National Transportation Safety Board
Aviation Accident Final Report

Location:	Honesdale, PA	**Accident Number:**	ERA16LA224
Date & Time:	06/20/2016, 1445 EDT	**Registration:**	N54285
Aircraft:	CESSNA 172P	**Aircraft Damage:**	Substantial
Defining Event:	Aerodynamic stall/spin	**Injuries:**	3 None
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis

The private pilot reported that the airplane was loaded near its maximum allowable gross weight before departure from the airport. The calculated density altitude was 3,297 ft mean sea level. The pilot stated that, after becoming airborne and climbing to 30 to 40 ft above ground level (agl), he "felt that the airplane was not climbing." The pilot subsequently closed the throttle and attempted to land on the remaining runway.

A review of surveillance video showed the wings of the airplane rocking immediately after liftoff at the mid-point of the runway, which was about 3,000 ft long. The video showed that the airplane's pitch attitude increased, but the airplane never climbed more than about 15 ft agl before it fell hard to the runway on all three landing gear, consistent with an aerodynamic stall. The airplane bounced several times, settled onto the runway with about 500 ft remaining, then overran the right side of the runway at the departure end. Performance data from the pilot's operating handbook indicated that, given the conditions present at the time of the accident, the airplane's landing distance was about 610 ft. Postaccident examination revealed substantial damage to the airplane's wings; there was no evidence of any preimpact mechanical anomalies of the airframe or engine. A postaccident engine run also revealed no anomalies.

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 adequate airspeed while departing in a heavily loaded airplane at high density altitude, which resulted in the airplane exceeding its critical angle of attack and experiencing an aerodynamic stall, landing hard, and overrunning the runway.

Findings

Personnel issues	Aircraft control - Pilot (Cause)
Environmental issues	High density altitude - Effect on operation

Factual Information

On June 20, 2016, at 1445 eastern daylight time, a Cessna 172P, N54285, was substantially damaged during a hard landing after takeoff from Cherry Ridge Airport (N30), Honesdale, Pennsylvania. The private pilot/owner, copilot, and one passenger were not injured. Visual meteorological conditions prevailed, and no flight plan was filed for the personal flight, which was conducted under the provisions of 14 Code of Federal Regulations Part 91.

In a written statement, the pilot stated he had flown from Morristown Airport (MMU), Morristown, New Jersey earlier in the day. He performed the preflight inspection, engine run-up, taxi, and takeoff for the earlier flight and the accident flight in accordance with the pilot operating handbook with no anomalies noted.

The pilot accelerated the airplane and performed the takeoff rotation at 65 knots after using "1/3" of the runway, which was 2,986 feet long. According to the pilot, "When I was about 30-40 feet in the air I felt the airplane was not climbing and I was not going to make it over the trees at the end of the runway." The pilot closed the throttle, landed on the runway, but over-ran the runway off the right side at the departure end. The airplane continued down a steep embankment and came to rest nose down in low brush.

In a telephone interview, the copilot stated that the pilot performed a walk-around and checked both the fuel and oil, and then he assisted him with the before starting engine and takeoff checklists. "Everything sounded normal, we taxied down, lined up at the approach end of runway 18, slowly advanced the throttle, reached full power and accelerated down the runway". The copilot called "65 knots" and rotate. At the time the airplane rotated, he activated the noise-cancelling feature of his headphones.

The copilot said he couldn't hear if there was a power interruption, but he did hear the pilot announce that he was landing back on the runway. After landing, the airplane nearly stopped on the runway, but carried off the right side at the departure end.

A review of surveillance video showed the wings of the airplane rocking immediately after liftoff at the mid-point of the runway. The pitch attitude increased, but the airplane never climbed more than 15 feet above ground level before the airplane leveled suddenly, and then fell hard to the runway on all three landing gear with approximately 675 feet remaining. The airplane bounced several times, and settled on all three landing gear with 500 feet of the runway remaining. The airplane was then seen departing the right side of the runway at the departure end.

According to Federal Aviation Administration (FAA) records, the pilot held a private pilot certificate with a rating for airplane single-engine land. He was issued an FAA third-class medical certificate on April 28, 2015. The pilot reported 878 total hours of flight experience, all of which was in the accident airplane make and model.

The four-seat, single-engine, high-wing airplane was manufactured in 1981, and was equipped with a Lycoming O-320, 160-horsepower engine. Its most recent annual inspection was completed on May 26, 2016 at 9,703.9 aircraft hours.

According to the pilot, the maximum allowable gross weight for the airplane was 2,400 pounds. According to his calculations based on passenger, fuel, and baggage weights, the airplane weighed 2,255 pounds at takeoff from N30.

Examination of the airplane by an FAA inspector revealed substantial damage to the airplane's wings due to the hard landing, but no preimpact mechanical anomalies. He then attempted an engine start with the airplane's own battery. The engine started immediately, accelerated smoothly, and ran continuously without interruption.

At 1455 the temperature reported at Sullivan County Airport (MSV), Monticello, New York, 23 miles northeast of N30, was 29 degrees C, dewpoint was 14 degrees C, and the altimeter setting was 30.09 inches of mercury.

The copilot stated that it was "warmer" at Morristown Municipal Airport (MMU), Morristown, New Jersey, at 186 feet elevation when they departed for N30 about 1200. The calculated density altitude at MMU at that time was 1,524 feet.

The calculated density altitude for N30 at the time of the accident, at 1,357 feet elevation, was 3,297 feet. At 2,000 feet density altitude, the calculated ground roll to stop the airplane was 610 feet.

According to FAA Pamphlet FAA-P-8740-2, Density Altitude:

Whether due to high altitude, high temperature, or both, reduced air density (reported in terms of density altitude) adversely affects aerodynamic performance and decreases the engine's horsepower output. Takeoff distance, power available (in normally aspirated engines), and climb rate are all adversely affected. Landing distance is affected as well; although the indicated airspeed (IAS) remains the same, the true airspeed (TAS) increases. From the pilot's point of view, therefore, an increase in density altitude results in the following:

- Increased takeoff distance.
- Reduced rate of climb.
- Increased TAS (but same IAS) on approach and landing.
- Increased landing roll distance.

Because high density altitude has particular implications for takeoff/climb performance and landing distance, pilots must be sure to determine the reported density altitude and check the appropriate aircraft performance charts carefully during preflight preparation. A pilot's first reference for aircraft performance information should be the operational data section of the aircraft owner's manual or the Pilot's Operating Handbook developed by the aircraft manufacturer. In the example given in the previous text, the pilot may be operating from an airport at 500 MSL, but he or she must calculate performance as if the airport were located at 5,000 feet. A pilot who is complacent or careless in using the charts may find that density

altitude effects create an unexpected –and unwelcome – element of suspense during takeoff and climb or during landing.

History of Flight

Takeoff	Aerodynamic stall/spin (Defining event)
Landing-flare/touchdown	Hard landing

Pilot Information

Certificate:	Private	**Age:**	58, Male
Airplane Rating(s):	Single-engine Land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 With Waivers/Limitations	**Last FAA Medical Exam:**	04/28/2015
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	878 hours (Total, all aircraft), 878 hours (Total, this make and model)		

Co-Pilot Information

Certificate:	Private	**Age:**	78, Male
Airplane Rating(s):	Single-engine Land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 With Waivers/Limitations	**Last FAA Medical Exam:**	
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	4200 hours (Total, all aircraft), 2000 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	CESSNA	**Registration:**	N54285
Model/Series:	172P P	**Aircraft Category:**	Airplane
Year of Manufacture:	1981	**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	17274945
Landing Gear Type:	Tricycle	**Seats:**	4
Date/Type of Last Inspection:	05/26/2016, Annual	**Certified Max Gross Wt.:**	2400 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	9703.9 Hours as of last inspection	**Engine Manufacturer:**	LYCOMING
ELT:	Installed, not activated	**Engine Model/Series:**	O-320 SERIES
Registered Owner:	On file	**Rated Power:**	160 hp
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	**Condition of Light:**	Day
Observation Facility, Elevation:	KMSV, 1403 ft msl	**Distance from Accident Site:**	23 Nautical Miles
Observation Time:	1455 EDT	**Direction from Accident Site:**	61°
Lowest Cloud Condition:	Clear	**Visibility**	10 Miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	10 knots /	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	280°	**Turbulence Severity Forecast/Actual:**	/ N/A
Altimeter Setting:	30.09 inches Hg	**Temperature/Dew Point:**	29°C / 14°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Honesdale, PA (N30)	**Type of Flight Plan Filed:**	None
Destination:	Morristown, NJ (MMU)	**Type of Clearance:**	None
Departure Time:	1445 EDT	**Type of Airspace:**	Class G

Airport Information

Airport:	CHERRY RIDGE (N30)	**Runway Surface Type:**	Asphalt
Airport Elevation:	1357 ft	**Runway Surface Condition:**	Dry
Runway Used:	18	**IFR Approach:**	None
Runway Length/Width:	2986 ft / 50 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	2 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	3 None	**Latitude, Longitude:**	41.509444, -75.250833 (est)

Administrative Information

Investigator In Charge (IIC):	Brian C Rayner	**Report Date:**	07/20/2017
Additional Participating Persons:	Thomas Savickas; FAA/FSDO; Allentown, PA		
Publish Date:	07/20/2017		
Note:	The NTSB did not travel to the scene of this accident.		
Investigation Docket:	http://dms.ntsb.gov/pubdms/search/dockList.cfm?mKey=93425		