Bombardier Canadair CL600-2B19, G-MSKP

AAIB Bulletin No: 10/2002	**Ref: EW/C2002/01/04**	**Category: 1.1**
INCIDENT		
Aircraft Type and Registration:	Bombardier Canadair CL600-2B19, G-MSKP	
No & Type of Engines:	2 General Electric Co CF34-3B1 turbo fans	
Year of Manufacture:	1999	
Date & Time (UTC):	28 January 2002 at 1430 hrs	
Location:	Runway 33, Birmingham Airport	
Type of Flight:	Public Transport	
Persons on Board:	Crew - 4	Passengers - 47
Injuries:	Crew - None	Passengers - None
Nature of Damage:	Wing tip fairing damaged	
Commander's Licence:	Airline Transport Pilots Licence	
Commander's Age:	40 years	
Commander's Flying Experience:	5,396 hours (of which 1,700 were on type)	
	Last 90 days - 134 hours	
	Last 28 days - 28 hours	
Information Source:	AAIB Field Investigation	

History of the flight

As the aircraft approached the top of descent point for Birmingham the crew obtained the current ATIS information. Identified as 'Hotel' and timed at 1355 hrs, the following conditions were reported: surface wind 250°/23 kt, visibility greater than 10 km, cloud broken at 3,000 feet. Runway 33 was the designated runway in use and the aircraft crosswind limit was 27 kt. The crew considered Runway 24 but were unable to use it because of performance limitations.

The calculated minimum approach speed (Vref) was 139 kt for the planned landing using 45° flap. The company procedures allow for an addition to this speed of half of any reported gust to a maximum addition of 10 kt. In the absence of any reported gusts the crew set the airspeed "bug" at 139 kt (the company procedure is to set the bug at Vref + 5 kt i.e. 144 kt). Because the turbulence was occasionally moderate, however, the commander decided to fly the approach at 149 kt (Vref + 10 kt), reducing to 139 kt over the threshold.

The first officer (FO) was the handling pilot during the descent and the autopilot (AP) was engaged. The commander accepted radar vectors for a surveillance radar approach in order to facilitate training for the radar controller but monitored the approach using the aircraft ILS displays. At approximately 1,000 feet above the runway the commander took control and disengaged the AP. At this stage he was visual with the runway and the aircraft was in the correct landing configuration. During the approach the tower controller passed a surface wind of 250°/22 kt when the aircraft was at 700 feet and 250°/20 kt when he subsequently cleared the aircraft to land.

The commander later reported that he was able to maintain the correct approach path without difficulty but that speed control required greater concentration than normal. As the aircraft approached the ground the turbulence increased but neither pilot became unduly concerned. Just prior to landing the commander applied right rudder to align the aircraft with the runway centre line and simultaneously applied lateral control to maintain the wings level. He recalled that at about the time the aircraft touched down the left wing began to rise rapidly and he applied full left lateral control to correct this roll.

Both pilots perceived that the landing was normal and the aircraft was taxied to the ramp where the engines were shutdown and the passengers disembarked. The line engineer then informed the commander that the lower skin of the left wing tip had sustained damage.

Damage to the aircraft

Damage to the aircraft was mainly to the forward lower surface of the left wing tip fairing which was constructed of kevlar. An area of approximately six inches square had been abraded and a small hole was evident in the middle of this abrasion. A rivet head had also been ground down where the wing tip fairing edge abuts the adjacent lower wing skin.

The wing tip fairing was repaired, as advised by the aircraft manufacturer, and refitted. The damaged rivet was replaced and the adjacent area blended to remove evidence of the scrape.

Pilot experience

The commander was the handling pilot during the final approach and landing. He had been rated on the aircraft since November 1998 and had previously flown the aircraft in limiting crosswind conditions. The FO had a total of 2,660 hours of which 460 were on this aircraft type.

Meteorological information

The synoptic situation at 1200 hrs on 28 January 2002 showed a strong westerly airflow affecting most of England and Scotland. At Birmingham airport the cloud base had remained above 3,000 feet and the visibility had been greater than 10 km since 1020 hrs. The only significant meteorological aspect was the surface wind.

Prior to descent the crew had obtained the current ATIS information, designated Hotel, which was timed at 1355 hrs and recorded a surface wind of 250°/23 kt. Three further ATIS updates were made in the next 18 minutes. All of these were related to changes in the surface wind with a maximum recorded gust of 36 kt. The flight crew were not aware of the ATIS updates.

The Manual of Air Traffic Services (MATS), Part 1, defines the criteria used to raise special aerodrome meteorological reports. With regard to the surface wind the following criteria apply:

"Criteria to be agreed locally, based on changes of operational significance at the aerodrome; otherwise,

> a A change in mean direction of 60° or more, the mean speed before or after the change being 10 kt or more, but a change of 30° when 20 kt or more.
>
> b A change in mean speed of 10 kt or more.
>
> c A change of gust speed of 10 kt or more, the mean speed before or after the change being 15 kt or more."

The National Air Traffic Services (NATS) had agreed with the Meteorological Office that they need no longer generate new ATIS information based solely on changes in surface wind. Although this agreement is implemented at most NATS sites where the ATIS is generated by SAMOS systems[1] Birmingham airport were still generating revised ATIS information in accordance with the criteria defined in MATS Part 1.

In this instance the system generated several updates around the time of interest because firstly the gust increased to 10 kt above the mean wind and then secondly the mean wind caught up with the gust. This was exacerbated by the fact that ATIS wind is based on a two minute average rather than the 10 minute average used for a METAR. The mean value therefore caught up with the gust value very quickly. However, the use of the two minute average wind for the generation of ATIS information is required by ICAO Annex 3 / WMO306.

Birmingham airport have now decided to implement the agreement reached between NATS and the Meteorological Office whereby they no longer need generate new ATIS information based solely on changes in surface wind. This should prevent the ATIS changing rapidly under such conditions thus reducing the workload for the flight crew without denying them important information. In future, if the SAMOS identifies changes in the surface wind in excess of the criteria defined in MATS Part 1, a message will flash on the met observers display screen to highlight the fact, but this will not in itself trigger an update to the ATIS information.

Flight Recorders

The solid state FDR and CVR retained recordings of the events around touchdown. The two hour CVR also retained a record of aircraft audio for a period of 90 minutes prior to this.

The approach to Runway 33 at Birmingham was uneventful. At 4,100 feet agl, as the aircraft turned left base, ATC advised a surface wind of 240°/20 kt gusting 39 kt. The landing gear was selected down at 3,000 feet agl and the aircraft was fully configured by 2,200 feet agl with full landing flap of 45° extended.

Following a frequency change to Birmingham Tower two further surface wind checks were given as 250°/22 kt and 250°/20 kt respectively. The FDR recorded values of wind speed and direction that were consistent with those reported by ATC.

Although they were not conducting an ILS approach, the crew had tuned their ILS receiver to the localiser and glideslope for Runway 33 and the relevant parameters were recorded on the FDR. By 500 feet agl the aircraft had stabilised on the extended centreline and was descending on the glideslope. An average rudder position of neutral was observed whilst drift angles of 15° right reducing to 10° right were recorded as the aircraft descended to 45 feet agl. Roll attitudes ranging from 7.8° left wing down to 5° right wing down and normal acceleration values between 0.64 g and 1.24 g were recorded during the same period. The recorded airspeed was generally about 155 kt with variations between 142 kt and 163 kt.

Below 45 feet radio altitude, pitch attitude began to increase as the aircraft flared. Right rudder was applied together with increasing roll left aileron and the drift angle reduced. Momentary left spoileron movement of 4° was recorded at a radio height of 32 feet. Thrust from both engines began to reduce symmetrically to flight idle at this point. During the one second period in which the aircraft descended from 17 feet to 9 feet radio height, drift angle reduced and the aircraft maintained a roll attitude of approximately 3.5° left wing down.

From nine feet radio height (recorded value) to an interpolated radio height of five feet, the aircraft rolled towards the right to a roll attitude of 1.4° left wing down. A brief application of nearly full roll left aileron was recorded, together with left spoileron movement of 7° at a recorded radio height of four feet and the aircraft rolled rapidly to the left achieving 9.3° left wing down. This roll attitude remained constant for half a second and is considered to be the point at which the left wing contacted the runway surface.

Main gear touchdown occurred immediately after this event. The aircraft rolled essentially wings level and the ground spoilers deployed. No evidence of the left wing ground contact was observed in the recorded values from the aircraft's tri-axis accelerometer. However, a normal acceleration of 1.46 g was recorded at main gear touchdown.

Right rudder, full into wind aileron and reverse thrust were used during the landing roll. A graph of pertinent parameters recorded during the landing is shown at Figure 1 *(jpg 95kb)*.

Summary

The flight crew were not aware of the most recent prevailing surface wind for their intended landing on Runway 33 at Birmingham and, because of the level of turbulence, increased the speed during the approach. During the landing flare the commander successfully aligned the aircraft with the runway centre line through the co-ordinated use of rudder and the lateral flight controls. However, just prior to touchdown the aircraft commenced a roll to the right that the handling pilot promptly opposed with full lateral control to the left. The left wing tip probably touched the ground at this point. The roll to the right was almost certainly the result of the strong crosswind that had previously gusted to a level above the published limits for the aircraft. The information passed to the flight crew during the latter stages of the approach however, indicated that the surface wind was within limits. In this instance there were frequent updates to the ATIS information generated by changes in the surface wind.

The generation of meteorological information by semi-automated systems is an area that is currently being reviewed by the CAA.

1. SAMOS. (Semi-automated met observing system). This equipment automatically provides observations for the non-visual elements and suggests observations for the visual elements which can then be accepted or amended as necessary by the met observer. This information is linked to, and broadcast on, the ATIS frequency.