AIRCRAFT ACCIDENT REPORT No 1/2009

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REPORT ON THE SERIOUS INCIDENTS TO BOEING 737-81Q, G-XLAC, ON 29 DECEMBER 2006; AVIONS DE TRANSPORT REGIONAL ATR-72-202, G-BWDA ON 29 DECEMBER 2006 EMBRAER EMB-145EU, G-EMBO ON 29 DECEMBER 2006 AND BOEING 737-81Q, G-XLAC ON 3 JANUARY 2007 AT RUNWAY 27, BRISTOL INTERNATIONAL AIRPORT

Three aircraft were involved in the principal events described in this report:

(i) Aircraft No 1 (This aircraft was involved in two events)

Registered Owner and Operator:	XL Airways UK Ltd
Aircraft Type and Model:	Boeing 737-81Q
Registration:	G-XLAC
Place of Incident:	Runway 27, Bristol International Airport Latitude: 51º 22' N Longitude: 002º43' W
Date and Time:	(i) 29 December 2006 at 1150 hrs (ii) 3 January 2007 at 1832 hrs

(ii) Aircraft No 2

Registered Owner and Operator:	Aurigny Air Services Ltd
Aircraft Type and Model:	Avions de Transport Regional ATR-72-202
Registration:	G-BWDA
Place of Incident:	Runway 27, Bristol International Airport
Date and Time:	29 December 2006 at 1215 hrs

(iii) Aircraft No 3

Registered Owner and Operator:	British Airways CitiExpress PLC
Aircraft Type and Model:	Embraer EMB-145EU
Registration:	G-EMBO
Place of Incident:	Runway 27, Bristol International Airport
Date and Time:	29 December 2006 at 2133 hrs

All times in this report are UTC unless otherwise stated.

Synopsis

The serious incidents involving G-BWDA and G-EMBO were notified to the Air Accidents Investigation Branch (AAIB) on 29 December 2006. An investigation into the two serious incidents began on 2 January 2007. During this investigation, the events involving G-XLAC, and others, were identified. All events took place during landings at Bristol International Airport, hereafter referred to as BIA.

The AAIB investigation team comprised:

Mr K Conradi	(Investigator-in-Charge)
Mr T J Atkinson	(Operations)
Mr S J Hawkins	(Engineering)
Mr C J Scott	(Flight Recorders)

Resurfacing and re-profiling work was taking place on parts of the runway at BIA as part of a major project to resurface the manoeuvring area pavements, and sections of the runway surface were ungrooved 'base course' asphalt. From 14 November 2006, there were reports from flight crew of a variety of problems related to the friction characteristics of the temporary runway surface, though no serious incidents occurred until 29 December 2006. On that day, the flight crew of G-XLAC experienced poor stopping performance during landing. Later that day, the flight crew of G-BWDA experienced stopping and lateral control difficulties during landing, and the aircraft departed the runway surface and came to rest on the grass area at the side of the runway. Later still, the flight crew of G-EMBO experienced lateral control difficulties during landing, and the aircraft partially left and then regained the runway. On 3 January 2007, another flight crew, also operating G-XLAC, experienced poor stopping performance. The airport was subsequently closed whilst grooves were cut in the base course. After it re-opened there were no further incidents.

The investigation identified the following causal factors:

1. Reduced friction on the wet ungrooved base course sections of the runway caused flight crews to experience reduced braking action and reduced lateral controllability on landing in strong crosswinds.

2. The Flight Operations Department Communication (FODCOM) advice published by the CAA regarding operations on runways notified 'slippery when wet', in wet conditions, was not communicated by operators to flight crews.

3. The passing, by ATC, of braking action reports based on Mu-meter friction assessments, gave flight crews a false confidence in the braking action available on the wet runway.

The investigation identified the following contributory factor:

1. G-BWDA landed in a crosswind outside the operator's published limits and the subsequent use of reverse thrust was contrary to the advice contained in the company's Operations Manual.

The AAIB has made five Safety Recommendations.

Findings

The aircraft

1. There was no evidence of the aircraft involved in the incidents having experienced a technical fault.

2. The only damage was to G-BWDA, which suffered damage to its left propeller.

3. The tread depths and pressures of the tyres on the incident aircraft were, as far as could be determined, within allowable limits.

The runway

4. The runway resurfacing work at Bristol Airport was complex because it involved an attempt to reshape parts of the runway prior to resurfacing.

5. Several separate areas of the runway had a temporary ungrooved base course Marshall Asphalt surface.

6. The runway resurfacing work was undertaken at night and during the winter to avoid disrupting flight schedules.

7. The longest stretch of ungrooved base course was the central runway portion and was 295 m long and covered the full width.

8. Marshall asphalt is not porous and, when used as a surface course, is usually grooved to allow water to drain to the side of the runway.

9. The surface friction of the ungrooved base course had not been assessed using a Mu-meter with self-wetting in dry conditions predominantly due to the prevailing weather. There was a dry period on 8 December 2006 but no staff were available to conduct the runs.

10. Mu-meter runs carried out in wet conditions revealed that the ungrooved base course had significantly less friction than the grooved runway sections.

11. Mu-meter runs of the central ungrooved section, undertaken in natural wet and damp conditions, indicated that the friction of the ungrooved base course was probably below the Minimum Friction Level (MFL) of 0.50.

12. The airport operator's risk assessment plan had not adequately addressed the hazards presented to aircraft operating on the temporary surfaces in wet and windy weather.

13. Runway surface contractors believed that temporary ungrooved base course did not represent a significant risk and were more concerned about limiting the length of ungrooved surface course to 100 m; no length limitation was specified for the ungrooved base course.

14. The information promulgated by NOTAM, that braking action information would be available during wet conditions, was incorrect.

15. Following the incidents investigated in this report, the airport operator closed the runway on 7 January 2007 and cut temporary grooves in the ungrooved base course.

16. The runway was re-opened on 8 January 2007; no further runway excursion or braking difficulty reports were received after this date.

17. The instruction in CAP 683 concerning friction assessment for resurfaced runways did not clearly include portions of runways which have been resurfaced.

18. The 295-metre full width section of runway surface covered with ungrooved base course asphalt did not provide adequate friction for safe operations when the runway surface was wet.

19. The airport authority was aware of the poor braking action provided by the ungrooved base course asphalt but did not take steps to increase the braking action available until 3 January 2007.

Flight operations

20. A significant number of flight crews experienced difficulties decelerating the aircraft after landing.

21. The flight crews of two aircraft were unable to prevent their aircraft leaving the paved surface while landing in strong crosswinds.

22. The operators of aircraft involved in the four principal events described in this report had not provided guidance concerning operations on runways notified *'slippery when wet'* to their flight crews.

23. During the landing roll of G-BWDA, the use of reverse thrust did not comply with the handling advice in the FCOM for operations in crosswind conditions.

24. The final wind information passed to G-BWDA was in excess of the wet crosswind limit for that aircraft.

Air traffic control

25. The instruction to air traffic controllers in the MATS Part 2, that they should provide runway friction value information based on Mu-meter measurements in wet conditions, was incorrect.

26. The use, by air traffic controllers, of the snow and ice table for conversion of mu-meter reading into braking action in wet conditions, was incorrect.

27. The passing of braking action reports based on CFME readings on a wet runway, ceased on 5 January 2007.

Causal Factors

The investigation identified the following causal factors:

1. Reduced friction on the wet ungrooved base course sections of the runway caused flight crews to experience reduced braking action and reduced lateral controllability on landing in strong crosswinds.

2. The Flight Operations Department Communication (FODCOM) advice published by the CAA regarding operations on runways notified 'slippery when wet', in wet conditions, was not communicated by operators to flight crews.

3. The passing, by ATC, of braking action reports based on Mu-meter friction assessments, gave flight crews a false confidence in the braking action available on the wet runway.

Contributory Factor

The investigation identified the following contributory factor:

1. G-BWDA landed in a crosswind outside the operator's published limits and the subsequent use of reverse thrust was contrary to the advice contained in the company's Operations Manual.

Safety Recommendations

Safety Recommendation 2008-075

The Civil Aviation Authority should inform airport operators about the potential hazards of operating aircraft on sections of ungrooved Marshall Asphalt base course during wet and windy conditions and require that these hazards be controlled during any runway resurfacing programme.

Safety Recommendation 2008-076

The European Aviation Safety Agency should require operators to ensure that flight crews are provided with guidance material on aircraft performance when operating on a runway that is notified as 'may be slippery when wet', or has sections thereof notified as 'may be slippery when wet'.

Safety Recommendation 2008-077

The Civil Aviation Authority should review the manner in which it transmits FODCOM information to ensure that safety critical information is effectively transmitted to private and commercial operators flying in the UK and that it is acted upon.

Safety Recommendation 2008-078

The Civil Aviation Authority should clarify to airport authorities, pilots, aircraft operators and air navigation service providers, that Continuous Friction Measuring Equipment must not be used to assess braking action on runways which are wet, although it may be used in the wet for assessing the relative friction of different runway sections for maintenance purposes.

Safety Recommendation 2008-079

The European Aviation Safety Agency should research the technical and operational feasibility of developing equipment and procedures to measure aircraft braking friction with respect to runway position, using on-board aircraft data from landings. As part of this research the European Aviation Safety Agency should develop appropriate standards of recording and methods for sharing this information, and its tolerances, in a timely manner, with interested parties.