

ACCIDENT

Aircraft Type and Registration:	DHC-8-311, G-WOWD
No & Type of Engines:	2 Pratt & Whitney Canada PW123 turboprop engines
Year of Manufacture:	1991
Date & Time (UTC):	13 December 2006 at 1450 hrs
Location:	St Mawgan, Cornwall
Type of Flight:	Commercial Air Transport (Passenger)
Persons on Board:	Crew - 4 Passengers - 33
Injuries:	Crew - None Passengers - None
Nature of Damage:	Damage to one main wheel and associated axle
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Age:	58 years
Commander's Flying Experience:	7,886 hours (of which 5,162 were on type) Last 90 days - 156 hours Last 28 days - 34 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot and AAIB examination of components

Synopsis

After takeoff from St Mawgan the flight crew were informed by ATC that a main wheel had fallen from the aircraft. The aircraft returned to St Mawgan and landed uneventfully. The wheel was released due to a failure of the wheel bearing, but only a limited amount of the failed bearing was recovered. The failure mode of the bearing was not determined. The aircraft manufacturer has investigated several other such events and, as a result, introduced several measures to improve the durability of the bearing.

History of the flight

Immediately after takeoff from St Mawgan the flight crew were informed by ATC that a wheel had fallen from

the aircraft. The flight crew reported that the takeoff had appeared normal and neither they nor the cabin crew had experienced any unusual noises or vibration. A fly-by of the ATC tower confirmed that the right inboard main wheel was missing. After contacting their company for advice the flight crew briefed the cabin crew for an emergency landing back at St Mawgan. The landing was uneventful and the aircraft was brought to a halt on the taxiway where a precautionary disembarkation of the passengers was carried out before towing the aircraft onto a stand. An examination of the aircraft by the company's engineers found that, with the exception of damage to the main landing gear stub axle, the aircraft was undamaged.

Technical examination

The main wheel together with some fragments of the retaining nut and wheel bearing were recovered from the runway. These, together with the stub axle, were dispatched to the AAIB for a detailed examination. The wheel and axle exhibited rotational damage to their bearing surfaces which was consistent with a failure of either the retaining nut or the wheel bearing. Metallurgical examination of the fragments of the retaining nut confirmed that it had been subjected to very high loads on its inner face which had resulted in its failure. The small number of bearing fragments recovered consisted of the remains of one roller and fragments of cage material. The surface of the roller exhibited heavy 'smearing'. The bearing cage fragments had been heavily distorted and their fracture surfaces were indistinct due to secondary damage which had occurred during the failure sequence. There was insufficient evidence to identify the primary failure mode of the bearing.

A review of the aircraft technical log showed that the wheel had been fitted to the aircraft on 19 November 2006 and had operated for 199 landings prior to this incident. Before being installed, the wheel assembly had passed through a maintenance facility to replace a worn out tyre. Records supplied by the maintenance organisation which replaced the tyre confirmed that the wheel and bearing had been cleaned, inspected and reassembled in accordance with the wheel manufacturers Component Maintenance Manual. No defects had been observed with the wheel or the bearing during this process.

The aircraft manufacturer reported that it has been notified of several other main wheel losses which have been attributable to bearing failures. To date, no single cause for these events has been identified. However, several factors which may have contributed to a wheel bearing failure have been identified including a build-up of brake dust within the bearing, failure to follow the correct installation procedure and inadequate filling of the bearing with grease. The manufacturer has now approved two new greases for use in the wheel bearings to improve their durability. In cases of adverse operational conditions they recommend that operators replace the wheel bearings at every wheel change. The manufacturer has stated that they are continuing to monitor the wheel bearings in service and will introduce additional steps to improve their performance should this be necessary.

Conclusion

The loss of the main wheel was the result of a failure of the wheel bearing. The small amount of bearing material recovered and severity of the damage to the fragments prevented the failure mode being confirmed. Prior to installation, the bearing and wheel assembly had been inspected and re-greased in accordance with the manufacturer's requirements. The aircraft manufacturer has introduced several measures to improve the performance of the main wheel bearing and will take additional steps should they be required. In view of this, no further safety action is considered necessary at this time.