

**ACCIDENT**

<b>Aircraft Type and Registration:</b>	Airbus A320-232, HA-LPL
<b>No &amp; Type of Engines:</b>	2 IAE V2500 turbofan engines
<b>Year of Manufacture:</b>	2007
<b>Date &amp; Time (UTC):</b>	23 March 2019 at 2110 hrs
<b>Location:</b>	Stand 2, Bristol Airport
<b>Type of Flight:</b>	Commercial Air Transport (Passenger)
<b>Persons on Board:</b>	Crew - 6                      Passengers - 159
<b>Injuries:</b>	Crew - None                      Passengers - None
<b>Nature of Damage:</b>	Torque link lock plate and nut damaged on nose landing gear
<b>Commander's Licence:</b>	Airline Transport Pilot's Licence
<b>Commander's Age:</b>	40 years
<b>Commander's Flying Experience:</b>	8,313 hours (of which 3,500 were on type) Last 90 days - 150 hours Last 28 days - 43 hours
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot and enquiries made by the AAIB

**Synopsis**

The aircraft was being pushed back from its stand by a 'towbarless' tug when the pilots detected a "major shake" from the aircraft nose landing gear. On inspection, damage was found on the torque link pivot of the nose landing gear and the aircraft had to be taken out of service. The damage had been the result of incorrect alignment of the tug lifting paddles. This was caused by the tug laser alignment system being lined up on the nose gear main forging whilst the nosewheels were 10° to 15° off centre. The handling company have taken four safety actions to prevent recurrence.

**Sequence of events**

An Airbus 320 at Stand No 2 at Bristol Airport had been given clearance and was being made ready for pushback. The nosewheel steering bypass pin had been installed and the TLD 200MT lift tug was aligned with the aircraft nose landing gear main forging. The tug was being driven by a driver undergoing his first pushback in this model and type of tug, under the direct supervision of a trainer seated alongside in the cab.

The tug was being brought forward using its laser guidance system and joystick and was at the point where the 'paddles' close around the nosewheels. Whilst this was taking place the trainer observed movement of the nose gear followed by a bang.

The driver immediately stopped the procedure, the brakes were applied, and the trainer and driver exited the cab to investigate the cause of the bang. On inspection they found that the paddle on the left side of the aircraft had contacted, and damaged, the nut on the torque link centre pivot. There also was a significant witness mark on the paddle.

They then informed the aircraft commander and the aircraft maintenance company. The scheduled flight was cancelled, and the aircraft taken out of service. There were no injuries reported by the passengers or the crews of the aircraft and tug.

### **Subsequent investigation and findings**

The handling company carried out a detailed investigation of the events during the incident to establish the cause along with any contributory factors.

#### *The cause of the damage to the aircraft*

The movement of the aircraft nosewheels described by the trainer was a result of the tug paddle first contacting the edge of the torque link nut. Then, as the paddle closed further under hydraulic force, the edge of the nut failed and the paddle slipped past it with a jolt and a bang, as heard by the trainer.

#### *Alignment of the tug*

There were several factors which undermined the ability of the tug to pick up the aircraft nosewheels correctly. The aircraft had been parked with its nosewheels 10° to 15° off centre. This is unremarkable in most circumstances. However, in this case, the position of the wheels was important. The handling company training department confirmed that with this type and model of tug, the laser guidance system must be aligned with the nosewheels and not the nose gear leg as occurred in this case.

The tug has an automated positioning system and can align with aircraft selected from a menu. If the wrong type of aircraft is approached the system will not allow positioning. However, if the correct aircraft is selected but the tug is aligned to the nose leg and not the wheel position, the paddles are not automatically prevented from closing because the system cannot detect that the nosewheels are offset.

#### *Driver and trainer*

The driver was fully trained in pushback procedures and principles and had several years experience on conventional tow bar tugs. The driver had already been trained on the TLD 100E towbarless tug and the TLD 200MT was the second of two types of towbarless tug training being undertaken.

The trainer was a qualified ramp trainer for towbarless pushback tugs.

### **Discussion**

It is not clear why the event occurred. The handling company confirmed that the training and knowledge of the requirement to align with the nosewheels was in place. However,

in this case it is possible that a momentary lapse in concentration led to the system being aligned to the nose leg rather than the nose wheels. This error is likely to have gone unnoticed because the 10° to 15° offset of the nosewheels was not significant enough to indicate a problem.

### **Safety actions**

It was noted that aligning with the nosewheels is vital. Lining up on the nose gear leg potentially leads to misalignments of up to 250 mm. This can result in significant damage to the components on the lower articulated part of the nose landing gear on this and many other aircraft types.

The handling company has taken several safety actions as follows;

The towbarless tug training was reviewed to confirm the correct procedures are being taught. There is now a specific emphasis made on the requirement to ensure the tug is always aligned with the nosewheels.

Pushback crews have been briefed to be more aware of the importance of the nosewheel position and have been asked to make the aircraft crew aware that, if possible, the nosewheels should be straight.

The handling company are consulting with the tug manufacturer to identify and if possible, trial a system, that warns the tug operator of wheel misalignment.

The A320 has been identified as the most potentially susceptible aircraft type to sustain nose landing gear damage whilst using the TLD 200MT tug. When possible on the A320 series of aircraft, the handling company will use either the conventional tow bar and tug or the TLD 100E towbarless tug.