

Case Study



Shaping the sustainable long-term future of the aviation industry

Overview

Airlines have faced significant challenges in recent times, particularly following the global pandemic. On top of that, the aviation industry is increasingly focused on mitigating the environmental impact of air travel. There is a pressing need for services that facilitate modernisation and safeguard the long-term future of the sector. Technological advancements and cooperative efforts are crucial for long-term sustainability in aviation. The ClearPath solution, developed by Swedish software company AVTECH Sweden AB, utilises Met Office high-resolution data to assist airlines in operating more efficiently and safely. The software enables airlines to optimise routes, reduce fuel consumption and offers improved safety measures for airlines. ClearPath provides a tangible response to the aviation industry's current and future challenges.

How we help

The Met Office provides industry leading weather and climate expertise and data on a global scale to the aviation sector, enhancing safety and efficiency. As a key partner to the aviation industry, the Met Office is committed to helping drive modernisation and sustainability, shaping the sector's long-term future through pioneering science and trusted services.

ClearPath: Advanced flight optimisation

One of these services is ClearPath from AVTECH, an advanced real-time flight path optimisation tool that integrates seamlessly with existing aircraft technology. Designed to enhance operational efficiency, ClearPath provides pilots with a cost-optimal flight path based on actual aircraft parameters such as weight and route sourced directly from the aircraft Flight Management Computer FMC.

AVTECH's system utilises high-resolution aviation weather forecasting from the Met Office, delivered through a 4-dimensional (4DT) trajectory API. This tailored solution provides precise tactical decision support for pilots, optimising flight paths and leading to significant fuel and time savings for each flight.

Operational benefits

By providing flight crews with up-to-date guidance on the most efficient flight altitudes, pilots can take maximum advantage of prevailing winds and temperatures to reduce carbon emissions. The service is fully automated and completely hands-off for the pilot, resulting in a high compliance rate and maximising value.

Additionally, the service alerts pilots about Clear Air Turbulence (CAT), Convective Turbulence (CB), and oscillating downwind waves caused by mountains (mountain waves). This approach reduces fuel consumption, minimises delays, and enhances the passenger experience.

The system's ground-based architecture is capable of performing millions of computations by utilising the aircraft's performance model and real-time parameters. This data is combined with a high-resolution 10-kilometre hourly weather forecast from the Met Office (surpassing the industry standard of 140 kilometre and 3-hourly) to optimise the flight path.

ClearPath uses existing onboard hardware, requires no up-front investment, and the software can easily be customised to fit into any airline's Standard Operating Procedure (SOP). This ensures seamless integration and widespread applicability across the aviation sector.

Our impact

AVTECH has worked closely with Scandinavian Airlines (SAS) since December 2022 to demonstrate the environmental and economic benefits of ClearPath. This collaboration aligns with the SAS Sustainability Program, which focuses on fleet renewal, operational efficiency, sustainable aviation fuel (SAF) usage, and fostering innovations and partnerships to create a robust framework for a more sustainable aviation industry.

Implemented in 2024 following a trial run from December 2022 to May 2023, the ClearPath solution introduced advanced technologies and methodologies into the SAS sustainability program.

Measurable results

The collaboration demonstrated significant improvements in environmental and economic benefits. Since the implementation of ClearPath, fuel efficiency has shown measurable progress. From 2019 to 2023, fuel efficiency for SAS increased by 1%, with an additional improvement of 0.25% from 2023 to 2024, particularly within the SAS neo fleet. Flights identified as candidates for optimisation demonstrated an average fuel saving equivalent to 24.1 kilograms, which translates to a 1.44% reduction.

AVTECH services, based on high-resolution aviation weather forecasting from the Met Office, provide estimates for fuel savings at each altitude level, as well as the corresponding time impact on the flight. This approach allows airlines to achieve fuel and CO₂ reductions of approximately 2.5% during the cruise phase.

Quantifying the benefits

To put all these numbers into perspective: if the top five biggest airlines flying to and from the UK were to save just 1% of their fuel consumption, this would result in a substantial reduction of approximately 60,000 tonnes of aviation fuel per year. These significant fuel savings would also lead to a remarkable decrease in CO₂ emissions, approximately 189,000 tonnes annually, based on a CO₂ emissions factor of 3.15 kg CO₂ per kg of fuel.

Over its 10-year operational period since inception, the ClearPath technology has successfully mitigated a total of 1.8 billion tonnes of CO₂ emissions. To put this in perspective, it would take approximately 82 million trees an entire year to absorb 1.8 billion tonnes of CO₂. AVTECH's achievement, spread over a decade, represents significant long-term environmental impact. This cumulative reduction in emissions has also translated to about £435 million in total fuel savings for airlines.

Beyond efficiency, AVTECH's ClearPath solution, powered by the Met Office, enhances safety through features such as speed optimisation, contrail avoidance, and inflight hazard prevention. These advancements reflect a commitment to continuous improvement in training programmes and operational practices, contributing to increased efficiency and environmental stewardship in the aviation industry.

“The implementation of ClearPath has been highly successful for SAS, resulting in 1.44% average equivalent fuel savings during cruise phase while maintaining our on-time performance. The system significantly contributes to our sustainability goals and operational efficiency.”

Svein Erik Jackwitz

SAS Flight Operations and Fuel Efficiency

“ We are pleased that this compelling case study showcases the transformative impact of AVTECH’s ClearPath on airlines’ flight operations. The system’s ability to optimise flight paths has proven to offer significant economic and environmental benefits for the aviation industry.”

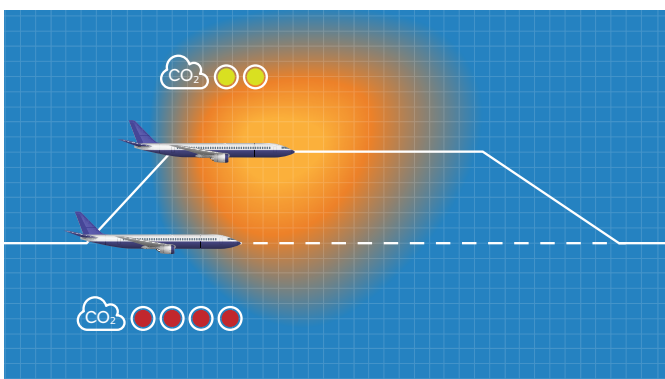
David Rytter

CEO Avtech Sweden

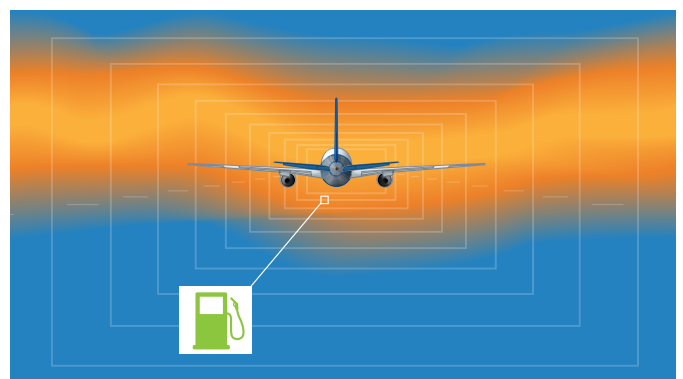
“The Met Office provides industry leading weather and climate expertise and data on a global scale to the aviation industry. Our high-resolution forecasts integrated within ClearPath allow airlines to make more informed decisions, resulting in significant fuel savings, enhanced efficiency and improved flight safety.”

Lauren Donohue

Met Office Business Manager – Aviation



Annotation 1: More dynamic decision making with high resolution weather data.



Annotation 2: Optimising flights with high resolution data to ensure more fuel-efficient paths

To find out more:

 0370 900 0100

 transport@metoffice.gov.uk



<https://www.metoffice.gov.uk/services/transport/aviation/regulated>



www.twitter.com/MetOfficeB2B