Flight planning and fuel efficiency

Introduction

With oil prices at a two year high, fuel efficiency is more than ever at the top of the agenda for senior executives in the aviation industry. Representing anything up to 40% of total operating costs, fuel is an issue that cannot be ignored.

IATA has successfully completed over 100 fuel efficiency projects worldwide, with airlines that differ widely in scale, scope and business model. These projects have identified savings of $30 billion and, have saved clients an average of 5% on their annual fuel burn.

One major lesson learned during these interventions is the importance of optimized flight plans. This paper shares how airlines can improve their flight planning capability in a way that results in a dramatic improvement in operational efficiency and value for money.

What are flight plans?

Flight plans are documents filed by pilots or a flight dispatcher with the local civil aviation authority prior to departure. They are a regulatory requirement and include basic information about the flight, including: departure and arrival points; estimated time en route; planned speed and altitude; alternate airports; type of flight operation (i.e. instrument flight rules or visual flight rules); the pilot's name; and the number of people on board the aircraft.

Flight plans ensure that applicable regulations such as weight limitations or minimum fuel requirements are met. They are then used by pilots to monitor the operation of the flight and by air traffic control to track and route aircraft and to provide necessary information in the event of an emergency.

Flight planners have detailed knowledge of navigation, air traffic control procedures, regulatory requirements and aircraft performance, including payload and range and combine their expertise in these subjects to create safe, accurate, and efficient flight plans for each flight. But while it is possible for them to create a satisfactory manual flight plan, most flight planners use computerized systems to develop flight plans that lead to optimal levels of efficiency.

The flight plan is used to comply with regulations and provide a measure of safety, but it can also play a significant role in managing operating costs. The simple process of selecting a route is a good example; a longer route may prove more cost effective than a route that is considerably shorter, due to high overflying fees. Speed and altitude can also have a significant effect on fuel consumption costs related to time. As well as reducing costs, an effective flight plan can also result in increased revenue by allowing more payload to be carried.

Optimized flight plans

Creating an optimized flight plan that considers these and other variables is a difficult proposition, even when using the latest techniques and methods. For any given flight, the large number of mathematical calculations involved makes an automated tool essential for today's flight planner. Such tools create optimized flight plans by evaluating multiple routes and operating styles for each flight, in consideration of the airline's preferences and cost objectives. The tool will not only present the flight planner with the 'best plan', but will also provide information about alternative plans that they might wish to consider to meet operational needs.

An optimized flight plan works on the principle that it calculates the most appropriate route on a dynamic basis. This is determined by evaluating wind and temperature forecasts, the planned weight of the aircraft (which affects altitude selection) and operational costs such as overflying fees, fuel and other direct operating costs.

While the benefits of optimized dynamic routings seem obvious, many operators continue to use stagnant routings which are based on historical knowledge of airspace restrictions and air traffic control acceptance. Such an approach limits the possibility of adjusting routes on a daily basis to take advantage of real time environmental and operational conditions.

Sample savings

Operators who create optimized flight plans can save as much as 4% in annual fuel costs.

The use of dynamic routings can save up to 300 gallons of fuel during a flight that typically burns 7500 gallons. At today's fuel prices, this would result in an annual saving in excess of $ 124,000 for that flight alone.

Reduced fuel burn that results from dynamic routings also means that operators can reduce the amount of fuel they uplift and this can have dramatic affects on the total fuel bill. For example, an airline with 50 flights per day that averages 100 gallons of additional fuel per flight could save as much as 300 gallons of fuel per day (at 3 hours average stage length) by reducing by 50% the amount of incremental fuel uplifted.

The importance of accuracy

Flight plans that are consistently accurate will result in less fuel uplifted and potentially more payload carried. Accurate flight plans will also instill confidence in the flight crew to operate with reduced levels of fuel on a more regular basis, which in turn results in reductions in consumption because the aircraft is lighter.

Accurate flight planning means that software must be capable of using OEM performance data, including information related to items on the aircraft that are deferred in accordance with the MEL/DDG. In addition, the software must allow the airline to fine tune the burn rates of the aircraft based on actual data (often referred to as a burn rate bias). This option is critical to ensure the flight planning system is considering actual operating data in its calculations.

Flight plan accuracy also depends on reliable and timely information about payloads; with precise payload data, the flight can be planned at actual weights, resulting in highly accurate flight plans.

Safety considerations

When it comes to fuel management, safety is the first priority and operators must undertake the necessary risk assessment analysis prior to commencing any new procedure. Managing fuel accurately and efficiently improves safety as a result of:

- additional attention to planning;
- high accuracy of the flight planning system and in the execution of the flights;
- increased situational awareness;
- discipline to follow the flight plan;
- appropriate analytical tools and statistics;
- adequate training for pilots and other operational personnel; and
- policy, efficiency and performance information for employees.

Other ways to improve fuel efficiency

Improvements to fuel efficiency can be realized in areas other than flight planning. Flight operations, maintenance and engineering; commercial; air traffic operations; ground operations; contracting; scheduling; and network planning all play an important role. The end goal must be to optimize fuel efficiency by any safe means.

Maintenance is a good example. For every 3,000 flying hours, a typical aircraft will become 1% less efficient, a figure that will tend to stabilize at 5-7%, but which can be as high as 10%. Major engine overhauls can reduce this by approximately half, whilst engine wash, airframe control rigging, buffing and a good paint condition is proven to reduce fuel burn by as much as 2%.

Conclusion

Airlines with an aggressive fuel saving program are more efficient, more profitable and more competitive. Each dollar wasted on fuel burn takes up to $20 dollars in additional revenue to achieve the same margin.

Flight planning software that can provide accurate and optimized flight plans based on current forecast models and operational conditions is one tool airlines can use to control such costs. To find out more about how your airline can become more efficient please contact:

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