ADVERSE WEATHER LOW-PROBABILITY FORECAST EFFECTS ON FLIGHT FUEL PLANNING

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ABSTRACT

The fuel amount carried on a flight is affected by several variables. One is the low probability weather forecast at the destination and how those probabilities should impact the amount of carried fuel. Predictions for the weather conditions at the airports are issued via Terminal Airdrome Forecast (TAF) messages. These reports contain several codes related to the various occurrence probabilities phenomena, but for this project, rain and storm were considered the main weather phenomena. The Flight Dispatcher, also known as the captain on the ground, is responsible for analyzing the weather condition information and, planning the flight, establishing the amount of carrying fuel. However, there is no standard for adding extra fuel when predicting adverse events caused delayed arrivals. It always happens subjectively as an interpretive factor in this judgment. The current procedure has ambiguity on the required amount of extra fuel when there is rain and storm low probability prediction. This study shows the examination results of additional fuel consumption with flight time increments. We considered a significant part of the adverse weather events; even if they have a low chance of occurring, we found an average of six additional minutes impact on destination arrivals. Our results demonstrate the need to observe this sort of low-probability weather forecast to define a model of additional fuel supply. We anticipate that, even if it is difficult to isolate all the variables that might affect a flight upon arrival, this could be a starting point for designing a fueling procedure under such circumstances. Furthermore, new practices that promote standardized supply tabulations can be found with a detailed retroactive analysis of each airline route.

Keywords: Flight Planning; Aircraft Fuel Planning; Mathematical Optimization; Brazilian Aviation Procedures.

References available on request.