

Investigation Report

The Investigation Report was written in accordance with para 18 Law Relating to the Investigation into Accidents and Incidents Associated with the Operation of Civil Aircraft stating facts only.

Identification

Type of Occurrence:	Serious incident
Date:	3 July 2006
Location:	Saarbrücken Airport
Aircraft:	Airplane
Manufacturer / Model:	Embraer / EMB 145
Injuries to Persons:	None
Damage:	Minor damage to aircraft
Other Damage:	None
Information Source:	Investigation by BFU
State File Number:	BFU EX005-06

Factual Information

History of the Flight

The following information was derived from crew statements, radar and flight data recordings. At 1908 hrs¹, the Embraer EMB 145 taxied via taxiway C on to runway 09 of Saarbrücken Airport. During the turn the left nose landing gear axle fractured and the airplane lost its left nose wheel. The flight crew did not notice the loss of the nose wheel. They did, however, notice metal pieces on the threshold of runway 09. Take-off occurred at 1909 hrs; arrival aerodrome was Munich Airport. After take-off the flight crew reported the metal pieces they had seen.

The Luftaufsicht (aviation supervision office) inspected the operating areas, and found the left nose wheel, and two metal rings in the area of threshold runway 09. The flight crew was notified accordingly. The flight to Munich was continued. A low overflight alongside runway 08L at Munich Airport showed that the remaining right nose wheel was undamaged. The subsequent landing occurred without problems. The airplane taxied to the parking position.

Aircraft Information

The aircraft had a certificate of registration issued in Luxembourg.

Manufacturer:	Embraer
Type:	EMB 145 LU
Manufacturer's Serial Number (MSN):	145369
Delivery:	12 January 2001
Maximum Take-Off Mass (MTOM):	21,990 kg
Operating hours:	13,530
Flight cycles:	11,962

¹ All times local, unless otherwise stated.

The Liebherr nose landing gear - serial number 00496 - had been fitted during manufacture. On 14 March 2006 it had been inspected during a C-check. On 16 May 2006 the maintenance organisation replaced both nose wheels due to wear.

Aerodrome Information

Saarbrücken Airport has one 2,000 m long and 45 m wide asphalt runway with a bearing of 087°/267°. On the day of the incident runway 09 was in service.

Munich Airport has two 4,000 m long and 60 m wide concrete runways with a bearing of 082°/262°. At the time of the incident the airplane used runway 08L.

Wreckage and Impact Information

The nose landing gear of the Embraer EMB 145 (Appendices Image 1) was equipped with a through axle which was fitted in the centre of the landing gear leg. The two nose wheels were mounted with tapered roller bearings to the two axle legs to the left and right of the landing gear leg. Crown nuts held the mounting and therefore the wheels in place (Appendices Image 2). The fastening torque of the crown nuts determined the bearing clearance. Bolts prevented the crown nuts from spinning off the axle.

The left axle leg fractured in the area of the inner wheel mounting. The mounting directly adjacent to the fracture was destroyed, and showed distinct staining due to overheating (Appendices Image 3).

The fracture pieces were examined at the Technische Universität Braunschweig, Institut für Werkstoffe (IfW). The macroscopic appearance of the fracture surface did not allow a definite identification of the type of fracture. Therefore the fracture surface was examined using a scanning electron microscope. The micro-ductile comb structure typical for forced ruptures was found (Appendices Image 4). To verify the result a reference fracture was induced on the larger of the fracture pieces which subsequently showed the same micro topography. In summary it was determined that the wheel axle was not pre-damaged by a fatigue crack. No indications were found pointing to a corrosive attack. The entire fracture surface showed exclusively signs of forced rupture.

Investigator in charge: Dietmar Nehmsch

Assistance: Dieter Ritschel

Braunschweig, 31 July 2015

Appendices

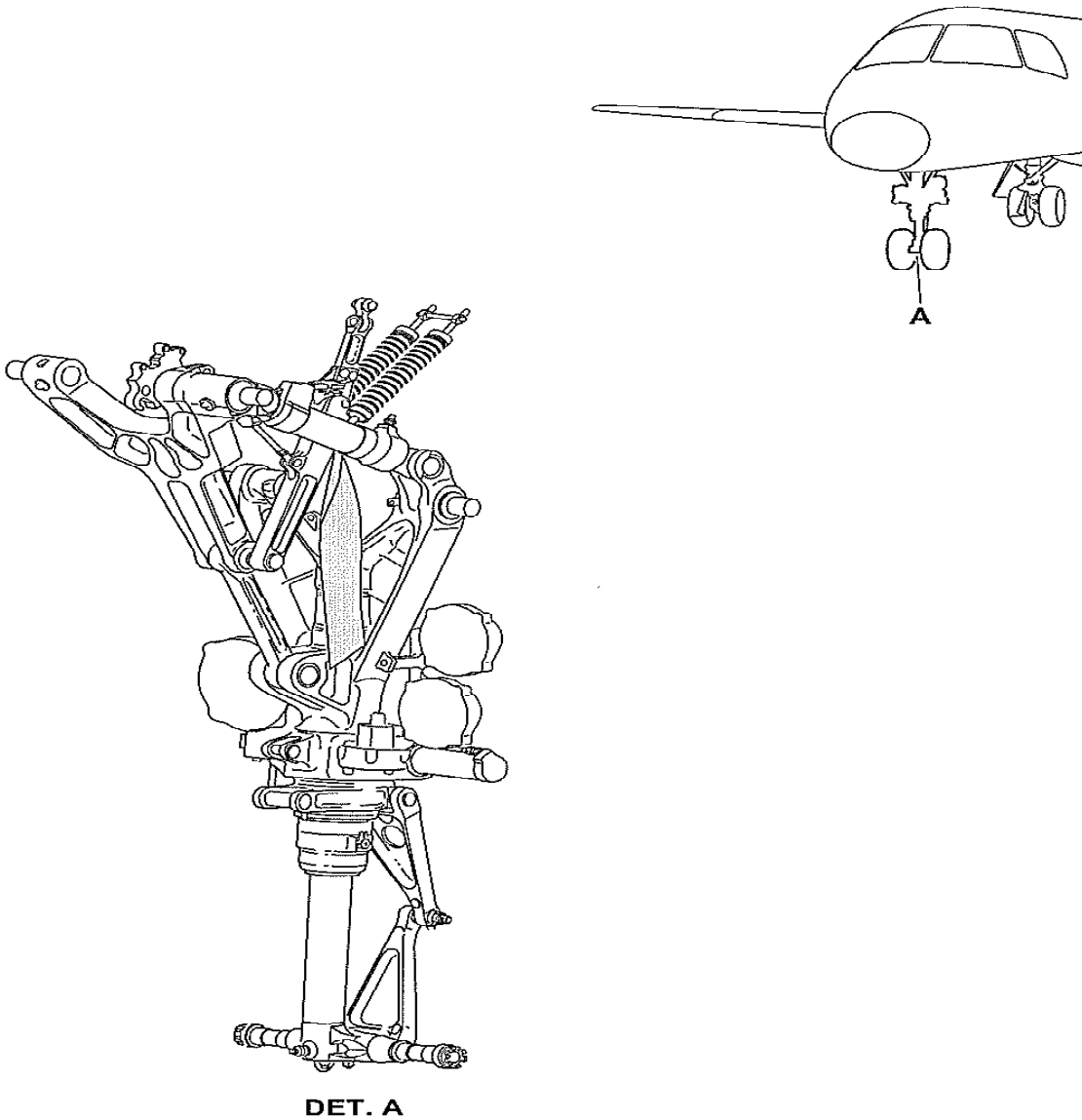


Image 1: Nose landing gear Embraer EMB 145

Source: Embraer



Image 2: Axle with crown nut and safety bolt

Source: BFU



Image 3: Axle stump with destroyed tapered roller bearing

Source: BFU

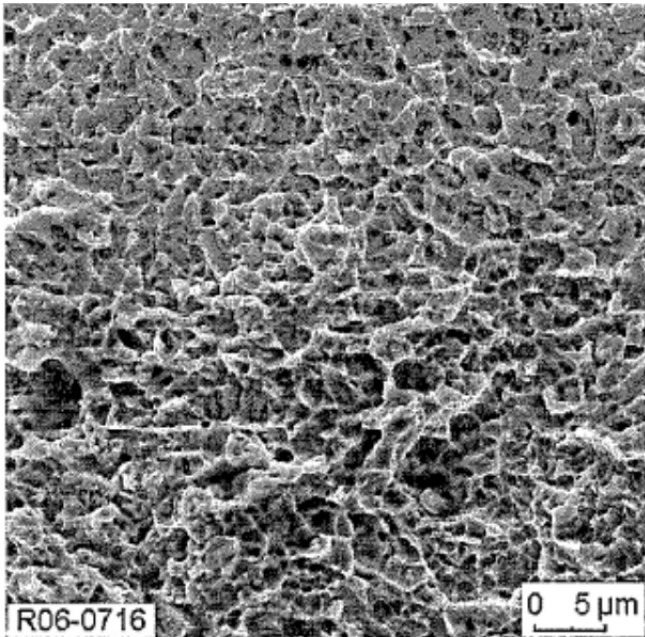


Image 4: Scanning electron microscopic image, micro-ductile comb structure

Photo: IfW

This investigation is conducted in accordance with the regulation (EU) No. 996/2010 of the European Parliament and of the Council of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation and the Federal German Law relating to the investigation of accidents and incidents associated with the operation of civil aircraft (*Flugunfall-Untersuchungs-Gesetz - FIUUG*) of 26 August 1998.

The sole objective of the investigation is to prevent future accidents and incidents. The investigation does not seek to ascertain blame or apportion legal liability for any claims that may arise.

This document is a translation of the German Investigation Report. Although every effort was made for the translation to be accurate, in the event of any discrepancies the original German document is the authentic version.

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