

## ACCIDENT

<b>Aircraft Type and Registration:</b>	Boeing 737-8AS, EI-EFB	
<b>No &amp; Type of Engines:</b>	2 CFM56-7B turbofan engines	
<b>Year of Manufacture:</b>	2009 (Serial no: 37532)	
<b>Date &amp; Time (UTC):</b>	29 July 2014 at 2144 hrs	
<b>Location:</b>	Stansted Airport, Essex	
<b>Type of Flight:</b>	Commercial Air Transport (Passenger)	
<b>Persons on Board:</b>	Crew - 6	Passengers - 171
<b>Injuries:</b>	Crew - None	Passengers - None
<b>Nature of Damage:</b>	Lower rear fuselage skin and drain mast	
<b>Commander's Licence:</b>	Airline Transport Pilot's Licence	
<b>Commander's Age:</b>	26 years	
<b>Commander's Flying Experience:</b>	4,905 hours (of which 4,754 were on type) Last 90 days - 262 hours Last 28 days - 82 hours	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot	

## Synopsis

After a stable instrument approach, the engines remained at approach power during the landing flare and the aircraft bounced. The thrust levers were then moved to idle, the speed brakes deployed automatically and during the subsequent heavy landing, the tail of the aircraft scraped along the runway.

## History of the flight

The pilots report that they flew an ILS approach for a Flaps 30 landing on Runway 04 at Stansted Airport. At 500 ft aal, with the aircraft stabilised on the approach, the co-pilot, who was pilot flying, disconnected the autopilot and then the autothrottle and continued flying manually to land. The wind in the final 200 ft before landing varied slightly from the ATC reported wind of 330° at 7 kt and the co-pilot was applying left aileron, into wind, which resulted in a touchdown on the left main landing gear first. The commander reports the aircraft then bounced "a few feet" back into the air. Three or four seconds later, there was a second much firmer touchdown, during which the aircraft had a high-nose attitude. The landing rollout was normal. After shutdown, the cabin crew commented that the second landing was hard, so the commander conducted a visual inspection of the aircraft and found damage to the lower rear fuselage.

The visible damage consisted of a large scrape along the skin of the tail section of the aircraft; numerous stringers and frames beneath the surface were also damaged, requiring a substantial repair before the aircraft was returned to service.

## Technical information

During landing the speed brake on the Boeing 737 will deploy automatically if selected and certain parameters are met, including thrust levers at idle and radio altitude less than 10 ft agl.

## Recorded information

The aircraft touched down at 144.5 KCAS with 5.1° of nose-up pitch and a peak normal acceleration of 1.3g. The recorded left and right engine  $N_1$ s after touchdown were 59% and 56% respectively. The speed brake was ARMED before touchdown but switched to NOT ARMED during touchdown.

The air/ground parameter then returned to AIR. The thrust levers were retarded and reached idle approximately 2 seconds after the initial touchdown. The speed brake then became ARMED, the speed brake handle position moved to the deployed position and the flight spoilers deployed. The highest recorded radio altimeter height in this period was 5 ft. The aircraft pitch attitude initially remained at just over 5°, reduced to 4° just before spoiler deployment and then increased.

4.4 seconds after the initial touchdown, the normal acceleration parameter rapidly increased with a peak recorded value of 2.07g. Pitch reached a peak of 8.9° nose up. This pitch value remained constant for 1 second before starting to reduce. During the recorded hard landing the engine  $N_1$  values had reduced to 31%, the auto brake became active and the ground spoilers deployed. Eight seconds after the second touchdown, the nose gear registered as on the ground.

## Comment

The commander considered that the aircraft bounced because the first touchdown occurred with higher than idle thrust. When the thrust lever was selected to idle during the bounce, the speedbrakes deployed automatically; this caused a loss of lift, the nose of the aircraft to pitch up, and the subsequent tailstrike on touchdown.

The Boeing 737 Flight Crew Training Manual contains the following advice:

*'Bounced landings can occur because higher than idle power is maintained through initial touchdown, disabling the automatic speedbrake even when the speedbrakes are armed. During the resultant bounce, if the thrust levers are then retarded to idle, automatic speedbrake deployment can occur resulting in a loss of lift and nose up pitching moment which can result in a tail strike or hard landing on subsequent touchdown'*