

# **CASE STUDY 7**

## **TYRE BLOWOUT ON TAKEOFF**

### **EVENT**

During a winter period, an Embraer regional jet - operated by an FDS customer - heading out on a short-haul internal flight, experienced a tyre blowout on the runway and aborted take-off.

Aircraft tyres are designed to carry incredibly heavy loads whilst travelling at high speeds and to withstand extreme ambient temperatures and air pressure fluctuations, but repeated stress can and does, lead to ruptures.

When FDS analysed the recorded data from this incident, it became clear there was more to the story than a simple blowout.

### **INVESTIGATION**

FDS began analysing the flight data which revealed that a normal start had been recorded, with all engine parameters and hydraulic pressures normal. According to the data, the aircraft commenced taxi with a tight right turn onto the taxiway, with average taxi speed during the early part of the taxi phase of between 8 and 11 knots. Both engines appeared to be operating at idle power.

Brake pressures were not recorded on this aircraft, so FDS determined the braking action by examining the recorded brake pedal positions. This investigation revealed that two and a half minutes into the taxi phase the Captain's brake pedals were depressed, on average at 30%, with more than 56% N1 on both engines. This could be referred to as 'riding' the brakes.

Further analysis of the data revealed that this continued for 45 seconds, during which time anti-icing systems were exercised. Power was then reduced and normal taxiing resumed, with ground speed averaging between 9 and 12 knots. The data revealed that two minutes later, the Captain's brake pedals were applied to slow the aircraft from a maximum groundspeed of 16 knots before commencing a left turn to line up on the runway.

Once the aircraft was lined up, take-off power was applied and the aircraft accelerated normally. At close to takeoff speed, the right wing recorded a drop of 1.5 degrees and the acceleration decreased from 0.20g to 0.11g. This reduced acceleration was accompanied by positive vertical g readings of 1.12, 1.14, 1.23, and 1.41 g, with a right hand roll angle up to 1.9 degrees, symptomatic of a tyre burst.

According to the data, five seconds after the initiated roll disturbance, take-off rejection was actioned, with the First Officer commencing brake pedal depression.

A second later, the spoilers were deployed and the Captain depressed the brakes. Full rejected take-off action was carried out, including use of reverse thrust.

A master warning was registered and ground spoilers and thrust reversers were apparently deployed on both engines within five seconds of initiation of the rejected take-off and then cancelled shortly thereafter. Peak deceleration was -0.4g. The aircraft was brought to a safe stop ten seconds later.

## **CONCLUSION**

FDS' analysis of the recorded data indicated the most probable sequence of events was the failure of one or both right hand main wheel tyres during the take-off run.

FDS concluded that it was likely the prolonged application of brakes during taxi, associated with the relatively high power setting, may have generated sufficient heat in the wheel assemblies to become a contributory factor to the tyre failure. It is presumed that this power during taxi was undertaken for airframe/engine de-icing.

## **ACTION**

FDS submitted their report, which attributed the cause of the burst tyre to a non-standard procedure, intended to ensure the aircraft was completely de-iced. The Flight Safety Officer was then able to notify all company aircrew - through the use of safety notices - emphasizing the correct procedure for de-icing.