



AVIATION



HIGHWAY



MARINE



RAILROAD



PIPELINE

# Aviation Investigation Final Report

<b>Location:</b>	St Louis, Missouri	<b>Accident Number:</b>	DCA16LA100
<b>Date &amp; Time:</b>	February 23, 2016, 23:23 Local	<b>Registration:</b>	N856HK
<b>Aircraft:</b>	Embraer EMB145	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>	Abnormal runway contact	<b>Injuries:</b>	33 None
<b>Flight Conducted Under:</b>	Part 121: Air carrier - Scheduled		

## Analysis

The airplane was landing on runway 30L at STL in gusty crosswind conditions and the first officer was the pilot flying. The first officer questioned the captain on the use of flaps 45 on two occasions during the approach but ultimately decided to land with flaps 45. There were no airport limitations in effect for runway 6 at the time of the accident that would have precluded the flight crew's use of the runway 6. The flight crew had the performance numbers available to land on runway 6 which was more aligned with the wind conditions and would have reduced the crosswind component by more than half. During the flare, with the engines at flight idle, the airplane rolled left and then right when they encountered a wind gust. The left wingtip struck the runway followed by the right wingtip as the first officer advanced the thrust levers for a go-around. After the first officer advanced the thrust levers as the pilot flying, the captain, as pilot monitoring, reduced the engine power to idle for about 1 second before advancing them back to max thrust without a positive transfer of control. After the go-around, the first officer transferred control to the captain who subsequently performed an uneventful landing at flaps 22 on runway 30L.

## Probable Cause and Findings

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

the flight crews' failure to consider all available runways for landing to minimize the gusty crosswind component. Contributing to the accident was the captain's reduction of the engine thrust for about 1 second at low altitude immediately after the first officer applied maximum thrust to conduct a go-around.

## Findings

Personnel issues	Weather planning - Flight crew
Personnel issues	Incorrect action selection - Pilot

## Factual Information

### History of Flight

#### Landing

Abnormal runway contact (Defining event)

On February 23, 2016, about 2323 central standard time (CST), Trans States Airlines flight 4615, an Embraer EMB-145, N856HK, encountered strong gusting crosswinds during its approach into Lambert-St. Louis International Airport (STL), St. Louis, Missouri, and struck both wingtips on the runway before performing a go-around. The flight crew made an uneventful landing on the second approach. The airplane was substantially damaged and there were no injuries to the 33 passengers and crew members onboard. The flight was operating under the provisions of 14 *Code of Federal Regulations (CFR)* Part 121 as a scheduled domestic passenger flight from Chicago O'Hare International Airport (ORD), Chicago, Illinois, to STL.

Prior to the departure from ORD the flight crew received dispatch paperwork from the company that indicated the weather at STL at that time was 10 statute mile of visibility, overcast clouds at 10,000 ft above ground level (agl) and wind from 040° at 15 knots (kts) with gusts to 30 kts. The forecasted weather at STL for the arrival time was greater than 6 statute miles of visibility, overcast clouds at 9,000 ft agl, and wind from 020° at 18 kts with gusts to 30 kts. The first officer was the pilot flying for the flight and the captain was the pilot monitoring.

The first officer briefed a visual approach to runway 30R after receiving the STL Automated Terminal Information System (ATIS) weather with winds reported from 030° at 22 kts with gusts to 27 kts. According to the captain, the approach speed for their weight was 121 kts plus 10 knots (one-half the gust factor) for a planned approach speed of 131 kts. The first officer questioned the captain about the use of flaps 22 for the landing instead of flaps 45 due to the gusty crosswind conditions, but ultimately decided to use flaps 45 for the landing. Air traffic control initially cleared the flight to land on runway 30R about 2318:40 CST (all times are CST) and stated the winds were from 020° at 20 kts with gusts to 25 kts. About 12 seconds later, the flight was cleared for the visual approach to runway 30L.

The airspeed varied plus or minus 5 kts between 1,300 ft and 1,700 ft agl on the approach that stabilized below 1,000 ft agl. The flight was cleared to land on runway 30L at 2318:52 and the first officer called for gear down followed shortly after by a call for flaps 22. The first officer remarked again about the winds and queried the captain again about the use of flaps 45 about 2319:23. The captain confirmed the flap setting and the speed noting it was almost a direct crosswind. At 2321:36 the first officer remarked about the gusty winds then stated, "I don't want to stall". The captain gave instructions on short final to put the wing down and put rudder in. When the first officer flared and reduced engine thrust, he noticed that with full right aileron and full left rudder inputs, the airplane continued to drift to the left of the runway centerline. The flight data recorder (FDR) recorded a maximum left bank of 17.41° at 2322:51.2, a maximum right bank of 15.48° at 2322:54.7, and a momentary change in the main landing gear weight on wheels signal from air to ground for less than 1 second between the banks. The airplane aural alerting system gave a "BANK ANGLE, BANK ANGLE" warning twice at 2322:52.9 and 2322:55.1. The first

officer then made the decision to go around and advanced the throttles to maximum thrust, however, about 4 seconds later, the captain momentarily retarded the throttles to flight idle for about 1 second before advancing them back to maximum thrust.

After the airplane was established in a climb and the landing gear were retracted, the first officer transferred control to the captain about 2323:16. The flight remained in a left traffic pattern for the visual approach to runway 30L and landed about 15 minutes after the go-around began. The captain elected to land with flaps 22 for the subsequent landing. The airplane landed safely and taxied to the gate where the passengers deplaned.

## PERSONNEL

The captain was 59 years old and held an Airline Transport Pilot (ATP) certificate for airplane multiengine land, a Commercial certificate for airplane single-engine land, and Flight Instructor for airplane single-engine land and Instrument. He held type ratings for the ATR-4212, ATR-72, BA-410013, EMB-145, EMB-12014, SA-22715, and SF-34016. The captain held a FAA first class medical certificate issued December 3, 2015 with the limitation that he must wear corrective lenses and possess glasses for near and intermediate vision. The captain had accumulated 30,406 total flight time, of which 12,223 hours were in the EMB-145.

The first officer was 24 years old and held an Airline Transport Pilot (ATP) certificate for airplane multiengine land, a Commercial certificate for airplane single-engine land, and Flight Instructor for airplane single-engine land and Instrument. He held type ratings for the CA-212 and EMB-145. The first officer held a FAA first class medical certificate issued June 13, 2015, with limitations of must wear corrective lenses. He estimated he had accumulated 1,850 hours of total flight experience, of which approximately 320 of those hours were on the EMB-145.

## METEOROLOGICAL INFORMATION

An NTSB Meteorology Study showed that there was a strong low pressure center in western Tennessee. Gusty winds and low-level wind shear (LLWS) would have been expected given the observed strong surface winds and upper-air sounding data. There was no precipitation reported at the time of the accident.

The one-minute STL Automated Surface Observing System (ASOS) wind data was examined around the accident time. At 2322, the ASOS recorded the two-minute average wind from 024° at 19 kts and a five-second maximum average wind from 022° at 24 kts. At 2323, the ASOS reported the two-minute average wind from 018° at 18 kts and a five-second maximum average wind from 035° at 23 kts. At 2324, the ASOS reported the two-minute average wind from 019° at 20 kts and a five-second maximum average wind from 024° at 28 kts.

## AIRPORT INFORMATION

The STL airport had 4 paved landing surfaces, 3 oriented northwest/southeast (12R/30L, 12L/30R, and 11/29) and 1 oriented northeast/southwest (6/24). Runway 12R/30L was an 11,019-ft long and 200-ft wide grooved concrete runway considered to be in good condition. The runway was equipped with Medium Approach Light System with Runway Alignment Indicator Lights (MALSR). Runway 6/24 was a 7,607-ft long and 150-ft wide grooved concrete runway considered to be in fair condition. Runway 6 had 7,352 ft available for landing and was equipped with MALSR approach lights.

## FLIGHT RECORDERS

The airplane was equipped with a solid-state CVR that recorded 2-hours of digital audio. The undamaged CVR was sent to the NTSB Vehicle Recorder Division where it was downloaded normally. A CVR group was formed and transcribed the communications and sounds between 2304:30 and 2331:35.

The airplane was equipped with a solid-state FDR that recorded 55 hours of data including the entire accident flight. The undamaged FDR was sent to the NTSB Vehicle Recorder Division where it was downloaded normally.

## WRECKAGE AND IMPACT INFORMATION

A post flight inspection of the airplane found substantial damage to both wingtips and ailerons. The left and right ailerons sustained abrasion damage to the outboard aft corners. The abrasion was through multiple layers of the composite lower aileron skins and affected several trailing edge fasteners such that the upper and lower aileron skins were separated at the trailing edges. The damage exceeded the limits in the manufacturer's structural repair manual requiring replacement of the ailerons which are primary flight controls.

## ADDITIONAL INFORMATION

At the time the flight's dispatch release was generated, the minimum landing distance information was provided for flaps 22 and flaps 45. Trans States Airlines' policy was to use flaps 45 for visual approaches. The flaps 45 minimum landing distance for a dry runway at the estimated landing weight of 37,100 lbs. was 4,137 ft. The flaps 22 minimum landing distance for a dry runway at the estimated landing weight was 5,338 ft. Those numbers did not take into consideration wind component factors. However, when using steady state wind component factors the minimum landing distance needed for landing on runway 6 at flaps 22 would have reduced the landing distance by about 400 ft. The crew had the performance numbers available to use runway 6.

### Information

<b>Certificate:</b>	<b>Age:</b>
<b>Airplane Rating(s):</b>	<b>Seat Occupied:</b>
<b>Other Aircraft Rating(s):</b>	<b>Restraint Used:</b>
<b>Instrument Rating(s):</b>	<b>Second Pilot Present:</b>
<b>Instructor Rating(s):</b>	<b>Toxicology Performed:</b>
<b>Medical Certification:</b>	<b>Last FAA Medical Exam:</b>
<b>Occupational Pilot:</b>	<b>Last Flight Review or Equivalent:</b>
<b>Flight Time:</b>	

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Embraer	<b>Registration:</b>	N856HK
<b>Model/Series:</b>	EMB145 MP	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>	2001	<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Transport	<b>Serial Number:</b>	145441
<b>Landing Gear Type:</b>	Retractable - Tricycle	<b>Seats:</b>	
<b>Date/Type of Last Inspection:</b>		<b>Certified Max Gross Wt.:</b>	
<b>Time Since Last Inspection:</b>		<b>Engines:</b>	
<b>Airframe Total Time:</b>		<b>Engine Manufacturer:</b>	ROLLS-ROYCE
<b>ELT:</b>		<b>Engine Model/Series:</b>	AE 3007A1
<b>Registered Owner:</b>	AFS Investments XIV LLC	<b>Rated Power:</b>	0 Horsepower
<b>Operator:</b>	TRANS STATES AIRLINES INC	<b>Operating Certificate(s) Held:</b>	Flag carrier (121)
<b>Operator Does Business As:</b>	United Express	<b>Operator Designator Code:</b>	RAIA

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Visual (VMC)	<b>Condition of Light:</b>	Night
<b>Observation Facility, Elevation:</b>	KSTL	<b>Distance from Accident Site:</b>	0 Nautical Miles
<b>Observation Time:</b>	04:51 Local	<b>Direction from Accident Site:</b>	
<b>Lowest Cloud Condition:</b>		<b>Visibility</b>	10 miles
<b>Lowest Ceiling:</b>	Overcast	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	22 knots / 27 knots	<b>Turbulence Type Forecast/Actual:</b>	/
<b>Wind Direction:</b>	30°	<b>Turbulence Severity Forecast/Actual:</b>	/
<b>Altimeter Setting:</b>		<b>Temperature/Dew Point:</b>	7°C / -2°C
<b>Precipitation and Obscuration:</b>			
<b>Departure Point:</b>	Chicago, IL (KORD)	<b>Type of Flight Plan Filed:</b>	IFR
<b>Destination:</b>	St Louis, MO (KSTL)	<b>Type of Clearance:</b>	IFR
<b>Departure Time:</b>		<b>Type of Airspace:</b>	Class B

## Airport Information

<b>Airport:</b>	Lambert-St Louis Intl KSTL	<b>Runway Surface Type:</b>	Concrete
<b>Airport Elevation:</b>	618 ft msl	<b>Runway Surface Condition:</b>	Dry
<b>Runway Used:</b>	30L	<b>IFR Approach:</b>	Visual
<b>Runway Length/Width:</b>	11019 ft / 200 ft	<b>VFR Approach/Landing:</b>	Full stop;Go around;Straight-in

## Wreckage and Impact Information

<b>Crew Injuries:</b>	3 None	<b>Aircraft Damage:</b>	Substantial
<b>Passenger Injuries:</b>	30 None	<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	33 None	<b>Latitude, Longitude:</b>	38.748611,-90.370002(est)

## Administrative Information

**Investigator In Charge (IIC):** Ward, Effie Lorenda

**Additional Participating Persons:** Eric West; FAA

**Original Publish Date:** June 9, 2020

**Last Revision Date:**

**Investigation Class:** [Class](#)

**Note:** The NTSB did not travel to the scene of this accident.

**Investigation Docket:** <https://data.nts.gov/Docket?ProjectID=92765>

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