Australian Government
Australian Transport Safety Bureau

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ATSB TRANSPORT SAFETY REPORT
Aviation Occurrence Investigation AO-2010-089
Safety Recommendation AO-2010-089-SR-012

Safety Recommendation
Rolls-Royce plc Trent 900 engines

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Abstract

On 4 November 2010, at 0157 Universal Coordinated Time (UTC), an Airbus A380 aircraft, registered VH-OQA (OQA), being operated as Qantas flight 32, departed from runway 20 centre (20C) at Changi Airport, Singapore for Sydney, New South Wales. On board the aircraft were five flight crew, 24 cabin crew and 440 passengers (a total of 469 persons on board).

Following a normal takeoff, the crew retracted the landing gear and flaps. The crew reported that, while maintaining 250 kts in the climb and passing 7,000 ft above mean sea level, they heard two almost coincident 'loud bangs', followed shortly after by indications of a failure of the No 2 engine.

The crew advised Singapore Air Traffic Control of the situation and were provided with radar vectors to a holding pattern. The crew undertook a series of actions before returning the aircraft to land at Singapore. There were no reported injuries to the crew or passengers on the aircraft. There were reports of minor injuries to two persons on Batam Island, Indonesia.

A subsequent examination of the aircraft indicated that the No 2 engine had sustained an uncontained failure of the Intermediate Pressure (IP) turbine disc. Sections of the liberated disc had penetrated the left wing and the left wing-to-fuselage fairing, resulting in structural and systems damage to the aircraft. The No 2 engine was removed from the aircraft and disassembled in an authorised engine workshop for examination, under the supervision of the Australian Transport Safety Bureau. In addition, a large section of liberated IP turbine disc was also recovered from Batam Island for examination. Those examinations are ongoing.

As a result of this occurrence, a number of safety actions were immediately undertaken by Qantas, the Australian Civil Aviation Safety Authority, Airbus, Rolls-Royce plc, and the European Aviation Safety Agency.

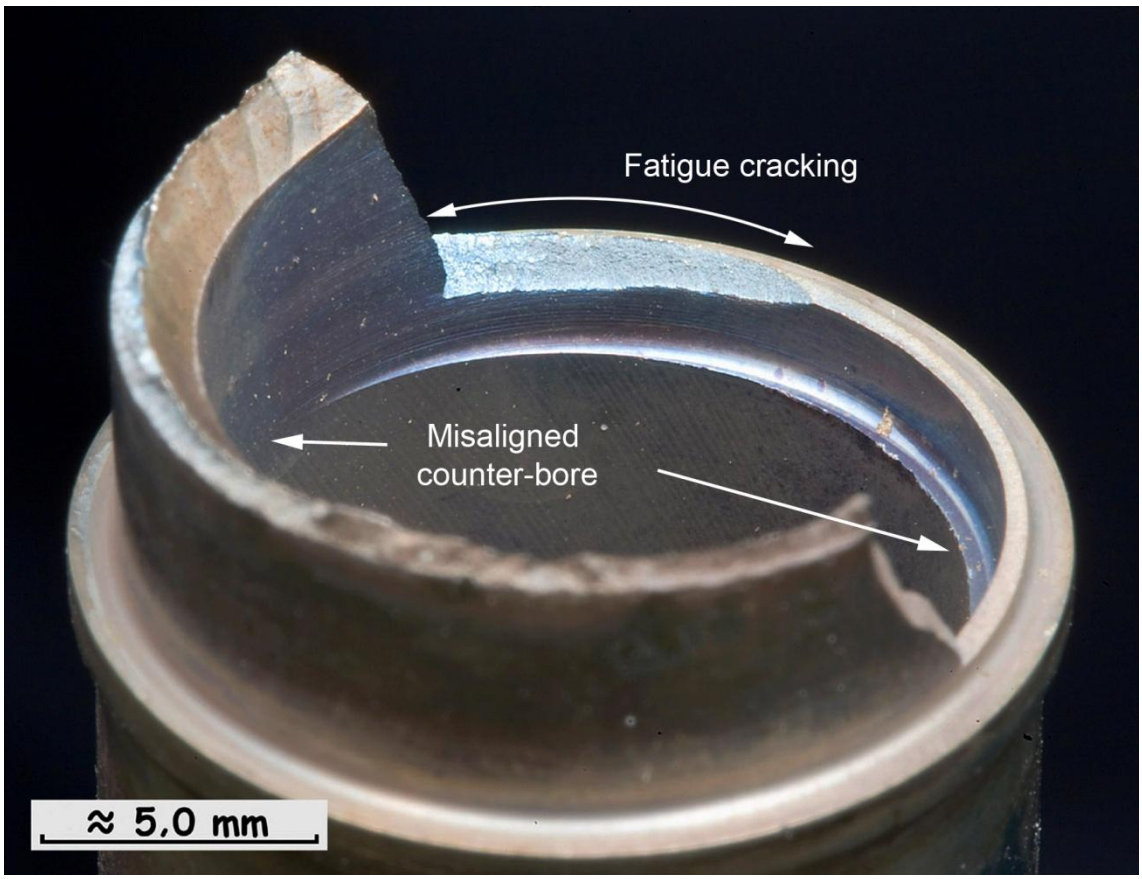
The Australian Transport Safety Bureau has prepared a Preliminary Factual Report on the investigation of the occurrence. That report will be publically released on 3 December 2010.

RECENT DEVELOPMENTS

Recent examination of components removed from the failed engine at the Rolls-Royce plc facility in Derby, United Kingdom, have identified the presence of fatigue cracking within a stub pipe that feeds oil into the High Pressure (HP) / Intermediate Pressure (IP) bearing structure. While the analysis of the engine failure is ongoing, it has been identified that the leakage of oil into the HP/IP bearing structure buffer space (and a subsequent oil fire within that area) was central to the engine failure and IP turbine disc liberation event.

Further examination of the cracked area has identified the axial misalignment of an area of counter-boring within the inner diameter of the stub pipe; the misalignment having produced a localised thinning of the pipe wall on one side. The area of fatigue cracking was associated with the area of pipe wall thinning (Figure 1).

Figure 1: Detail of stub pipe showing misaligned counter-bore



CRITICAL SAFETY ISSUE

Misaligned stub pipe counter-boring is understood to be related to the manufacturing process. This condition could lead to an elevated risk of fatigue crack initiation and growth, oil leakage and potential catastrophic engine failure from a resulting oil fire.

As a result of the identified critical safety issue, the Australian Transport Safety Bureau issues the following safety recommendation:

SAFETY RECOMMENDATION AO-2010-089-AR-012

The Australian Transport Safety Bureau recommends that Rolls-Royce plc address the safety issue and take actions necessary to ensure the safety of flight operations in transport aircraft equipped with Rolls-Royce plc Trent 900 series engines.