

## ACCIDENT

<b>Aircraft Type and Registration:</b>	Airbus A320 -233, HA-LPJ
<b>No &amp; Type of Engines:</b>	2 IAE V2500-A1 turbofan engines
<b>Year of Manufacture:</b>	2007
<b>Date &amp; Time (UTC):</b>	12 March 2009 at 0902 hrs
<b>Location:</b>	Stand 40, London Luton Airport
<b>Type of Flight:</b>	Commercial Air Transport (Passenger)
<b>Persons on Board:</b>	Crew - 6                      Passengers - 136
<b>Injuries:</b>	Crew - None                      Passengers - None
<b>Nature of Damage:</b>	Nosewheel and damage to engine cowling
<b>Commander's Licence:</b>	Airline Transport Pilot's Licence
<b>Commander's Age:</b>	35 years
<b>Commander's Flying Experience:</b>	5,447 hours (of which 2,952 were on type) Last 90 days - 198 hours Last 28 days - 64 hours
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot and further enquiries by the AAIB

## Synopsis

While the aircraft was being pulled forward by the tug after a misaligned pushback, both the towbar's shear pins failed and the aircraft became detached from the tug. The aircraft continued to roll forwards and collided with the tug causing damage to both. Neither ground crew was injured.

## Background information

The towbar in this incident had a wheeled undercarriage to support it while being moved un-laden. The undercarriage was adjusted hydraulically through the range of heights necessary to facilitate connecting to, and towing, aircraft. It had two shear pins to provide torque and axial overload protection for the

aircraft's nose gear that connects the towbar head to the towbar.

Approximately eight months before this incident, the towbar had two bricks attached to one side to help level the undercarriage when it was raised. After this incident it was discovered that the level imbalance was because one of the undercarriage's tyres was pneumatic and one was solid. The valve in the hydraulic pump, which holds up the undercarriage, was also found to be leaking.

Stand 40 at London Luton Airport has a descending gradient of between 1% and 1.5% to the east.

## History of the flight

HA-LPJ was cleared to pushback from Stand 40 on the north apron at London Luton Airport, to face east. This meant it would initially be pushed back in a northerly direction before being turned west up the slope. In attendance were a tug driver and a headset operator. The towbar and tug were already connected to the aircraft when the tug driver arrived for the pushback. The headset operator was informed by the aircraft commander that they were cleared to commence the pushback. The headset operator then instructed the commander to release the aircraft's brakes and informed him he was cleared to start both engines; the pushback was then commenced.

The aircraft had been pushed back clear of the roadway, at the rear of the stand, when the manoeuvre was halted by the tug driver because the towbar's undercarriage had started to lower. The tug driver signaled to the headset operator to raise the undercarriage which he did. The pushback was restarted and the aircraft was pushed back and turned up the slope. The tug driver, believing the aircraft would not end up aligned with the taxiway centreline, decided to reposition the aircraft. He planned to do this initially by towing the aircraft forward towards the stand. During this manoeuvre both the shear pin and axial pin on the towbar failed, resulting in the towbar detaching from the aircraft. The tug driver stopped the tug and signaled to the headset operator to instruct the commander to set the aircraft's parking brake. At this point the aircraft, with both engines at idle power, began to move towards the tug. Anticipating a collision, the tug driver vacated the tug and ran clear two seconds before the aircraft's right engine collided with the tug cabin. The flight crew had been unable to see events developing on the ground because the aircraft's structure had obscured their view.

As a result of the collision the tug sustained substantial damage to its cabin and the aircraft sustained damage to its nosewheel tyre and the right engine inlet cowl and fan blades. The ground crew were uninjured.

CCTV captured the event on two separate cameras from different angles. It showed that just prior to the tug pulling the aircraft forward, the towbar and the tug were at a large acute angle. After the incident the aircraft's nosewheel was found having turned through nearly 90 degrees to the right. The towbar head was still attached to the nosewheel.

## Commander's comments

The commander stated that after both engines had been started during the pushback the aircraft was pulled forward for what he believed to correct the pushback track. A few seconds later, the headset operator said "looks like we have a problem with the towbar" and then shouted "set your brakes." The aircraft started to shake as the commander "jumped" onto the brakes and stopped the aircraft. He was then informed by the headset operator and the cabin crew that the aircraft had collided with the tug.

## Handling agent's comments

The handling agent commented that the maximum allowable nosewheel angle during a pushback for an A320 was 90° as indicated on the nosewheel door and stated in the aircraft manufacturer's ground handling manual. However, they would normally push at angles of between 45° and 60° at Luton Airport. At other airports however, aircraft are regularly pushed back using the maximum angle of 90°. They added that there were no markings on this aircraft to indicate this maximum angle (although there are on other aircraft) and there was no maximum angle stated in the aircraft operator's ground operations manual.

During rectification of the towbar's undercarriage hydraulic pump, it was discovered that the 'up, down and hold' valve was leaking in the hold position which allowed the undercarriage to creep down very slowly.

The handling agent also added that both pins had been replaced three weeks prior to the incident.

### **Towbar manufacturer's comments**

A representative of the towbar manufacturer viewed the CCTV footage and inspected the towbar head. He commented that it is very unusual for both pins to fail. On inspection of the towbar head, he noted that the outer turn bush was sitting approximately 4 mm proud of the shear face because of apparent damage to the towhead. He added that this damage appeared to be pre-incident because of the lubrication and colour of the bush.

He also added that the pushback angle was close to the 90° limit and he believed that "due to the bush being out of position it would have acted as the shear pin, rather than the actual shear pin...this could explain how the tug was able to get such an acute angle without the shear pin breaking".

### **Discussion**

Prior to the pins failing, the towbar's undercarriage unintentionally lowered, causing the pushback to be stopped so that it could be raised. This may have distracted the tug driver, which could have led to him pushing the aircraft off the ideal track.

The tug driver was in the process of re-positioning the aircraft when the torque pin and axial pin on the towbar

failed, leaving the head unit attached to the nose gear of the aircraft. A combination of the towing angle, the gradient of the taxiway, the aircraft's thrust and the incorrectly seated bush resulted in an abnormal load being transmitted through the towbar, causing both pins to fail.

Had only one pin failed, the tug and aircraft would have remained attached and the incident would not have happened.

### **Safety actions**

Although not a London Luton Airport requirement, the handling agent has amended its procedure for pushbacks on the north apron and will not permit aircraft to start engines until aircraft are positioned on the taxiway centreline.

As a result of the condition of the towbar and its prolonged usage with the bricks attached, the handling agent issued the following notice to all of its UK bases:

*'[Handling agent's] WORK EQUIPMENT*

*All staff must ensure that all work equipment is inspected before use, and any defects reported.*

*Temporary repairs will only be carried by Fleet Maintenance or the relevant Service Engineer.*

*Modifications can only be made with the authorisation of the Fleet Maintenance General Manager.'*