Take-off performance calculation and entry errors: A global perspective

There have been numerous take-off accidents worldwide that were the result of a simple data calculation or entry error by the flight crew. This report documents 20 international and 11 Australian accidents and incidents (occurrences) identified between 1st January 1989 and 30th June 2009 where the calculation and entry of erroneous take-off performance parameters, such as aircraft weights and 'V speeds' were involved. Importantly, it provides an analysis of the safety factors that contributed to the international occurrences and suggests ways to prevent and detect such errors.

A review of the international and Australian occurrences showed that these types of errors have many different origins; with crew actions involving the wrong figure being used, data entered incorrectly, data not being updated, and data being excluded. Furthermore, a range of systems and devices have been involved in these errors, including performance documentation, laptop computers, the flight management computer, and the aircraft communications addressing and reporting systems. The consequences of these errors also ranged from a noticeable reduction in the aircraft’s performance during the takeoff, to the aircraft being destroyed and loss of life.

The most common contributing safety factor identified related to crew actions (39%), including monitoring and checking, assessing and planning, and the use of aircraft equipment. This was followed by absent or inadequate risk controls (31%), mostly centred on poor procedures, non-optimally designed aircraft automation systems, inappropriately designed or unavailable reference materials, and inadequate crew management practices and training. Common local conditions (27%) involved inadequate task experience or recency, time pressures, distractions and incorrect task information.

Different airlines use, and different aircraft types require, different methods for calculating and entering take-off performance parameters, which means there is no single solution to ensure that such errors are prevented or captured. This report also discusses several error capture systems that airlines and aircraft manufacturers can explore in an attempt to minimise the opportunities of take-off performance parameter errors from occurring or maximise the chance that any errors that do occur are detected and/or do not lead to negative consequences.

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