

SERIOUS INCIDENT

Aircraft Type and Registration:	Boeing 737-3L9, G-OGBE	
No & Type of Engines:	2 CFM CFM56-3C1 turbofan engines	
Year of Manufacture:	1995	
Date & Time (UTC):	6 February 2009 at 0737 hrs	
Location:	Birmingham Airport	
Type of Flight:	Commercial Air Transport (Passenger)	
Persons on Board:	Crew - 5	Passengers - 100
Injuries:	Crew - None	Passengers - None
Nature of Damage:	None	
Commander's Licence:	Airline Transport Pilot's Licence	
Commander's Age:	39 years	
Commander's Flying Experience:	5,398 hours (of which 4,300 were on type) Last 90 days - 121 hours Last 28 days - 25 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot and further enquiries by the AAIB	

Synopsis

The aircraft was scheduled to operate a commercial air transport flight from Birmingham to Edinburgh. The weather was poor and the crew had the aircraft de-iced prior to departure. The stabiliser trim was not set at the usual time due to the ongoing de-icing procedure and the omission was not noticed after start because the crew became preoccupied with the flap setting. G-OGBE started its takeoff run with the incorrect stabiliser trim setting, the first officer was unable to raise the nose at V_R and the captain decided to reject the takeoff. The thrust levers were closed at 155 kt and the aircraft stopped without further incident.

A number of distractions, combined with unusual

demands imposed by the poor weather, led to a break down of normal procedures and also allowed a missed action to go unchecked. Concerns about the weather featured strongly in the captain's decision to reject the takeoff above V_1 .

History of the flight

Prior to this incident, G-OGBE had been left overnight with the stabiliser in the full nose-down position, selected using the electric trim switch in accordance with company procedures. On the morning of the incident, the aircraft was scheduled to operate a commercial air transport flight from Birmingham to Edinburgh. The weather conditions were surface wind

of 350°/6 kt, visibility 2.5 km in snow, broken cloud at 2,600 ft and a temperature of 0° C. The crew asked for G-OGBE to be de-iced and the work was carried out by the handling agent using Type 2 de-icing fluid. The process started at 0659 hrs, finished at 0713 hrs and the holdover time was between 30 and 65 minutes.

It was normal practice during pre-flight preparations for the first officer to set the stabiliser trim to the takeoff position when the crew checked information from the loadsheet. On this occasion, however, G-OGBE was being de-iced at the time and the trim could not be set. During the after-start checks the crew focussed on leaving the flap up, as they expected slushy conditions while taxiing. The trim setting was not checked.

While taxiing towards the runway, the snow became “moderate to heavy” according to the captain and his attention turned to the holdover time. He decided to reduce the holdover time to between 35 and 40 minutes giving a last takeoff time of 0739 hrs. The crew selected flaps for takeoff when G-OGBE arrived at the holding point and the aircraft began its takeoff run at 0737 hrs.

The first officer was the handling pilot and, at rotation speed, he used a “normal pull” on the control column to rotate the aircraft. He “doubled his effort” after his first attempt had no effect and then called to the captain to inform him of the situation. The captain was aware there was no rotation and decided to stop the aircraft. Four seconds after the first attempt at rotation, the thrust levers were closed and the crew carried out the rejected takeoff procedure. The speed was under control with 900 m of runway remaining, which allowed braking to be reduced, and the aircraft vacated the runway at the upwind end. The fire service inspected the brake units and reported that it was safe for the aircraft to proceed back to stand.

During the taxi back to stand, the crew noticed the stabiliser trim was set to 3 units and not 4.5 units as was required for the takeoff. When on stand, the fire service inspected the brakes again and informed the captain that their temperature posed no further threat. No evidence was found that the controls were restricted as a result of icing.

Flight data recorder (FDR) information

The FDR showed that the pitch trim was set to 2.3 units. During the takeoff, at an airspeed of 135 kt, the control column was pulled aft by 7°. The pitch attitude increased by 1°, which was sufficient for the nosewheel air/ground switch to change to air mode, but the nose dropped back again almost immediately and the switch returned to ground mode. The takeoff was rejected from an airspeed of 155 kt.

Takeoff performance

The speed V_1 is used during takeoff to aid decision making in the event of an engine failure or other significant problem. Below V_1 , the aircraft is able to stop within the runway emergency distance available, whereas above V_1 it is unable to do so. Attempting to stop above V_1 is considered hazardous due to the possibility of overrunning the end of the runway

If takeoff mass is not limited by runway length, however, V_1 may be increased, subject to certain restrictions, and the aircraft would still be able to stop from the higher speed if necessary. In normal circumstances, crews do not consider the range of possible values for V_1 but use a single value obtained from the Regulated Takeoff Mass (RTOM) tables provided by the operator.

The takeoff mass for G-OGBE indicated on the loadsheet was 46,776 kg. The crew calculated the wet runway takeoff performance using the next higher mass on the

RTOM table, which was 48,500 kg. This gave a V_1 of 126 kt, a V_R of 132 kt and a V_2 of 139 kt.

Operations Manual – Technical

The technical section of the airline's Operations Manual states that, for the Boeing 737-300:

'the green band range of the Stabiliser Trim Indicator shows permissible take-off trim range (1.0 to 6.3 units). An intermittent horn sounds if take-off is attempted with the stabiliser trim NOT in the green band range.'

The trim can be set using a manual trim wheel or an electric trim switch. The nose-down limit using the electric switch is 2.5 units.

Simulator trial

The operator carried out a trial in a simulator to reproduce the conditions present during the actual takeoff. The results showed that a more forceful pull on the the control colum than normal was required to raise the nose at rotation speed. However, the results also showed that rotation was achievable and that the aircraft could have climbed away safely.

Human factors

It is the usual practice in many airlines for crews to operate a sector each as handling pilot. In this case, the decision was made for the captain to fly the return sector into Birmingham because of the poor weather forecast and so the first officer planned to operate the outbound sector. The first officer stated to the operator when interviewed that he had been less comfortable about the weather than the captain. The captain, however, was not sufficiently aware of the first officer's concerns to decide to operate the outbound sector himself.

The usual flow of pre-flight activities contained triggers for certain actions, such as the first officer setting the stabiliser trim as part of the procedure for checking the loadsheet. This flow was disrupted by the de-icing procedure and the stabiliser trim was not set. The trim setting would normally be checked as part of the after-start checklist but this check was not made because the crew was distracted by the unusual requirement to leave the flaps up while taxiing.

As G-OGBE taxied out for departure, the deteriorating weather increased the crew's workload and subsequently introduced a takeoff time constraint that had to be met. The captain believed he and the first officer became pressurised by the need to meet the revised holdover time. This was compounded by the ATC taxi clearance that required them to taxi the longest route to the holding point and caused the aircraft to be at the back of the queue on arrival. While they focussed on selecting takeoff flap prior to departure, they did not notice the incorrect trim setting.

The takeoff commenced just inside the revised holdover time limit and the captain was "very aware of this situation at the point at which the decision was made to reject". He said he was very aware of snow and potential ice-accretion coupled with holdover times. Consequently, when the first officer said he could not rotate the aircraft, the captain quickly made the decision to reject the takeoff having judged there was sufficient runway remaining to do so and believing the aircraft was not capable of flying.

Analysis

The crew was subject to a number of distractions and unusual situations before takeoff which led to a break-down of normal procedures and also allowed a missed action to go unchecked. This was compounded

because the trim setting, although incorrect, was within the green band range and so there was no warning horn to alert the crew.

Both crew members were concerned about the weather conditions and were taking off at the limit of the de-icing holdover time. When the first officer was unable to rotate the aircraft he believed there was a problem with the aircraft control surfaces. When the captain saw the lack of rotation, his concerns about possible ice accretion were reinforced and he made the decision to reject the takeoff even though the speed was, by then, well above V_1 .

The aircraft was well below its runway limited takeoff mass and it is likely that a range of V_1 speeds existed although they were not calculated. Self-evidently, G-OGBE had sufficient runway to stop from 155 kt, as

the captain had judged to be the case when he made his decision to reject the takeoff.

Subsequent actions by the operator

Crews were reminded that a configuration warning will not sound to prevent a takeoff with the trim set to the full nose-down position by the electric trim switch. The standard operating procedure and checklist action for setting the stabiliser trim is being reassessed, as is the de-icing procedure, to ensure they do not interact in such a way as to make a recurrence of this incident likely. This incident will be discussed with all crews as part of their technical refresher training and advice will be given regarding decisions to reject a takeoff. Crews will be reminded that weather conditions might sometimes preclude first officers from operating a sector.