



National Transportation Safety Board

Washington, D.C. 20594
Safety Recommendation

LOG# 1917

Date: December 19, 1986

In reply refer to: A-86-131

Honorable Donald D. Engen
Administrator
Federal Aviation Administration
Washington, D.C. 20591

On December 2, 1985, an Embraer EMB-110P1 airplane experienced a failure of the left main landing gear axle fitting, P/N 14331, during taxi for departure from Detroit Metro/Wayne County Airport, Detroit, Michigan. The airplane landing gear system received minor damage and the 15 passengers and crewmembers were not injured.

Metallurgical examination of the axle fitting at the National Transportation Safety Board's Materials Laboratory revealed a fracture between the brake attachment flange of the axle and the piston tube (body of the fitting). There were three zones of fatigue cracking on the fracture, all of which had initiated from multiple sites within the as-manufactured radius between the axle and the body of the fitting. This measured effective radius on a section through the axle was approximately 0.06 inch at the position corresponding to the locations of the fatigue initiation sites. This value is far below the manufacturer's specified radius of 10.0 mm (0.395 inch).

The axle fitting which failed had experienced 15,587 landing cycles. The Safety Board is also aware that there have been three landing gear axle fitting failures on other EMB-110 airplanes. All of these failures have occurred at the point where the axle joins the body of the fitting, and they occurred after 5,753, 7,583, and 10,929 cycles. Although no reports on these other failures are available, a representative of Embraer Aircraft Corporation has indicated that at least two of these failures also resulted from fatigue cracking which initiated in the radius between the axle and the body of the fitting. On December 13, 1985, Embraer Aircraft Corporation issued Service News Letter No. 39 which recommends inspection for cracks in the area of the failures. This was followed in July 1986 by Embraer Service Bulletin 110-032-0071 which recommends an inspection and rework procedure for the radius between the axle and body of the fitting. The axle cracking problem was described in the August 1986 issue of "General Aviation Airworthiness Alerts" (Advisory Circular AC-43-16), page 5.

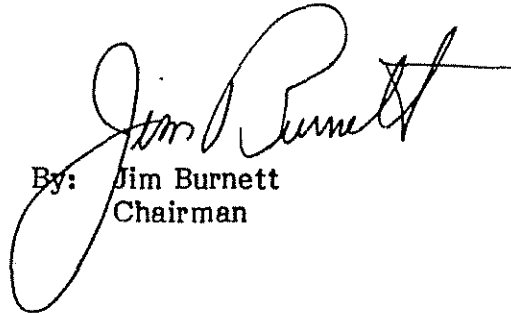
The Safety Board is concerned that there may be additional EMB-110 airplanes with main landing gear axle fittings that have an undersized radius between the axle and the body of the fitting, that the undersized radius may lead to fatigue cracks and failures of this component, and that these failures may result in substantial damage to the airplanes and injury to the occupants if they occur during a critical phase of takeoff or landing roll.

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Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Issue an airworthiness directive to require immediate inspections of the main landing gear axle fittings installed on all EMB-110 airplanes with methods adequate (1) to detect cracking in the area of the radius between the axle and main body of the axle fitting and (2) to measure this radius. The airworthiness directive should specify that any cracked fittings be removed from service and that all fittings with undersize radii be reworked to comply with the manufacturer's engineering drawing requirements within a prescribed time interval. (Class II, Priority Action) (A-86-131)

BURNETT, Chairman, GOLDMAN, Vice Chairman, and LAUBER and NALL, Members, concurred in this recommendation.


By: Jim Burnett
Chairman

File No. - 5075 12/02/85 DETROIT, MI Brief of Incident

A/C Reg. No. N90427

Time (Lcl) - 1150 EST

---Basic Information---

Type Operating Certificate-COMMUTER

Name of Carrier - SIMMONS AIRLINES

Type of Operation - SCHEDULED, DOMESTIC, PASSENGER

Flight Conducted Under - 14 CFR 135

Incident Occurred During - TAXI

Aircraft Damage - MINOR

Fire - NONE

Injuries - Fatal 0 Serious 0 Minor 0

Crew - None

Pass - 2

None - 13

ELT Installed/Activated - UNK/NR

Stall Warning System - YES

---Aircraft Information---

Make/Model - EMBRAER EMB-110P1

Landing Gear - TRICYCLE-RETRACTABLE

Max Gross Wt - 12500

No. of Seats - 20

Eng Make/Model - P3M PT6A-34

Number Engines - 2

Engine Type - TURBOPROP

Rated Power - 500 HP

---Environment/Operations Information---

Weather Data

Mx Briefing - UNK/NR

Method - UNK/NR

Completeness - UNK/NR

Basic Weather - UNK/NR

Wind Dir/Speed - VMC

Visibility - 280/027 KTS

Lowest Sky/Clouds - UNK/NR

Lowest Ceiling - 2500 FT SCATTERED

Obstructions to Vision - NONE

Precipitation - BLOWING SNOW

Condition of Light - SNOW

Daylight - DAYLIGHT

---Personnel Information---

Pilot-In-Command

Certificate(s)/Rating(s)

ATP

SE LAND, ME LAND

Age - 31

Biennial Flight Review - YES

Current - YES

Months Since - 2

Aircraft Type - EB110P1

Medical Certificate - UNK/NR

Total Flight Time (Hours) - 3200

Make/Model - 150

Instrument - 0

Last 24 Hrs - UNK/NR

Last 30 Days - UNK/NR

Last 90 Days - 100

---Narrative---

THE ACFT SUFFERED A FAILURE OF THE LEFT REAR AXLE DURING TAXI TO TAKEOFF.

Brief of Incident (Continued)

File No. - 5075 12/02/95 DETROIT, MI A/C Reg. No. N90427 Time (Lcl) - 1150 EST

Occurrence AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION
Phase of Operation TAXI - TO TAKEOFF

Findings(s)

1. LANDING GEAR, AXLE - FAILURE, TOTAL

-----Probable Cause-----

The National Transportation Safety Board determines that the Probable Cause(s) of this incident is/were finding(s) 1