1. **Download and watch the video (access link below). Complete the synopsis of the event with the words given.**

https://drive.google.com/file/d/1zhcxuiHaZsNYZTVeobD1FjOTVCA8w8pp/view?usp=sharing

In-flight uncontained engine failure Airbus A380-842, VH-OQA, overhead Batam Island, Indonesia, 4 November 2010

QF32 – Synopsis of the event and its aftermath

What happened

damage / sustained / multitude / engine rotor failure / climbing / impacted / Trent 900 / structural / returned to / managed / required actions / departing from

On 4 November 2010, while 1) _____ through 7,000 ft after 2) _____ Changi Airport, Singapore, the Airbus A380 registered VH-OQA, 3) _____ an uncontained 4) _____ (UERF) of the No. 2 engine, a Rolls-Royce 5) _____. Debris from the UERF 6) _____ the aircraft, resulting in significant 7) _____ and systems 8) _____. The flight crew 9) _____ the situation and, after completing the 10) _____ for the 11) _____ of system failures, safely 12) _____ and landed at Changi Airport.

What the ATSB found

internal / conform to / contain / High Pressure / ultimately / oil feed stub pipes / non-conforming / drive shaft / wall sections / IP / reduced / manufactured / sufficient / accelerated / fitted / separation / including / a fatigue crack

The Australian Transport Safety Bureau (ATSB) found that a number of 1) _____ within the 2) _____ / Intermediate pressure (HP /3) _____) hub assembly were 4) _____ with thin 5) _____ that did not 6) _____ the design specifications. These 7) _____ pipes were 8) _____ to Trent 900 engines, 9) _____ the No. 2 engine on VH-OQA. The thin wall section significantly 10) _____ the life of the oil feed stub pipe on the No. 2 engine so that 11) _____ developed, 12) _____ releasing oil during the flight that resulted in an 13) _____ oil fire. That fire led to the 14) _____ of the intermediate pressure turbine disc from the 15) _____. The disc 16) _____ and burst with 17) _____ force that the engine structure could not 18) _____ it, releasing high-energy debris.

What has been done to fix it

quality management / a range of steps / turbine overspeed protection / non-conformances / overspeed / operators / shut / identified / non-conforming / software update

Following the UERF, the ATSB, Rolls-Royce plc, regulatory authorities and 1) _____ of A380 aircraft with Trent 900 engines took 2) _____ to ensure that HP/IP hub assemblies with non-conforming oil feed stub pipes were 3) _____ and either removed from service, or managed to ensure their safe continued operation. Rolls-Royce also released an engine control 4) _____ that included an IP 5) _____ system (IPTOS) that is designed to 6) _____ the engine down before the turbine disc can 7)_____, in the unlikely event that a similar failure occurs.

Rolls-Royce has also made a range of changes to their 8) _____ system to improve the way in which they manage 9) _____ parts, both during the manufacturing process and when it has been identified that parts had unknowingly been released into service with 10) _____.

Safety message

certification / turbine engines / an opportunity / incorporate / reliable / designs / failure / enhance / rare / potential

Even though modern civil 1) _____ are very **2)** _____, and UERFs are very 3) _____ events, the resulting damage from such a 4) _____ can be significant and the 5) _____ effects catastrophic. This accident represents 6) _____ for the regulatory authorities to **7)** _____ any lessons learned into their 8) _____ advisory material to 9) _____ the safety of future aircraft 10) _____.