

Boeing 777-236, G-VIIL

AAIB Bulletin No: 11/2004	Ref: EW/A2003/08/01	Category: 1.1
Aircraft Type and Registration:	Boeing 777-236, G-VIIL	
No & Type of Engines:	2 GE90-85B turbofan engines	
Year of Manufacture:	1998	
Date & Time (UTC):	6 August 2003 at approximately 2100 hrs	
Location:	Atlanta, Georgia, USA	
Type of Flight:	Public Transport (Passenger)	
Persons on Board:	Crew - 14	Passengers - 254
Injuries:	Crew - Nil	Passengers - Nil
Nature of Damage:	Refuelling adapter broken	
Commander's Licence:	Airline Transport Pilot's Licence	
Commander's Age:	Not known	
Commander's Flying Experience:	Not known	
Information Source:	Information provided by the operator and a metallurgical examination	

History of the incident

The aircraft had arrived from London and landed at approximately 1600 hrs (local) and parked on-stand at 1613 hrs. The refuelling operative had been refuelling aircraft for about 29 years and had qualified to refuel Boeing 777 aircraft in January 2003. The operative arrived at the aircraft with a hydrant refuelling vehicle at approximately 1648 hrs. He parked the vehicle under the aircraft's left wing, inserted the vehicle's wheel chocks, raised the electro-hydraulic refuelling platform and connected two refuelling hoses to the refuelling point located under the wing, just to the rear of the leading edge. By this time all the passengers had disembarked but the flight crew were still onboard completing their arrival procedures.

The refuelling operative set the 'fuel required' figure on the aircraft's refuelling panel, which is adjacent to the refuelling point, and commenced the refuelling. When refuelling was nearly complete the operative lowered the platform towards the lower end of its travel and stepped off, using a small set of portable steps, onto the apron. When the amount of fuel being loaded onto the aircraft reached the pre-set figure that had been entered into the aircraft's refuelling panel, the automatic system started to shut the aircraft's refuelling valves. As this was taking place the refuelling operative released the 'deadman's handle' to close the apron hydrant valve which stopped fuel entering the hydrant refuelling vehicle. At about the same time the hydrant refuelling vehicle 'lurched' and the inboard of the two refuelling hoses detached from the aircraft. Because the operative had released the 'deadman's handle' only a small amount of fuel (about 17 litres) was spilled onto the apron. There was no fire.

Engineering examination of G-VIIL

The engineering examination was initially carried out by an operator's engineer in Atlanta. His examination revealed that the three lugs of the aircraft's refuelling adapter had failed and were found lodged in the refuelling nozzle that was part of the hydrant refuelling vehicle. He also found that the flexible hoses that connected the hydrant refuelling vehicle's platform to the aircraft's refuelling point were not long enough to allow the platform to descend fully when the hoses were connected to the aircraft.

The aircraft's refuelling adapter together with the three failed lugs were submitted to a materials failure laboratory in the UK for a detailed examination. After a very exhaustive examination and analysis it was concluded that the failure of the lugs was the result of excessive stress being applied via the refuelling nozzle which caused an overload failure of the lugs. There was no contribution to this failure from prior cracking, material or manufacturing defect.

Previous refuelling accident and incident

Accident to a Boeing 777 at Denver, Colorado on 5 September 2001

On 5 September 2001, just as the refuelling of a Boeing 777 commenced using a hydrant refuelling vehicle, the inboard refuelling hose broke away from the aircraft's refuelling adapter and sprayed a considerable quantity of fuel around the apron before the release of the 'deadmans handle' by the refuelling operative took effect. The fuel ignited causing fatal burns to the refuelling operator and substantial damage to the aircraft and the hydrant refuelling vehicle. The engineering examination revealed that the lugs of the aircraft's refuelling adapter had failed as a result of overload and that there was no pre-existing defect that contributed to the failure. This accident is the subject of an ongoing investigation by the National Transportation Safety Board in the USA.

Incident to an Airbus A320 at Stansted, England on 19 October 2001

On the 19 October 2001, just as a refuelling leak check using a hydrant refuelling vehicle was being carried out as part of a maintenance task, the refuelling hose broke away from the aircraft. Approximately 70 litres of fuel was sprayed around the apron before the releasing of the 'deadmans handle' by the refuelling operative took effect. The fuel contaminated two aircraft engineers who were on the refuelling platform, the refuelling operator who was stood next to his vehicle and, through an open door, the inside of the cab of the hydrant refuelling vehicle. Fortunately the fuel did not ignite.

The engineering examination revealed that the screws attaching the refuelling adapter to the aircraft's refuelling manifold had failed in overload and that they had been subjected to excessive tensile stress at some time prior to the incident. Enquires found that immediately before to the previous flight, a refuelling vehicle was driven away whilst its refuelling hose was still attached to the aircraft, failing the three lugs of the aircraft's refuelling adapter. The maintenance check was being performed following the replacement of the refuelling adapter using the same attachment screws that had been used to attach the damaged adapter.

Safety actions taken by the operator of G-VIIL

Following the investigation into this incident to G-VIIL, the aircraft operator made four internal safety recommendations. Two of these recommendations were associated with internal company procedures and training. One recommendation was for a risk assessment to be carried out to determine the safer position for the refuelling operative during refuelling, either on the platform or on the ground. The fourth recommendation was for all hydrant refuelling vehicles that refuel the operator's Boeing 777 aircraft to have refuelling hoses of adequate length. The hoses were to be long enough to allow the platform to be fully lowered during refuelling and so not apply any loads to the aircraft's refuelling adapter except the weight of the hose and the fuel contained within it.