Using Aircraft Sensor Data to Measure the Effect of Airport Interventions on Flight Efficiency

Client Profile

Boeing Vancouver is a leading-edge provider of global IT solutions focused on maximizing efficiencies of today's aviation business and creating the digital aviation technology of tomorrow.
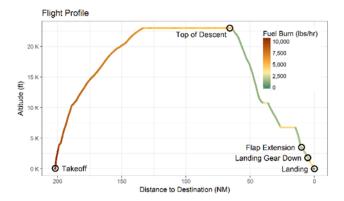
BOEING
Boeing Vancouver

Problem and Opportunity

The Federal Aviation Administration (FAA) has developed a set of metrics to measure and report the impact of its Next Generation Air Transportation System (NextGen) on the access, capacity, safety, and efficiency of the National Airspace System (NAS). Since the FAA reports metrics on an aggregate level, airlines are hoping to leverage their proprietary data to better understand the impact of NextGen initiatives on their operations. Quick Access Recorder (QAR) data is well suited for this purpose; it records high frequency readings from thousands of aircraft sensors, providing a complete description of many aspects of a flight such as trajectory and fuel consumption. The goal of this project was to determine whether aircraft sensor data can be used to develop a set of metrics that measure the effects of airport programs on flight efficiency.

Approach and Solution

Flight efficiency is generally defined in terms of fuel and time, as these are an airline's main cost drivers. Using the NextGen Airport Performance Metrics as a reference, the team first developed a set of flight metrics related to flight efficiency.

These metrics were then applied in a case study of approximately 32,000 descent profiles arriving at a single airport, as well as nearly 2,700 flights between a selected city pair. Evidence that an actual airport improvement event was captured in the dataset allowed for before and after testing. Flight metrics were calculated based on each flight's QAR data and the effects of the airport improvement initiative were statistically measured.

Benefits to Client

The results offer conclusive evidence that aircraft sensor data can be used to develop flight metrics that measure changes in flight efficiency related to the implementation of an airport program. Since QAR data is recorded from gate-to-gate, flight metrics can be developed for any phase of flight, including takeoff, cruise, descent, or approach. The project has helped Boeing Vancouver understand the potential of using QAR data to assist airlines in measuring the impact of airport improvement programs on their own operations.