

No: 2/84

INCIDENT

Ref: EW/C856

Aircraft type and registration: HS 748 G-BCOF (twin turbo prop – public transport aircraft)

Year of manufacture: 1975

Date and time (GMT): 29 November 1983 at 1736 hrs

Location: Sumburgh Airport, Shetland

Type of flight: Scheduled public transport

Persons on board: Crew – 3 Passengers – 17

Injuries: Crew – Nil Passengers – Nil

Nature of damage: Right inner mainwheel tyre burst

Commander's Licence: Airline Transport Pilot's Licence

Commander's Age: 38 years

Commander's total flying experience: 5200 hours (of which 786 hours were in command on type)

The aircraft was completing a scheduled passenger flight from Aberdeen to Sumburgh, via Kirkwall. Prior to their departure from Aberdeen, the flight crew had checked the weather forecasts and actual conditions at both destinations. The forecast for Sumburgh was a surface wind of 330°/26 knots, with gusts to 36 knots, visibility 10 kilometres or more, 1 okta of cloud at 1800 feet, 3 oktas at 2600 feet, and 5 oktas at 3200 feet; temporarily, visibility 5000 metres with hail showers and 5 oktas at 1400 feet. A Snow Notice to Airman (SNOWTAM) had also been issued from Sumburgh.

The aircraft took off from Aberdeen at 1602 hrs and arrived at Kirkwall on schedule, landing at 1642 hrs. During the ground turn-round the flight crew re-checked the Sumburgh actual weather conditions with particular reference to the surface wind and runway braking action. The surface wind was reported as 340°/28 knots, and the braking coefficient readings (Mu-meter) were all in excess of 0.60, indicating that the measured braking action was 'good'. These readings were taken at Sumburgh at 1600 hrs, when the runway surface was described as wet with 'small amounts of slush in places'.

As the cross-wind component was within the company limitation (30 knots) and the landing runway conditions were reported as satisfactory, the flight was re-commenced and the aircraft took off from Kirkwall at 1709 hrs.

The aircraft contacted Sumburgh Approach Control at 1714 hrs, having previously copied the Sumburgh Automatic Terminal Information Service (ATIS), information Delta, timed at 1650 hrs. This reported the surface wind as 340°/26 knots, maximum gusts 36 knots; visibility 30 kilometres, nil weather; air temperature plus 04°C, dew point minus 03°C; runway in use 27. The commander requested regular reports of the indicated surface wind conditions, and these were provided by Sumburgh Air Traffic Control (ATC) throughout the remainder of the flight. At 1726 hrs a further meteorological observation was passed to the aircraft, which reported a temporary deterioration of the weather conditions, with visibility reduced to 5 kilometres, a shower of soft hail, and a cloud base of 3 oktas at 1200 feet. The aircraft was cleared to descend to 2000 feet and establish on the 185° radial from the Sumburgh VOR, for a visual approach to runway 27. During the descent, ATC reported variations in the surface wind direction, which ranged from 010° to 030° at 20 to 30 knots. The commander accordingly requested a landing on runway 09. ATC also mentioned that another HS 748 aircraft which had just landed (at 1727 hrs) had reported no abnormality in braking action.

At 1731 hrs control was transferred to Sumburgh Tower, and the aircraft was cleared to carry out a visual procedure to establish on a right base leg for runway 09. During this procedure, as the aircraft was turning onto the final approach, it flew through a shower of sleet and soft hail. Evidence from the Cockpit Voice Recorder (CVR) is that good visual contact with the runway was established at about 1100 feet above ground level, when the Precision Approach Path Indicators (PAPI's) showed the aircraft to be slightly above the ideal 3° approach slope. The commander took corrective action, and the aircraft was positioned towards the correct approach path. LAND FLAP (27½°) was selected at about 350 feet above ground level at an airspeed of 110 knots. The aircraft was then flown to a firm touch-down at a position which the pilots estimated to be at, or just before, the intersection of the crossing runway 15/33. Immediately after touch-down, the commander selected GROUND FINE pitch on the aircraft's propellers and applied the wheel

brakes. As little retardation was felt, the co-pilot also applied the brakes. However, the aircraft still failed to decelerate and, as the available stopping distance was rapidly diminishing, the commander took the decision to attempt to steer the aircraft off the runway to the right; this was in order to slow it down on the grass area, and so avoid the danger of overrunning the end of the runway and the consequent possibility of the aircraft finishing in the sea. As the aircraft left the runway to the right, the co-pilot commenced the IMMEDIATE OVERRUN drills. The aircraft came to rest approximately 70 metres to the south, and 40 metres beyond the end, of runway 09. It was in a level attitude, the landing gear appeared to be intact, and there was no apparent danger of fire. The commander accordingly ordered that the passenger door should be opened, the airstairs deployed, and that passengers should remain in the aircraft.

The fire and rescue services, who had been on 'weather stand-by' with their vehicles manned, arrived at the aircraft within one minute of the incident and confirmed that there was no fuel leakage or apparent damage. The passengers were then disembarked and transferred to the airport terminal building.

Examination of the aircraft

Initial examination revealed that the aircraft was undamaged except that the right inner mainwheel tyre was deflated.

The Flight Data Recorder (FDR) and CVR were removed from the aircraft and transferred to the AIB facility at Farnborough for readout. The CVR was of excellent quality and covered the entire flight from take-off to landing. The FDR readout was corrupt, and could not be used to establish the final flight path, touch-down, or a measure of deceleration during the landing run.

The aircraft's wheel brakes and anti-skid units were found to be serviceable and in good condition. The tyres had adequate tread depth and, with the one exception, were correctly inflated. The right inner mainwheel tyre had two areas of severe wear, in one of which the fabric carcass had been worn through, allowing the tyre to deflate. Both of these damage areas showed some evidence of rubber 'reversion', as produced by viscous aquaplaning. The three other mainwheel tyres showed no marked damage, apart from some scoring which could be associated with their passage over rough ground after the aircraft had left the runway.

Landing performance

The published landing distance available on runway 09 at Sumburgh is 1026 metres. The maximum landing weight allowed in the company Performance Summary for this runway, with a zero head-wind component, is 18910 kg. The actual landing weight, at the time of the occurrence, was 16340 kg, and the reported head-wind component was generally zero or slightly positive. The target threshold speed (VAT) for a landing weight of 16340 kg is 88 knots, and this was correctly recorded by the flight crew. The maximum permitted threshold speed for this weight and configuration is 103 knots (VAT +15). Due to the lack of FDR information the precise threshold speed achieved could not be determined. However, the CVR confirms that, when LAND FLAP was selected at 350 feet, the aircraft was reported to be flying at 110 knots. The lowering of the final stage of flap normally results in a reduction in airspeed of at least 10 knots, and it must be concluded that the aircraft achieved a threshold speed that was within the permitted limits.

The pilots estimated that the touch-down point was close to the intersection of the crossing runway, that is to say some 250 metres in from the runway 09 threshold. The first witness mark on the runway that could be positively attributed to the aircraft was found at a position about 425 metres in from the runway 09 threshold; however, there was no definite evidence that this was the first point of touch-down. In either event, and assuming the worst case that the aircraft did indeed touch-down 425 metres in from the runway threshold, calculations from the approved 'landing distance required' criteria show that the aircraft should still have stopped within the remaining distance available, provided that the runway was free of contaminant and that the depth of any residual water was less than two millimetres. As the subsequent examination of the aircraft showed that the wheel brakes, tyres and control systems were all fully serviceable at the time of the incident, it suggests that the poor deceleration was due to some form of contamination on the runway surface. This possibility is supported by the evidence of aquaplaning on the right inner mainwheel tyre. Accordingly, the presumption must be that, despite the evidence that the braking characteristics of the runway were satisfactory shortly before, and some 35 minutes after, the incident (when a second Mu-meter reading was taken), the intervening shower of soft hail seriously degraded the surface co-efficient of friction at the time the aircraft was landing. This is despite the fact that the surface was of a special friction/drainage type.

Operational considerations

Of the two runways at Sumburgh Airport, orientated 09/27 and 15/33, the 15/33 runway is not available to fixed wing aircraft at night. Accordingly, with the information available to him at the time, the commander's decision to land on runway 09 was entirely reasonable. When it became apparent that the aircraft could not be stopped on the hardened surface, he immediately made the difficult decision to steer off to the right whilst there was still time to do so. Although it has not been possible to quantify the speed or rate of deceleration at the time that this decision was made, there is evidence to suggest that, had the aircraft been allowed to continue down the runway, it would have overrun the paved surface and might possibly have fallen into the sea, with serious consequences.

Follow up action

This is not the first incident at Sumburgh Airport when an aircraft has failed to stop on a contaminated runway. Accordingly, discussions are taking place with the CAA to determine any further actions that may be taken to avoid a similar occurrence.