Aviation Investigation Final Report

Location:	North Manchester, Indiana	**Accident Number:**	CEN20FA098
Date & Time:	February 23, 2020, 23:08 UTC	**Registration:**	N840GS
Aircraft:	INNOVATOR Mosquitto	**Aircraft Damage:**	Substantial
Defining Event:	Unknown or undetermined	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot was flying his single-seat, experimental amateur-built helicopter over his private grass runway. There were no witnesses to the accident. Examination of the airframe and engine revealed no anomalies, and damage to the main and tail rotor blades and drive systems, as well as recorded data, were consistent with the engine producing power at the time of impact. No autopsy or toxicological testing were performed on the pilot due to medical care received following the accident.

Family members stated that the pilot would often practice hovering and taxiing over the runway. The pilot had reported to family members that he had experienced a couple of hard landings during previous flights and that he would often revert to his fixed-wing habits and push the cyclic forward when he encountered trouble flying the helicopter. Although he had received about 12 hours of flight instruction in a helicopter of a different make/model and had logged about 10 hours of solo flight experience in the accident helicopter, the pilot had not received an endorsement for solo flight in a helicopter.

Examination of the helicopter wreckage found no preimpact anomalies to explain why the helicopter impacted terrain and no determination could be made whether the pilot experienced a medical event. The extent to which the pilot's lack of training and experience in helicopters may have contributed to the accident could not be determined. The accident is consistent with the pilot's loss of control of the helicopter for reasons that could not be determined based on the available information.

Probable Cause and Findings

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

The pilot's loss of control for reasons that could not be determined based on the available information.

Findings

Not determined	(general) - Unknown/Not determined
Personnel issues	Total instruct/training recvd - Pilot

Factual Information

History of Flight

Unknown	Unknown or undetermined (Defining event)

On February 23, 2020, about 1808 eastern standard time, an experimental, amateur-built XE285 helicopter, N840GS, was substantially damaged when it was involved in an accident near North Manchester, Indiana. The pilot was fatally injured. The helicopter was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

One witness reported that he saw the helicopter flying from a distance about 30 minutes before the accident. He did not know if the helicopter was over the airstrip or a nearby field but that the helicopter appeared to be hovering.

Family members of the pilot reported that the pilot had purchased the helicopter about 3 years before the accident. The pilot had received some flight instruction in a helicopter but had limited his flights in the accident helicopter to practicing hovering, taxiing, and landings at their airstrip. They stated that the pilot had previously experienced two hard landings in the accident helicopter. They did not witness the accident flight but believed that the pilot was performing those same maneuvers at the time of the accident. The pilot had previously told the family members that he had difficulty overcoming his habits from flying airplanes and would sometimes push the cyclic forward when he had trouble flying the helicopter.

Pilot Information

Certificate:	Private	**Age:**	76,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Single
Other Aircraft Rating(s):	None	**Restraint Used:**	4-point
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 Without waivers/limitations	**Last FAA Medical Exam:**	February 3, 2020
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	1578 hours (Total, all aircraft), 9.4 hours (Total, this make and model), 1498 hours (Pilot In Command, all aircraft), 1.2 hours (Last 90 days, all aircraft)		

The pilot held a private-pilot certificate with a rating for airplane single-engine land. According to his logbook, he had accumulated about 22 total hours of helicopter experience in the 3 years before the accident, 12.6 hours of which were instructional flights in an Enstrom 280FX helicopter; 9.4 hours were logged as pilot-in-command (solo) in the accident helicopter. The pilot had not received an endorsement for solo flight in a helicopter. The pilot annotated "hover and taxiing" next to each logbook entry for flights in the accident helicopter.

Aircraft and Owner/Operator Information

Aircraft Make:	INNOVATOR	**Registration:**	N840GS
Model/Series:	Mosquitto XE285	**Aircraft Category:**	Helicopter
Year of Manufacture:	2019	**Amateur Built:**	Yes
Airworthiness Certificate:	Experimental (Special)	**Serial Number:**	MXE1272A15B
Landing Gear Type:	Skid	**Seats:**	1
Date/Type of Last Inspection:	Unknown	**Certified Max Gross Wt.:**	720 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	22.1 Hrs at time of accident	**Engine Manufacturer:**	Innovative
ELT:	Not installed	**Engine Model/Series:**	800
Registered Owner:	On file	**Rated Power:**	85 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

No aircraft maintenance logbooks were located during the investigation. A single record of repairs conducted by Composite FX dated February 15, 2020, was located. The record indicated that the repairs were necessary following a hard landing.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	FWA,815 ft msl	**Distance from Accident Site:**	35 Nautical Miles
Observation Time:	17:54 Local	**Direction from Accident Site:**	90°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:		**Visibility (RVR):**	
Wind Speed/Gusts:	10 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	225°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.1 inches Hg	**Temperature/Dew Point:**	9°C / 0°C
Precipitation and Obscuration:			
Departure Point:	North Manchester, IN (N/A)	**Type of Flight Plan Filed:**	None
Destination:	North Manchester, IN (N/A)	**Type of Clearance:**	None
Departure Time:		**Type of Airspace:**	

Airport Information

Airport:	Private N/A	**Runway Surface Type:**	Grass/turf
Airport Elevation:	755 ft msl	**Runway Surface Condition:**	Unknown
Runway Used:	280	**IFR Approach:**	None
Runway Length/Width:	1960 ft / 75 ft	**VFR Approach/Landing:**	Unknown

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	40.998054,-85.825553

The accident site was located on the east end of a private grass airstrip located about 3 miles west of North Manchester, Indiana. The helicopter came to rest on its right side. Both aluminum main rotor blades (MRB) remained attached to the rotor mast. One MRB was

partially embedded into the ground and displayed some bending and deformation along its entire length. The second MRB was bent about 70° and exhibited deformation throughout its length. Two impact marks, one of which was linear, were located on the ground within 3 ft of the nose of the helicopter. (see figure 1.)

Figure 1. Accident Site.

The fiberglass tail boom was separated from the fuselage but was retained by the anti-torque control cable. The tail rotor assembly remained attached to the tail boom. One aluminum tail rotor blade (TRB) was mostly straight. The second TRB was separated from the tail rotor gearbox about 3 inches outboard of the TRB attachment point on the TRB assembly and was located immediately below the TRB assembly in the wreckage. The separation was consistent with impact damage.

Flight control continuity was continuous from the cyclic and the collective to the swash plate assembly. The main rotor mast was folded forward into the cabin area. The two control rods immediately above the swash plate assembly were fractured in a manner consistent with impact. Continuity continued from the breaks in the control rods above the swash plate

through the rotor mast to the main rotor blades. The anti-torque pedal control cables were intact from the pedals to the tail rotor assembly.

Throttle continuity was verified from the collective to the dual carburetor assembly, and liquid consistent with automotive gasoline was found in both the main and reserve fuel tanks. The liquid was clear of contaminants and water when visually examined.

Engine continuity was verified by rotating the radiator fan and observing both pistons move in each respective cylinder and observing the output shaft on top of the engine rotate. Engine compression was verified on each cylinder. The hour meter displayed 22:06 at the time of the accident.

Postaccident examination did not reveal any pre-impact anomalies with the airframe or engine.

Two MGL Avionics Stratomaster Velocity engine monitors and a Dynojet Power Commander V module were recovered and subsequently downloaded. Data recovered from each unit was consistent with the engine producing power at the time of impact.

Medical and Pathological Information

The pilot initially survived the accident and received medical treatment. As a result of medical procedures performed on the pilot following the accident, neither toxicology testing nor an autopsy was conducted.

Additional Information

The Assembly and Operating/Maintenance Manual for the Composite FX XE-285 helicopter stated:

Although it is light and small, the Composite FX aircraft is a real helicopter in every sense, with controls, drive, rotor systems and capabilities all similar to its bigger companions. It

therefore requires the same amount of respect and consideration for safety and integrity required of a larger helicopter. In order to fly the Composite FX helicopter, pilots must receive proper training. It is strongly recommended that pilots be fully trained to private pilot status in a small training helicopter such as a Robinson R-22. Training to student pilot status is considered the minimum acceptable amount of training required.

To be flown as an experimental aircraft the pilot must possess a private pilot's license. The aircraft must be registered with the FAA ("N" numbered) and pass an airworthiness inspection by a Designated Airworthiness Representative, (DAR), prior to the first flight.

Administrative Information

Investigator In Charge (IIC):	Baker, Daniel
Additional Participating Persons:	David Kline; FAA; Indianapolis, IN
Original Publish Date:	March 11, 2022
Last Revision Date:	
Investigation Class:	Class 3
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=100982