Adding Another Barrier Against Incorrect Takeoff Data

The account headed "Late Change Disrupts Preflight" (*ASW*, 9/10, p. 57) talks about an aircrew taking off with invalid takeoff data due to human error. Probably everybody knows a few more examples of this. I think that there is one more "slice of Swiss cheese" one should consider establishing to make this type of event less likely.

In order to calculate correct takeoff data and takeoff thrust settings, entry of the correct weights in the charts or computer programs is essential. Although there are multiple procedures in effect to ensure entry of valid weights, there is always the chance for human error — for example, taking wrong weights by accident, like in this case; mistyping the weights, like in Brisbane; or maybe the loaders providing a wrong measurement.

At present, if the crew uses wrong weights for calculation, and does not detect the error before takeoff, it is too late to react. Once you select takeoff power, the aircraft indicates the calculated N_1/engine pressure ratio, and you can only observe whether the calculated value has been reached ... but not whether this value is correct.

My idea to solve that issue: Calculate takeoff data to achieve a certain speed at a certain point to ensure sufficient stopping distance remaining at V_1 and to obtain a specific climb gradient later on. In other words, takeoff data and thrust settings generate a specific acceleration along the runway. If the aircraft is heavier than the numbers used for the calculation, the aircraft won't reach the required acceleration. If one could calculate the minimum acceleration required for a takeoff and measure it while still in the slow-speed regime, one could take corrective action in time based on data rather than a feeling that an error had occurred.

I see two options to accomplish that: (1) Calculate the maximum distance you travel along the runway to reach the check speed. If one reaches the check speed and has traveled a longer distance, then the selected thrust setting was too low. If one reaches the speed early, the error was on the safe side. The problem with this method is that every runway would need to have a "runway remaining" marker in order to precisely analyze the acceleration.

(2) Calculate the maximum time allowed to reach check speed. If one reaches check speed too late, again, the thrust setting was too low; if you reach it early, you are good to go. The advantage of this procedure is that no additional signs have to be erected along the runways.

Basically, I am suggesting that one should find a method to perform a validity check of the takeoff data during the takeoff run. This method should be simple and should not increase the workload of the pilots or unduly change their crosscheck. Furthermore, the validity check should be done in the early stages of the run.

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AeroSafety World encourages comments from readers, and will assume that letters and e-mails are meant for publication unless otherwise stated. Correspondence is subject to editing for length and clarity.

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