Aviation Investigation Final Report

Location:	Wichita, Kansas	**Accident Number:**	CEN16LA093
Date & Time:	January 19, 2016, 12:31 Local	**Registration:**	N602MA
Aircraft:	Socata TBM700	**Aircraft Damage:**	Substantial
Defining Event:	Loss of control in flight	**Injuries:**	2 None
Flight Conducted Under:	Part 91: General aviation		

Analysis

The private pilot was conducting an instrument flight rules business flight to an uncontrolled airport with forecast and reported moderate icing conditions. The pilot reported that he activated the deice systems and then executed an instrument landing system approach to the airport with the autopilot connected. While descending through about 1,200 ft above ground level, the pilot extended the landing gear and lowered the flaps to the takeoff setting and subsequently noticed the airplane shudder. Flight data from the airplane's avionics display revealed that the pilot continued the approach, and while on short final, he retarded the throttle toward idle and then disconnected the autopilot. While approaching the runway threshold, the pilot allowed the airspeed to decrease below the Pilot's Operating Handbook's (POH) minimum-recommended approach speed for icing conditions. The airplane's descent rate then increased, and the airplane banked left. The pilot subsequently applied full throttle, and the airplane impacted the ground 1,463 ft short of the runway threshold, skidded 460 ft, hit a hole, and nosed over.

At the accident site, significant ice accumulation was noted on both of the wings and the stabilizer, including ice buildup aft of the deice boots. Weather data indicated that the flight encountered areas of freezing drizzle and supercooled liquid water. Given this evidence, the airplane likely encountered severe (rather than the forecast moderate) in-flight icing conditions during the approach that exceeded the airplane's anti-ice systems' capabilities and led to the pilot's loss of airplane control. Given the icing conditions, the pilot should have maintained the POH's minimum-recommended approach speed for icing conditions.

Probable Cause and Findings

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

The pilot's failure to maintain the minimum-recommended approach airspeed in icing conditions, which resulted in a loss of airplane control.

Findings

Aircraft	(general) - Capability exceeded
Environmental issues	Conducive to structural icing - Effect on operation
Aircraft	Airspeed - Not attained/maintained
Personnel issues	Aircraft control - Pilot
Personnel issues	Use of policy/procedure - Pilot
Environmental issues	(general) - Contributed to outcome

Factual Information

History of Flight

Approach-IFR final approach	Structural icing
Approach-IFR final approach	Loss of lift
Approach-IFR final approach	Loss of control in flight (Defining event)

On January 19, 2016, about 1231 central standard time, a Socata TBM 700 airplane, N602MA, was substantially damaged after landing short at the Colonel James Jabara Airport (AAO), Wichita, Kansas. The private pilot and passenger were not injured. The airplane was registered to and operated by Premier Furnace Specialists, Inc. under the provisions of 14 Code of Federal Regulations Part 91 as a business flight. Day instrument meteorological conditions (IMC) prevailed for the flight, which departed on an instrument flight rules (IFR) flight plan from the Schenck Field Airport (ICL), Clarinda, Iowa, about 1137.

The pilot stated after his departure from ICL, he was in and out clouds at his cruising altitude of flight level 200. He was advised of icing conditions along the route of flight and activated the de-ice boots to automatic, turned on the propeller heat, and the heated windshield, each of which appeared to be operating normally. On his descent into AAO, the pilot observed ice accumulating on the leading edges of the wings, but the de-ice boots appeared to be operating to keep the leading edges of the wings clear.

The pilot flew an instrument landing system (ILS) approach to Runway 18 at AAO with the autopilot connected. After exiting IMC conditions on final about 1,200 ft agl, the pilot stated that he lowered flaps to the takeoff setting and extended the landing gear. Descending through about 1,000 ft agl, he noticed the airplane shudder, with an immediate increase in sink rate. The pilot stated he applied full engine power while on final, but the airplane continued to sink and subsequently touched down 1,463 ft short of the Runway 18 threshold. The airplane skidded 460 ft, during which the landing gear impacted a ground hog hole and the airplane nosed over, which damaged the firewall and wing spar.

Federal Aviation Administration (FAA) personnel responded to the accident site about 1500 and noted approximately 1/8 to 1/4 inch of ice on both wings. The ice accumulation was aft of the deice boot and continued aft to the trailing edge of each wing. The vertical stabilizer had similar amounts of ice buildup, which included ice accumulation aft of the stabilizer de-ice boot.

Pilot Information

Certificate:	Private	**Age:**	54,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	4-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 Without waivers/limitations	**Last FAA Medical Exam:**	April 24, 2015
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	January 8, 2016
Flight Time:	1105 hours (Total, all aircraft), 56 hours (Total, this make and model), 962 hours (Pilot In Command, all aircraft), 59 hours (Last 90 days, all aircraft), 47 hours (Last 30 days, all aircraft), 4 hours (Last 24 hours, all aircraft)		

Passenger Information

Certificate:		**Age:**	Female
Airplane Rating(s):		**Seat Occupied:**	Right
Other Aircraft Rating(s):		**Restraint Used:**	4-point
Instrument Rating(s):		**Second Pilot Present:**	No
Instructor Rating(s):		**Toxicology Performed:**	No
Medical Certification:		**Last FAA Medical Exam:**	
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:			

Aircraft and Owner/Operator Information

Aircraft Make:	Socata	**Registration:**	N602MA
Model/Series:	TBM700	**Aircraft Category:**	Airplane
Year of Manufacture:	2015	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	1086
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:		**Certified Max Gross Wt.:**	7394 lbs
Time Since Last Inspection:	75 Hrs	**Engines:**	1 Turbo prop
Airframe Total Time:	75 Hrs at time of accident	**Engine Manufacturer:**	Pratt and Whitney
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	PT6A-66D
Registered Owner:	Premier Furnace Specialists	**Rated Power:**	850 Horsepower
Operator:	Premier Furnace Specialists	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KAAO,1421 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	12:39 Local	**Direction from Accident Site:**	186°
Lowest Cloud Condition:		**Visibility**	2.5 miles
Lowest Ceiling:	Broken / 700 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	8 knots /	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	50°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.12 inches Hg	**Temperature/Dew Point:**	-2°C / -3°C
Precipitation and Obscuration:	Moderate - None - Mist		
Departure Point:	CLARINDA, IA (ICL)	**Type of Flight Plan Filed:**	IFR
Destination:	WICHITA, KS (AAO)	**Type of Clearance:**	IFR
Departure Time:	11:37 Local	**Type of Airspace:**	

At 1239, the weather observation station at AAO reported the following conditions: wind 050 degrees at 8 knots, visibility 2 ½ miles in mist, broken clouds at 700 ft agl, overcast clouds at 1,100 ft agl, temperature minus 2 degrees C, dew point minus 3 degrees C, and altimeter setting 30.13 inches of mercury.

At 1233, the weather observation station at Wichita Dwight D. Eisenhower National Airport (ICT),

Wichita, Kansas, located about 12 miles southwest of AAO, reported the following conditions: wind 020 degrees at 7 knots, visibility 2 miles in light drizzle and mist, overcast clouds at 800 ft agl, temperature minus 1 degrees C, dew point minus 3 degrees C, altimeter setting 30.13 inches of mercury.

The terminal aerodrome forecast (TAF) for ICT issued at 0854 and used by the pilot for preflight planning expected minimum visual flight rules (MVFR) conditions at the estimated time of arrival with wind 110 degrees at 12 knots, visibility unrestricted, and overcast clouds at 1,500 ft agl. Light freezing drizzle was forecast between 1300 and 1900.

At the time of the accident, the National Weather Service had an Airmen's Meteorological Advisory (AIRMET) covering the route for moderate icing conditions from the freezing level to 18,000 ft msl. The freezing level was identified from the surface to 7,000 ft msl across the region. A review of the forecast icing products from 4 hours prior to the accident also indicated a high probability of encountering icing conditions over the route and the Wichita, Kansas area, with moderate intensity, and with some potential of supercooled large drop (SLD) conditions over the region.

During the period surrounding the accident there were 14 pilot reports of icing along the route ranging from a trace to moderate intensity, with light intensity the most frequent (10 reports). The type of ice varied from rime type ice (5 reports), clear (4 reports), and mixed type icing (3 reports). No severe icing events were reported in the system.

The official observations disseminated from the ASOS at AAO noted a rapid decrease in visibility between 1154 and 1239, with visibility decreasing from 8 miles down to 2 ½ miles in mist. The ASOS system did not detect any measureable precipitation during this period.

Current ASOS systems utilize a Light Emitting Diode Weather Identifier (LEDWI) optical sensor to report precipitation falling through the sensor volume to determine rain or snow. The sensor is unable to detect very light precipitation at less than 0.01 inch per hour, which often occurs with mist or freezing drizzle. Currently, ASOS systems do not report freezing drizzle.

Airport Information

Airport:	COLONEL JAMES JABARA AAO	**Runway Surface Type:**	Concrete
Airport Elevation:	1420 ft msl	**Runway Surface Condition:**	Wet
Runway Used:	18	**IFR Approach:**	ILS
Runway Length/Width:	6101 ft / 100 ft	**VFR Approach/Landing:**	

The AAO airport lists an elevation of 1,421 ft, with a single runway 18/36 at 6,101 ft long by 100 ft wide. The airport does not have an air traffic control tower. The airport had a federally installed and maintained Automated Surface Observation System (ASOS).

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 None	**Latitude, Longitude:**	37.757778,-97.219444(est)

Tests and Research

On January 28, 2016, the FAA and aircraft manufacturer personnel performed an examination and operational test of the aircraft de-ice systems. The de-ice boots, pitot/stall vanes, and windshield de-ice systems all performed normally. No anomalies were noted with the de-ice systems. The flaps were observed to be near the 'takeoff' position.

The airplane was equipped with a Garmin G1000 system. Downloaded flight data revealed the following information from the last 20 seconds of the flight:

1230:59 to 1231:11 – Airspeed decreased from 102 KIAS to 92 KIAS and engine torque decreased from 20% to 8%.

1231:11 - Autopilot was disconnected.

1231:14 – Airspeed decreased to 89 KIAS, descent rate increased, and the airplane banked 10 degrees to the left.

1231:16 – Engine torque increased to 110% (all engine data showed a normal engine response for increased throttle input) and the airplane banked 24 degrees to the right.

1231:19 – Approximate time of ground impact.

Additional Information

The pilot operating handbook (POH) contains the following information and guidance for the aircraft, which was certified for flight into known icing conditions:

When ice has accumulated on the unprotected surfaces of the airplane, aerodynamic characteristics may be changed. Particularly, stall speeds may increase by up to 15 knots indicated airspeed (KIAS) at 'Flaps-Takeoff' and up to 10 KIAS at 'Flaps-Landing'. For flight into known icing conditions, minimum recommended speed (for the airplane's weight at the time of the accident) is 110 KIAS at 'Flaps-Takeoff' and 90 KIAS at 'Flaps-Landing'.

Severe icing may result from environmental conditions outside of those for which the airplane if certificated. Flight in freezing rain, freezing drizzle, or mixed icing conditions (supercooled liquid water and ice crystals) may result in ice build-up on protected surfaces exceeding the capability of the ice protection system, or may result in ice forming aft of the protected surfaces. This ice may not be shed using the ice protection systems, and may seriously degrade the performance and controllability of the airplane.

FAA Advisory Circular (AC) 91-47B, 'Pilot Guide: Flight in Icing Conditions,' contains the following guidance for approach and landing in icing conditions:

Determine if freezing drizzle or freezing rain are being reported and avoid flying into these areas. A ground observation of any type of precipitation when temperatures are near freezing may indicate freezing precipitation aloft, so be vigilant for severe icing conditions.

In accordance with the POH, use a higher approach speed into the landing when carrying an accumulation of ice. Carry some power on flare and flare slightly faster than normal if carrying ice.

A Piper PA-46, operating northeast of Wichita during the timeframe of this accident, also encountered significant icing conditions and made an emergency off field landing. This PA-46 was also certified for flight into known icing conditions, but the pilot was unable to maintain altitude and encountered a stall buffet that required him to make a forced landing. The NTSB case number for this accident is GAA16CA107.

Administrative Information

Investigator In Charge (IIC):	Folkerts, Michael
Additional Participating Persons:	Shane Preston; Federal Aviation Administration; Wichita, KS Beverly Harvey; Transportation Safety Board of Canada; Gatineau Yann Torres; Bureau of Enquiry and Analysis of France; Toulouse
Original Publish Date:	October 3, 2016
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=92630