

Airbus A320-211, D-AIPX, 9 July 2002

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Category: 1.1

Aircraft Type and Registration:	Airbus A320-211, D-AIPX	
No & Type of Engines:	2 CFM56-5-A1 turbofan engines	
Year of Manufacture:	1991	
Date & Time (UTC):	9 July 2002 at 0742 hrs	
Location:	London Heathrow Airport	
Type of Flight:	Public Transport	
Persons on Board:	Crew - 7	Passengers - 112
Injuries:	Crew - None	Passengers - None
Nature of Damage:	Damage to left main landing gear and trailing edge flaps	
Commander's Licence:	Airline Transport Pilots Licence	
Commander's Age:	40 years	
Commander's Flying Experience:	9,000 hours (of which 3,500 were on type)	
	Last 90 days - 170 hours	
	Last 28 days - 80 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot and further enquiries by AAIB	

Shortly after a normal touchdown on Runway 27L at London Heathrow Airport, the flight crew felt light vibrations originating from the left side of the aircraft. Approximately four seconds later, two caution messages, 'GEAR NOT DOWN', and 'SYSTEM DISAGREE' appeared on the Electronic Centralised Aircraft Monitoring (ECAM) displays. The aircraft, which remained controllable as on a normal landing, vacated the runway and stopped on the taxiway for inspection by the Airfield Fire Service and the operator's maintenance organisation. It was found that most of the tread had become detached from the left main landing gear inboard tyre; however the tyre carcass had remained inflated.

After insertion of the left main landing gear safety pin, the aircraft was towed to a parking stand where the passengers disembarked normally.

Examination of the aircraft and tyre

Two Landing Gear Control and Interface Units (LGCIUs) control the extension and retraction of the landing gear and the operation of the doors. They also supply information about the landing gear to the ECAM for display, and send signals indicating whether the aircraft is in flight or on the ground to other aircraft systems. Proximity sensors for the LGCIUs are located on the landing gear struts.

It was apparent that flailing tyre debris had damaged a sensor on the left main landing gear, thus resulting in the ECAM messages. Damage had also occurred to the inboard flap components.

The tyre had been fitted to the aircraft on 18 June 2002 and had achieved 131 landings at the time of the accident, which is less than half of the usually expected tyre life. It had been retreaded once since original manufacture. According to the tyre retread contractor, the maximum allowable number of retreads for this tyre size is two. However, the operator of D-AIPX has a company policy of fitting tyres to its A320 fleet that have been subjected to a maximum of one retread process.

The tyre, together with the pieces of tread, were sent to the operator's facility in Frankfurt for examination and, thereafter, to the tyre retread contractor's facility in the Netherlands.

Most of the 'thrown' tread was recovered and could be positioned accurately on the carcass. The tread examination revealed no evidence of foreign object damage, but did show signs of 'working separation' with associated tear lines. On the carcass, the area of working separation, or fatigue process, was associated with a piece of spiral belt material, from which the tyre tread is constructed. It was concluded that the separation initiated as a result of reduced adhesion levels over this region. This developed during service, probably forming a slight bulge on the tyre, to the point where the forces generated during wheel spin-up on landing caused the tread to be thrown from the carcass.

Tyres are inspected after the retread process using a Non-Destructive Inspection (NDI) technique known as shearography. This uses holographic laser imaging of surface displacement characteristics, which reveals flaws in materials by looking for strain anomalies on the surface. Areas of poor adhesion show up in the images, although the process is necessarily dependent on the interpretative skills of the inspection personnel. The shearograms made following the retread were reviewed and an anomaly was found in the region of the tyre where the separation initiated. It thus appeared that the tyre may have been released to service as a result of a lapse in the NDI process.

As soon as the problem was confirmed, the tyre manufacturer interviewed the NDI inspector concerned and initiated an audit of his previous releases in order to assess the risk to tyres currently in service. This will include a review of all the relevant shearography records.