

3 Questions: John Hansman on the Qantas A380 engine blowout

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A Qantas A380 takes off from London's Heathrow Airport.

Last week, a Qantas Airbus 380 superjumbo jetliner made an emergency landing in Singapore following the mid-flight explosion of one of its engines that is manufactured by Rolls-Royce. All flights of Qantas's A380 aircraft, which is the world's newest and largest airliner, remain suspended as investigators pinpoint the cause of the explosion.

Experts have speculated that the blowout was caused by an “uncontained” engine failure that occurred when a turbine disc inside one of the plane's four engines disintegrated and ejected large metal chunks that damaged the engine and a wing. In a statement released today, Rolls-Royce confirmed that the failure was confined to a “specific component” in the engine's turbine area that caused an oil fire that led to the release of the turbine disc. The company is working to

replace the faulty part for 20 A380s that have this particular engine.

Aviation expert John Hansman, the T. Wilson (1953) Professor of Aeronautics and Astronautics and Engineering Systems in MIT's Department of Aeronautics and Astronautics and director of MIT's International Center for Air Transportation, researches several areas related to air transportation, [flight](#) vehicle operations and safety. He discusses the engine failure with MIT News.

Q. What exactly is an “uncontained” engine failure?

A. An "uncontained" engine failure means that the failure spread outside of the engine itself. Because turbine engines turn at very high speeds, the centrifugal forces are very high. If there is a structural failure inside the engine, parts will tend to fly out, and the shrapnel can cause damage to the rest of the aircraft.

Q. Why didn't this serious engine failure result in a more serious outcome?

A. The A380 is a four-engine aircraft, so the loss of a single engine is not critical. However, in this case there was damage to the aircraft itself. Some of the control lines to the outboard engine were cut, so it was not possible to change the thrust on the outboard engine, and there were also some hydraulic system problems. But even with these problems, there was sufficient redundancy in the control lines and aircraft structure that the airplane was airworthy. This, combined with the good airmanship of the crew, made it possible to land without incident.

Q. What does this mean going forward for companies that manufacture the engines for the A380 aircraft and for people who fly on these planes?

A. An investigation is under way to determine the exact cause of the structural failure within the engine, which could be: a manufacturing flaw, a problem in how the [engine](#) is operated (running at too high of a temperature, for example), a design issue or some other problem. Once the cause is identified, it will be corrected if it could impact other flights.

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