ACCIDENT

Aircraft Type and Registration:	Airbus A320-214, G-EZWC
No & Type of Engines:	2 CFM56-5B4/3 turbofan engines
Year of Manufacture:	2012 (Serial no: 5236)
Date & Time (UTC):	3 April 2019 at 1410 hrs
Location:	Belfast International Airport
Type of Flight:	Commercial Air Transport (Passenger)
Persons on Board:	Crew - 6 Passengers - 180
Injuries:	Crew - None Passengers - None
Nature of Damage:	Damage to leading edge of No 2 engine nacelle, underside of fuselage, leading edge of right wing, nose landing gear, and to tyre
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Age:	56 years
Commander's Flying Experience:	11,886 hours (of which 7,943 were on type) Last 90 days - 58 hours Last 28 days - 9 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot and a report into the incident by the ground handling agent

Synopsis

While being pushed back from Stand 18 at Belfast International Airport, the aircraft was stopped with the tug and tow bar positioned at a significant angle to the aircraft's nose. The tow bar disconnected from the nose landing gear, and the aircraft rolled forward and struck the tug.

The handling agent carried out an internal investigation and initiated Safety Action which is included at the end of the report.

History of the flight

The aircraft was scheduled for a flight from Belfast International Airport to Malaga Airport in Spain and was parked on Stand 18 at the terminal building. It was to depart from Runway 35, and clearance had been given to pushback to Spot L3 facing west and for engine start (Figure 1). It was raining, and the parking area was wet with the pushback being carried out in daylight.

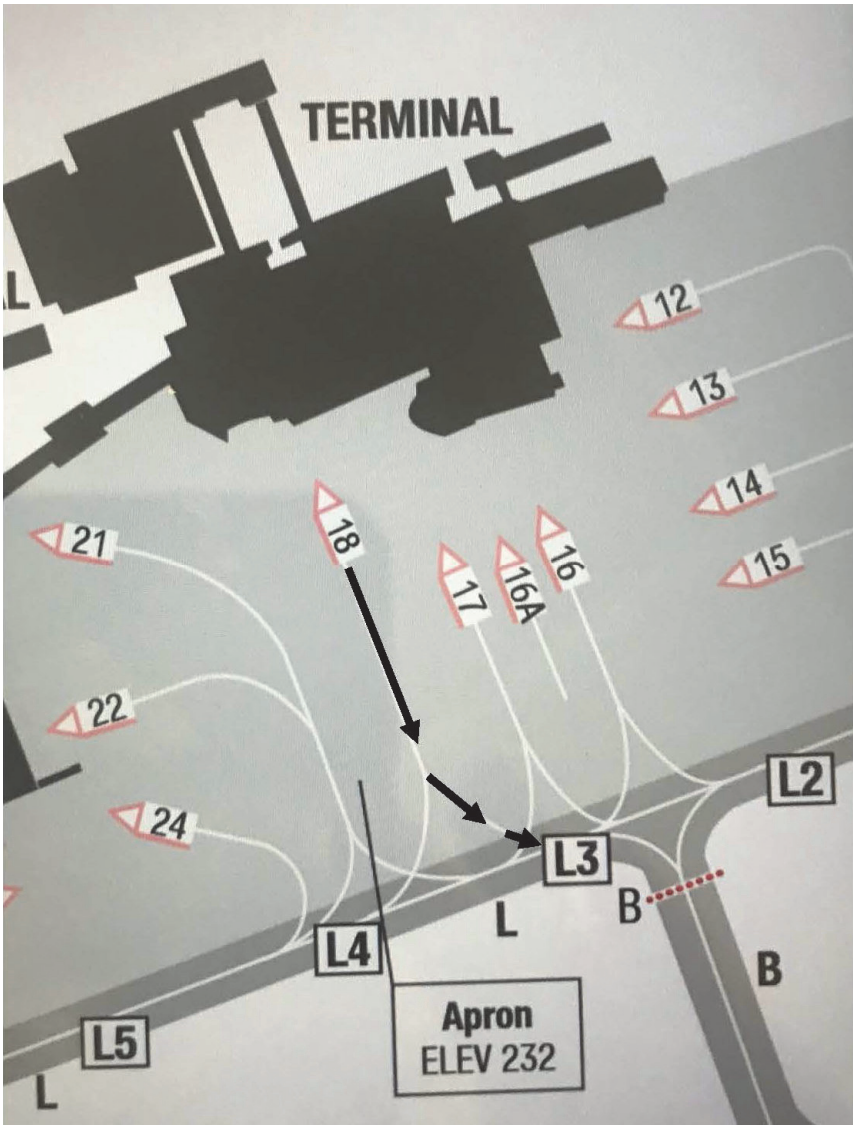

Figure 1

Parking Stand 18 showing the taxi line for the pushback to position L3

Both engines were started during the pushback, which appeared normal to the flight crew until, part of the way around the 90° turn to face west, the commander became aware that the aircraft was close to the edge of the apron. He questioned the situation with the member of the groundcrew on the headset and was told the situation was "OK". The aircraft stopped at an angle to the taxiway centreline with the nose pointing towards the grass area beyond the edge of the apron. It then started to move forward which the commander thought was to align it with the taxiway centreline, but he quickly became concerned about the direction of travel, which was towards the grass, and called the groundcrew to "STOP, STOP, STOP". There was no reply to his instruction, but he did not apply the aircraft's wheel brakes because the operator's SOPs prevented him from doing so while under tow (to prevent damage to the nose landing gear by the tug pushing or pulling against the aircraft brakes). Shortly afterwards the aircraft stopped, accompanied by an unfamiliar noise which was the underside of the aircraft contacting the roof of the tug cab (Figure 2).

Figure 2

The aircraft with the tug beneath it showing the close proximity to the edge of the apron

The commander applied the parking brake and asked the groundcrew for information as to what had happened. He found it very difficult to understand what the groundcrew was saying but he understood the right engine had been damaged and told them that he was shutting it down. He started the Auxiliary Power Unit (APU), informed ATC of the situation and requested assistance from airport ground operations.

The Cabin Manager (CM) entered the flight deck and provided an update on the passengers and what some of them had seen. The commander used the Public Address (PA) system to inform them of the situation and explained that they would have to return to the terminal to disembark them. He then shut down the left engine. At this point, there were two fire vehicles and several operations vehicles present and the commander was surprised by how many people were taking photographs, especially when he still had no clear idea of the situation. He contacted ATC on the ground frequency to try and establish what had happened to ensure that any potential hazards were identified. The airport Rescue and Fire Fighting Service (RFFS) inspected the damage and the fire crew informed him that the number two engine was damaged (Figure 3) but there was no fuel leak and no need for an evacuation.

The fire crew advised the commander that the aircraft had rolled forward over the tug which was wedged under the fuselage. Following a discussion with the operator's Base Captain, it was decided to disembark the passengers through the rear right door because the front left door was close to the edge of the apron and the front right door was close to the tug and debris. The commander made a PA announcement to that effect, whilst

emphasising that the disembarkation must be carried out in an orderly manner to avoid there being too much weight at the rear of the aircraft at any one time. The passengers left the aircraft and were then taken to the terminal building in coaches.

Figure 3

The damage to the right engine intake caused by the initial impact with the tug

Report by the ground handling agent

The ground handling agent carried out an investigation into the incident and their report is summarised below.

The pushback groundcrew comprised a tug driver and headset man who was in direct contact with the aircraft's flight crew, but there was no radio communication between the tug driver and the headset man. There was also a third person who was observing the pushback for training purposes. The aircraft was close to maximum all up weight and the latter part of the pushback was uphill which, when combined with the engine start and wet surface, increased the workload on the pushback groundcrew. The tug driver had difficulty seeing the taxi line due to the wet reflective surface of the apron and the tug was struggling to move the aircraft due to a high gear having been selected. The turn to L3 was made late and the aircraft's position was closer to the edge of the apron than normal (Figure 4).

Figure 4

Images showing the normal and incident pushbacks

The tug driver attempted to correct the situation by stopping the pushback and selecting a lower gear on the tug. When the pushback was stopped, the tug was at an acute angle to the aircraft and the tow bar angle was possibly close to the 75° maximum angle to the aircraft's centreline. The aircraft, which was at idle power and facing down-slope, moved forward and, at some point, the shear pin in the tow bar failed disconnecting the tow bar and tug from the aircraft (Figure 5).

Figure 5

The tow bar to nose landing gear attachment unit with the shear-bolt circled

With the aircraft's brakes released, the combination of the aircraft facing downslope and both engines running at idle, meant that it moved forward impacting the tug with the right engine nacelle, which caused the aircraft to yaw to the right as it moved forward and overran the tug, wedging it under the aircraft. Given the unusual situation, the headset man and tug driver were slow to react but the rate of forward movement of the aircraft was at a speed consistent with towing and the tow bar disconnect may not have been immediately apparent.

Recorded information

Both the CVR and FDR were downloaded, and the airport CCTV recorded images showed the pushback and point at which the tow-bar separated. This information supported the descriptions provided by the flight crew and ground staff involved in the incident.

Analysis

The pushback was a frequently-conducted procedure with two experienced groundcrew members performing it. The late turn towards L3 was caused by the tug driver not being able to see the taxi line clearly due to the wet reflective surface of the apron. The commander, who had been monitoring the engine start as well as the progress of the pushback, was concerned with the closeness to the edge of the apron but was reassured by the headset man responding that the situation was "OK".

The aircraft came to a halt pointing downhill towards the grass but then began to move forward slowly under idle thrust and with the tow bar having detached from the tug. Given

the low speed, it appeared to the flight crew that the aircraft was still under tow and that they should not, therefore, apply the brakes. Despite the commander's repeated instructions for the tow to be stopped, the aircraft continued moving, turning to the right because of the impact with the tug, until the impact caused it to a stop.

Conclusion

During the pushback, the left turn was made beyond the correct turning point because the tug driver had difficulty seeing the taxi line in the wet reflective surface of the apron. The aircraft was stopped with the tug and tow bar positioned at a significant angle to the right of the aircraft's nose and, at some point, the tow bar disconnected from the nose landing gear. The aircraft rolled forward slowly, and the flight crew believed it was still under tow and they could not apply aircraft brakes. The aircraft was brought to a halt when it struck the tug.

Safety action

Following this incident, the handling agent took action to prevent a reoccurrence of the incident:

1. A Safety Alert was issued to all staff regarding the incident.
2. A training awareness training module was developed covering the use of pushback tugs and gear selection.
3. Refresher training was instigated for headset procedures and action to be taken in the event of a shear pin to bar head separation.
4. A Safety App was developed that all managers and supervisory assessment staff could use on pushback and/or headset evaluation.
5. Bluetooth headsets would be issued to tug drivers to improve communication with the flight deck.