail and 60-knot wind gusts. The area included the accident location and was moving from 250° at 25 kts.

Terminal aerodrome forecasts (TAF) for the airport, issued at 1813 and valid for the accident time, noted the possibility of thunderstorms in the vicinity. A TAF issued at 1840 forecast the potential for a west wind from 290° with gusts to 38 for a period beginning a few minutes after the accident time.

At 1853, the automated surface observing system (ASOS), located about 6,100 ft east-northeast of the runway 10R approach threshold, recorded the wind from 250° at 8 kts.

At 1855, the ASOS recorded an increase in the wind gust magnitude from 10 kts to 21 kts. About 1857, the low-level windshear alert system (LLWAS) station located about 4,400 ft east-southeast of the runway 10R approach threshold recorded an increase of the 2-minute averaged wind speed from 290° magnetic at 8 kts, to 310° magnetic at 16 kts with 30-knot gusts. At 1858, the LLWAS alert system display located in the tower presented numerous wind shear alerts applicable to the east side of the airport, notably an alert for an area about 6,600 ft southeast of the runway 10R departure threshold.

At 1908, the ASOS recorded the wind from 290° at 17 kts with gusts to 30 kts.

### Airport Information

<b>Airport:</b>	Capital Region International LAN	<b>Runway Surface Type:</b>	Asphalt
<b>Airport Elevation:</b>	861 ft msl	<b>Runway Surface Condition:</b>	
<b>Runway Used:</b>	10R	<b>IFR Approach:</b>	None
<b>Runway Length/Width:</b>	8506 ft / 150 ft	<b>VFR Approach/Landing:</b>	None

### Wreckage and Impact Information

<b>Crew Injuries:</b>	1 None	<b>Aircraft Damage:</b>	Destroyed
<b>Passenger Injuries:</b>	3 None	<b>Aircraft Fire:</b>	On-ground
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	4 None	<b>Latitude, Longitude:</b>	42.778514,-84.564771

The airplane impacted an airport perimeter fence off the end of runway 10R and a postimpact fire consumed portions of the airplane. An examination of the airframe did not reveal any anomalies; however, the extent of the postimpact fire damage limited the scope of the examination.

The airplane was equipped with an RDM that recorded multiple flight and system parameters. According to that data, about 1857:08, the thrust lever angle (TLA) increased from idle to takeoff, and the engine fan ( $N_1$ ) and core speeds ( $N_2$ ) responded as commanded by 1857:15. As the airplane began to accelerate, the airspeed lagged the ground speed consistent with a tailwind condition at the time. About 1857:50, the heading began to oscillate but generally began drifting left with respect to the easterly takeoff direction. The true airspeed reached 106

kts and stagnated as the ground speed continued to increase consistent with a tailwind gust encounter. About 1857:56, the TLA was reduced from takeoff to idle, consistent with a rejected takeoff. At that time, the airspeed and groundspeed were about 100 kts and 120 kts, respectively. The ground speed began to decrease consistent with the pilot's decision to reject the takeoff. The airplane ultimately reached a maximum of 108 kts airspeed and 121 kts ground speed before it began to decelerate. The coarse GPS data indicated that the airplane departed the runway about 1858:20 at a groundspeed of about 75 kts.

The RDM did not record any parameters related to the application of the brakes other than for the parking brake; the parking brake parameter was off during the accident takeoff.



## Administrative Information

**Investigator In Charge (IIC):** Sorensen, Timothy

**Additional Participating Persons:** Thomas Kozura; FAA Flight Standards; Grand Rapids, MI  
Brannon Mayer; Cirrus Aircraft; Duluth, MN

**Original Publish Date:** August 23, 2023

**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=103750>

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