Aviation Investigation Final Report

Location:	Beecher, Illinois	**Accident Number:**	CEN20LA219
Date & Time:	June 8, 2020, 09:46 Local	**Registration:**	N257V
Aircraft:	Flight Design CTLS	**Aircraft Damage:**	Destroyed
Defining Event:	Loss of engine power (partial)	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

Flight data showed that, shortly after takeoff, the airplane turned left and impacted a farm field about 0.4 mile from the runway's departure end. The farm field was suitable for an emergency landing, and impact signatures were consistent with the airplane impacting terrain in a wings-level, nose-low attitude, indicating the pilot did not attain proper pitch during the forced landing.

About 14 seconds into the takeoff roll, when the airplane was likely still on the ground, engine monitor data showed a reduction in engine power. The reduction in power was accompanied by reductions in fuel flow, manifold pressure, and engine rpm. Shortly thereafter, the fuel pressure increased, consistent with the takeoff sequence.

At the time of the initial power reduction, sufficient runway length remained for the pilot to perform an aborted takeoff, but he continued the takeoff instead. Although the airplane's engine had been modified from its original configuration by the addition of aftermarket electronic fuel injection and turbocharger systems, postaccident examination of the airplane did not reveal any preimpact anomalies to which the engine power loss could be attributed.

Based on the available evidence, the accident was the result of the pilot's decision to continue the takeoff after the partial loss of engine power occurred and his subsequent failure to control airplane pitch during the forced landing. Contributing to the accident was the partial loss of engine power for reasons that could not be determined based on available evidence.

Probable Cause and Findings

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

The pilot’s decision to continue takeoff after a partial loss of engine power, and the pilot’s subsequent failure to control airplane pitch during a forced landing. Contributing to the accident was the partial loss of engine power for reasons that could not be determined.

Findings

Personnel issues	Use of checklist - Pilot
Personnel issues	Decision making/judgment - Pilot
Aircraft	(general) - Unknown/Not determined

Factual Information

History of Flight

Takeoff	Loss of engine power (partial) (Defining event)
Maneuvering	Loss of control in flight

On June 8, 2020, at 0946 central daylight time, a Flight Design GMBH CTLS airplane, N257V was destroyed when it was involved in an accident near Beecher, Illinois. The pilot was fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

There were no witnesses to the accident; automatic dependent surveillance-broadcast (ADS-B) data showed the airplane accelerated to about 60 knots (kts) groundspeed and climbed to about 75 ft above ground level (agl). The groundspeed then decreased to about 50 kts while the altitude continued to increase until reaching about 175 ft agl. At that time, the airplane was about 300 ft short of the departure end of the runway and began a descending left turn. During the turn, the groundspeed remained about 50 kts. The accident site was in a harvested corn field about 0.4 mile northeast of the departure end of the runway and about 300 ft and 10° from the last recorded data point (see figure 1).

Figure 1: Accident Flight Track

The field was a flat and recently planted corn field. The corn plants were about 3 to 4 inches tall, and the ground was firm, dry, and hard packed. Three linear marks at the accident site were consistent with the airplane's tricycle landing gear. The center depression among the three marks was deeper and longer, indicating that the airplane impacted in a nose-low attitude (see figure 2). The airplane's nose landing gear and right main landing gear separated

Figure 1: Accident flight track.

from the airplane, and the airplane nosed over on its back. The forward fuselage was crushed rearward and upward into the cabin area. The wings were predominately intact and still attached to the fuselage. The empennage of the airplane was intact but separated from the remainder of the fuselage at the leading edge of the vertical tail.

Figure 2: View of aircraft wreckage from initial impact point.

The airplane was equipped with a Dynon EMS-D120 engine monitoring system. The engine data for the accident flight showed that engine start occurred at 0937:40. The engine rpm remained below 3,000 rpm until 0944:55, when engine speed increased to about 5,500 rpm, consistent with takeoff power application. The ADS-B data for the flight showed that 2 seconds

later, the airplane was 350 ft from the approach end of the runway at 35 kts groundspeed, and a recorded altitude of 700 ft msl. ADS-B reports pressure altitude to the nearest 25 ft increment. When corrected for the altimeter setting at the time of the accident (30.03 in-hg), the corrected altitude would have been about 100 ft higher than the reported altitude or about 800 ft msl. The field elevation at Bult Field Airport, Beecher, Illinois was listed as 790 ft msl.

The Rotax 912ULS Operator's Manual calls for a pre-takeoff ignition check at 4,000 engine rpm. Based on the engine monitor data, this ignition check was not performed, and the engine rpm did not reach 4,000 rpm until the application of takeoff power.

The increase in engine speed at the beginning of the takeoff was accompanied by corresponding increases in manifold pressure and fuel flow. The engine speed, manifold pressure and fuel flow remained consistent with takeoff power until 0945:09, about 14 seconds after the initial application of takeoff power, when all three parameters decreased sharply, and engine speed dropped below 4,000 rpm. ADS-B data showed that the airplane was about 1,300 ft. from the approach end of the runway, and still at a recorded altitude of 700 ft. msl, indicating the airplane was likely still on the runway. At this time, there was still about 3,700 ft. of runway remaining ahead of the airplane.

At 0945:10, ADS-B data showed its first change in altitude since the beginning of the takeoff roll, indicating the airplane was airborne. At that time, the airplane was about 1,500 ft from the approach end of the runway, with about 3,500 feet of runway remaining.

The engine speed remained between 3,500 and 4,000 rpm until 0946:08, when the rpm again sharply decreased, and the data ended.

Engine data also showed that fuel pressure was steady at 40 pounds per square inch (psi) until 0945:31, when the pressure increased sharply to about 105 psi, where it remained until the end of the data. The increase in fuel pressure did not coincide with the reductions in engine rpm.

At the beginning of the accident flight, the electrical system voltage was about 12.3 volts. The system voltage decreased throughout the data and the rate of decrease increased about the time takeoff power was applied. The final recorded system voltage was 9.3 volts. According to the manufacturer of the aftermarket fuel injection, the system will continue to operate down to about 7.5 volts. According to the Rotax 912 manual, the ignition system is powered from discrete coils in the engine stator and is independent from accessory power. The effect of the reduced voltage on other engine systems was not determined.

Pilot Information

Certificate:	Sport Pilot	**Age:**	84,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
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 With waivers/limitations	**Last FAA Medical Exam:**	August 1, 2016
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	April 18, 2018
Flight Time:	995 hours (Total, all aircraft)		

Current pilot flight records were not available during the investigation. The most recent flight records available showed that the pilot had accumulated 995 hours of flight experience as of July 25, 2016. The flight records also contained an instructor's endorsement for a flight review conducted on April 18, 2018, but no further flight records were available.

Aircraft and Owner/Operator Information

Aircraft Make:	Flight Design	**Registration:**	N257V
Model/Series:	CTLS Undesignat	**Aircraft Category:**	Airplane
Year of Manufacture:	2008	**Amateur Built:**	
Airworthiness Certificate:	Experimental light sport (Special)	**Serial Number:**	F-08-05-09
Landing Gear Type:	Tricycle	**Seats:**	2
Date/Type of Last Inspection:		**Certified Max Gross Wt.:**	
Time Since Last Inspection:		**Engines:**	Reciprocating
Airframe Total Time:		**Engine Manufacturer:**	ROTAX
ELT:		**Engine Model/Series:**	912ULS
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:	KIGQ,616 ft msl	**Distance from Accident Site:**	11 Nautical Miles
Observation Time:	09:55 Local	**Direction from Accident Site:**	32°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.03 inches Hg	**Temperature/Dew Point:**	26°C / 13°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Monee, IL (C56)	**Type of Flight Plan Filed:**	None
Destination:	Kankakee, IL (IKK)	**Type of Clearance:**	None
Departure Time:		**Type of Airspace:**	Class G

Airport Information

Airport:	Bult Field C56	**Runway Surface Type:**	Concrete
Airport Elevation:	790 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	09	**IFR Approach:**	None
Runway Length/Width:	5001 ft / 75 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	41.381668,-87.665275

The airplane was powered by a Rotax 912 ULS engine that had been modified with the addition of aftermarket electronic fuel injection and turbocharger systems.
A postaccident examination of the airframe and engine was conducted after removal from the accident site. The airplane's wings had been removed for transport and remained predominately intact. There was impact damage to the leading-edge tip of the left wing. The

ailerons and flaps of both wings remained attached. The empennage and tail cone were separated from the rest of the fuselage. The tail surfaces were intact, and the rudder and elevator remained attached to the empennage. The forward fuselage had extensive crushing damage. Examination of the control system revealed continuity from the cockpit controls to each surface except for breaks associated with wing removal and impact damage. The fuel system was examined, and no pre-impact anomalies were noted.

The engine crankshaft rotated, and rotation confirmed suction and compression on all cylinders, and continuity of the valve train and the propeller reduction drive unit. The top set of spark plugs were removed and exhibited normal burn signatures. The engine's turbocharger was free to rotate. Inspection of the fuel lines and fuel system components revealed no obstructions. Disassembly of the spring-loaded diaphragm type fuel pressure regulator revealed no anomalies obstructions or debris. Field testing of the engine's electronic ignition system was not possible.

The 3-blade controllable pitch composite propeller remained attached to the engine propeller flange. One blade was separated at the hub, a second blade was separated about one foot from the hub and the third blade was separated about 1-1/2 feet from the hub. All three blade roots were still in the propeller hub.

Medical and Pathological Information

The Will County Coroner's Office, Joliet, Illinois, performed an autopsy of the pilot. The cause of death was multiple injuries due to an airplane mishap. The examination identified mild-moderate coronary artery disease with 50-60% stenosis of the proximal left anterior descending coronary artery without signs of previous ischemia. No other significant natural disease was identified.

Toxicology testing performed by NMS Labs identified caffeine and duloxetine in cardiac blood.

Toxicology testing performed by the Federal Aviation Administration's (FAA) Forensic Sciences Laboratory identified tamsulosin, amlodipine, atorvastatin, and benazepril in urine and cardiac blood. In addition, duloxetine was found in cardiac blood and urine.

Caffeine is the stimulant commonly found in coffee, tea, and sodas. Duloxetine is commonly marketed with the name Cymbalta and carries this warning, "may impair mental and/or physical ability required for the performance of potentially hazardous tasks (e.g., driving, operating heavy machinery)."

Personal medical records revealed that the pilot had a history of high blood pressure, high cholesterol, recurrent lumbar stenosis with sciatica, prediabetes, chronic fatigue, an enlarged

prostate, and vitamin D deficiency. His medications at his last physician visit included aspirin, atorvastatin and omega-3-acid ethyl esters (fish oil) for cholesterol, benazepril, hydrochlorothiazide, and amlodipine for high blood pressure, finasteride and tamsulosin for symptoms from an enlarged prostate, esomeprazole for heartburn. These drugs are not generally considered impairing. In addition, he was taking gabapentin (an anti-seizure medication also used to treat nerve pain with sedating properties), paroxetine (an antidepressant), and ropinirole (a sedating drug used to treat restless leg syndrome and Parkinsonism). The gabapentin had apparently been prescribed to treat the pilot's sciatica. No diagnoses related to the pilot's use of paroxetine or ropinirole were present in the records although there was a note from a visit in 2017 which states the pilot had sleep apnea but he did not use a positive pressure device. No other treatment was noted, or other evaluation result documented in the available records regarding a sleep disorder. The available records did not identify when the pilot began using duloxetine or for what diagnosis.

Preventing Similar Accidents

Manage Risk: Good Decision-making and Risk Management Practices are Critical (SA-023)

The Problem

Although few pilots knowingly accept severe risks, accidents can also result when several risks of marginal severity are not identified or are ineffectively managed by the pilot and compound into a dangerous situation. Accidents also result when the pilot does not accurately perceive situations that involve high levels of risk. Ineffective risk management or poor aeronautical decision-making can be associated with almost any type of fatal general aviation accident.

What can you do?

- Develop good decision-making practices that will allow you to identify personal attitudes that are hazardous to safe flying, apply behavior modification techniques, recognize and cope with stress, and effectively use all resources. Understand the safety hazards associated with human fatigue and strive to eliminate fatigue contributors in your life.

- Understand that effective risk management takes practice. It is a decision-making process by which you can systematically identify hazards, assess the degree of risk, and determine the best course of action.
- Be honest with yourself and your passengers about your skill level and proficiency. Refuse to allow external pressures, such as the desire to save time or money or the fear of disappointing passengers, to influence you to attempt or continue a flight in conditions in which you are not comfortable.
- Be honest with yourself and the FAA about your medical condition. If you have a medical condition or are taking any medication, do not fly until your fitness for flight has been thoroughly evaluated.
- Plan ahead with flight diversion or cancellation alternatives, and brief your passengers about the alternatives before the flight.

See https://www.ntsb.gov/Advocacy/safety-alerts/Documents/SA-023.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):	Brannen, John
Additional Participating Persons:	Dwayne Hudson; FAA - Greater Chicago FSDO; Des Plaines, IL
Original Publish Date:	March 18, 2022
Last Revision Date:	
Investigation Class:	Class 3
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=101406