AI-Powered Solutions as the Key to Operational Efficiency and Sustainability at Flair Airlines

In the dynamically evolving world of aviation, efficiency and sustainability are not just operational goals but essential mandates. As global awareness of environmental impacts and fuel costs increase, airlines are driven to innovate to stay competitive and compliant with emerging regulations. Flair Airlines, Canada's only ultra low-cost carrier, has taken a proactive approach to these challenges, involving all the stakeholders within the company. By integrating advanced technologies and focusing on precise aircraft performance modelling, flight path compliance monitoring, and effective Cost Index management, Flair is reducing its carbon footprint and enhancing operational efficiency, thus setting new standards in the industry.

This case study delves into how Flair Airlines has embraced a broad range of AI-driven solutions to optimize operations and reach for remarkable goals in sustainability and efficiency. But first, a brief introduction to Flair Airlines.

FLAIR AIRLINES

Flair Airlines' journey with a whole new business model and character of operations began in 2017 when they decided to respond to increasing demand for low-cost air travel — with success. Now, Flair operates as Canada's pioneering ultra low-cost carrier, dedicated to making air travel more accessible and sustainable than ever before. The 2020/21 COVID-19 pandemic presented significant challenges to the aviation industry, but Flair thrived and expanded its fleet to include 20 Boeing 737 aircraft, featuring 18 MAXs. Their network now covers 35 destinations across North America. Operating from five major bases — Vancouver, Edmonton, Calgary, Kitchener, and Toronto — Flair has rapidly scaled its operations to handle over 90 daily flights. Last year, Flair transported over 4.5 million passengers, and their overall completion factor was 98.2%, making them the most reliable airline in Canada. Embracing new technologies is vital for Flair to achieve exceptional efficiency, and pilot engagement is equally important. Their expansion and innovative approach reflect growth and a commitment to operational excellence and sustainability.

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CHALLENGES FACED

One of Flair's challenges was that the aircraft's existing Flight Management Computers (FMCs) were limited by simplified Flight Path Optimization methods, poor pilot decision support, and a lack of near real-time data integration. Also, it was not possible to provide pilots with detailed insights and feedback on speed and altitude choices nor fully manage dynamic Cost Index changes during flight. Additionally, Flair faced the dual pressures of environmental regulations and the need for cost-effective operations. These challenges necessitated a shift towards more sophisticated, data-driven technologies that could integrate seamlessly with existing systems and enhance decision-making processes.

IMPLEMENTATION AND THE SYNERGY BEHIND SOLUTIONS

To address the challenges, Flair Airlines performed a full market analysis. The decision was to select services from StorkJet, an established provider of aviation technology solutions with valuable experience in Aircraft Performance engineering and Fuel Efficiency analytics. This collaboration led to the implementation of a portfolio of solutions, see figure 1, including: AdvancedAPM, FuelPro, and FlyGuide app for pilots, along with the FlyGuide FPO (Flight Path Optimization) module.

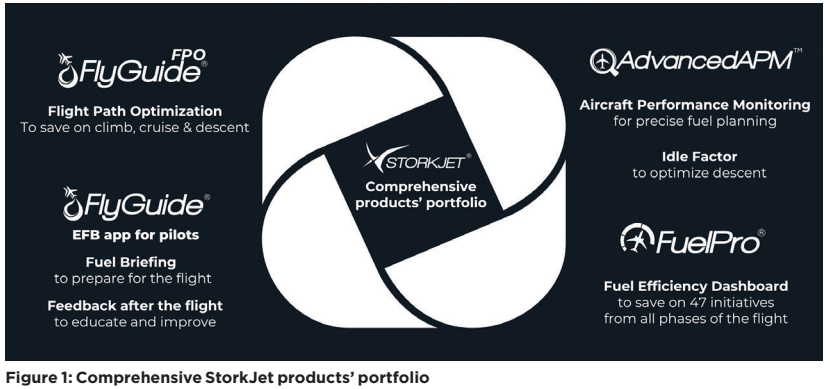

Figure 1: Comprehensive StorkJet products' portfolio

Together, these solutions form a coherent ecosystem supporting the decision-making process for various stakeholders, from aircraft performance and fuel efficiency analysts, through dispatch to pilots. Moreover, it ensures a data-driven, tail specific approach to operations, supporting efficient Cost Index management across the entire route.

The partnership started with the implementation of AdvancedAPM. Achieving accuracy in fuel efficiency optimization would not be possible without introducing precise aircraft performance models first. StorkJet builds performance models using QAR data and AI. Figure 2 presents the specific range chart. Each color relates to different aircraft weights. Solid lines on the chart are from Flair's QAR-driven performance models, and the dotted lines are from the legacy model. At this point, the differences between the curves can already be spotted. They are emphasized even more by the dashed lines marked vertically, which join the optimum Mach numbers. Consequently, utilizing the legacy models can generate from 0.3% to 0.9% fuel penalty. StorkJet develops performance models from the foundational level and updates them continuously. Combined with fuel and drag factors for flight planning and FMC, this ensures maximum precision and coherent fuel predictions in the Operational Flight Plan, FMC, and FPO. This was the first stage of system implementation.

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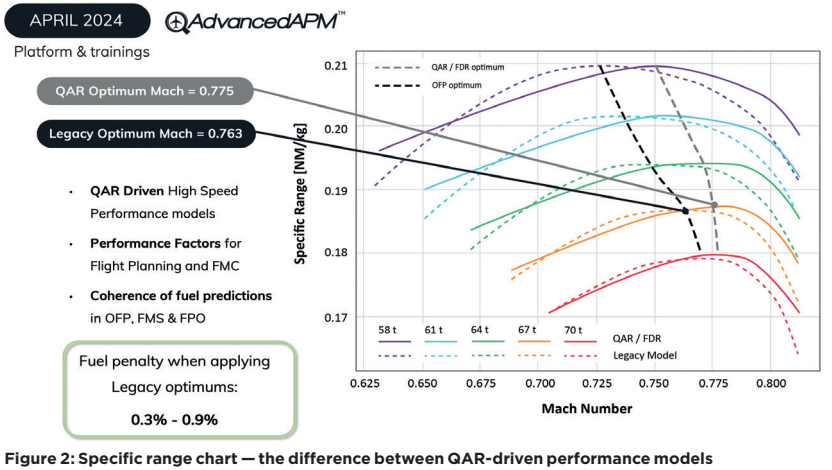

Figure 2: Specific range chart — the difference between QAR-driven performance models versus legacy models

The ecosystem would not be complete without a proper feedback loop and way of monitoring the level of operational efficiency because what is not measured cannot be properly improved or can even degrade. Therefore, Flair also decided to implement FuelPro, a fuel efficiency dashboard and analytical tool. This allowed the airline to start precisely monitoring various initiatives, policy adaptations and changes in flight planning system configuration. It also helped the analysts to understand the impact of optimization, evaluate fuel savings, and identify the areas for further improvement.

One of the examples is presented in Figure 3, which shows the chart of cruise speeds in relation to the time period. After implementing StorkJet solutions in June 2024, the average cruise Mach number was reduced. This change is reflected on the chart and the analyst can continuously monitor the new policy adaptation as well as validate and measure the achieved and potential savings. Due to proactive monitoring and analysis, it became possible for Flair specialists to set sensible targets for flight operations and configure flight ops policies at the fleet/route/airport level, adjusting the Cost Index settings, which are respected by the FlyGuide FPO app implemented on the later stage.

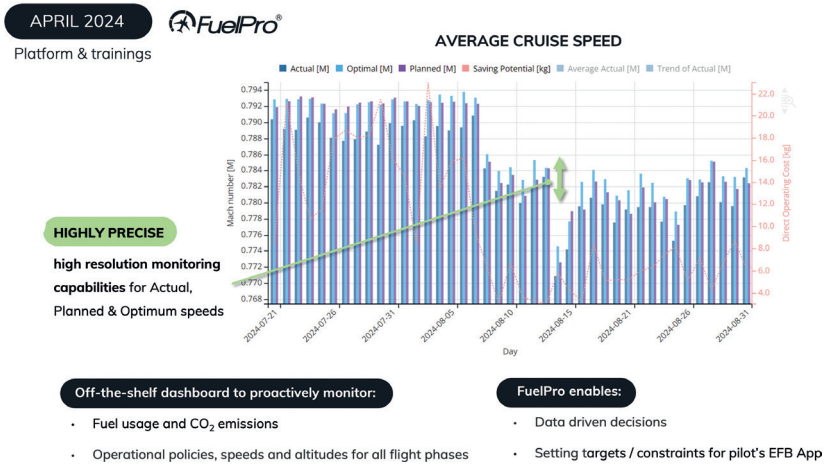

Figure 3: Chart of cruise speeds in relation to the time

FLYGUIDE FPO — A WAY TO INVOLVE THE PILOTS

The final phase of implementation was FlyGuide app including FPO module, which gives pilots real-time flight path optimization. While deciding to cooperate with StorkJet, one of the important factors for Flair was that the FPO, contrary to the FMC and other solutions, optimizes the whole flight as an integrated path, not each phase (Climb, Cruise, Descent) separately. FPO aims to achieve cost reductions for the whole flight and avoid situations where savings on one phase will generate penalties on another, potentially increasing cost and fuel consumption.

Flair recognized the importance of supporting pilots in their critical role as decision-makers during flights. Providing crews with a tool that enhances their ability to make informed decisions, promotes engagement in fuel efficiency initiatives, and aligns with Flair's development and sustainability goals. During the testing period, after adjusting the app to Flair's operations and customized needs, FPO met all these requirements with its intuitive and straightforward interface, as presented in Figure 4. The flight path is presented with cost mesh in a simple way and an intuitive color palette, allowing quick and accurate decisions inflight. Such a method of data presentation, combined with flight path accompanied by real-time weather, enables pilots to analyze alternative

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scenarios and understand the impact of selecting different flight levels or Mach numbers as quickly as the blink of an eye. Because of that, Flair recently decided to release the app for all the pilots together with the training materials and operational manuals prepared together with StorkJet's team.

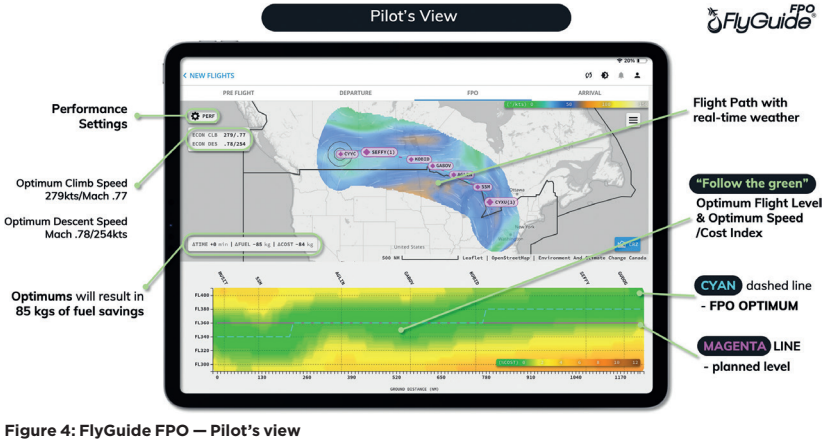

Figure 4: FlyGuide FPO — Pilot's view

Although Flight Path Optimization was the primary focus, Flair has also decided to use additional modules within the FlyGuide app. The Fuel Briefing module has the potential to be a valuable tool for Flair's pilots, helping them prepare for flights with clear and actionable insights into fuel planning. Its goal is to improve their confidence in making fuel-related decisions and allow for better anticipation of taxi, historical shortcuts, or descent strategies, which are often key, yet overlooked, parts of fuel efficiency.

The Post-Flight module adds another layer of support by providing a feedback loop that, during the testing phase, pilots found practical and insightful. Rather than just presenting savings as static numbers or comparison with Flight Planning, it visualizes data through intuitive graphs comparing simulated and actual profiles, showing why certain savings weren't achieved — whether due to factors like an early descent or steeper-than-optimal descents. This level of feedback gives pilots a better understanding of how their decisions influence fuel efficiency, helping them make more informed choices in future flights (figure 5).

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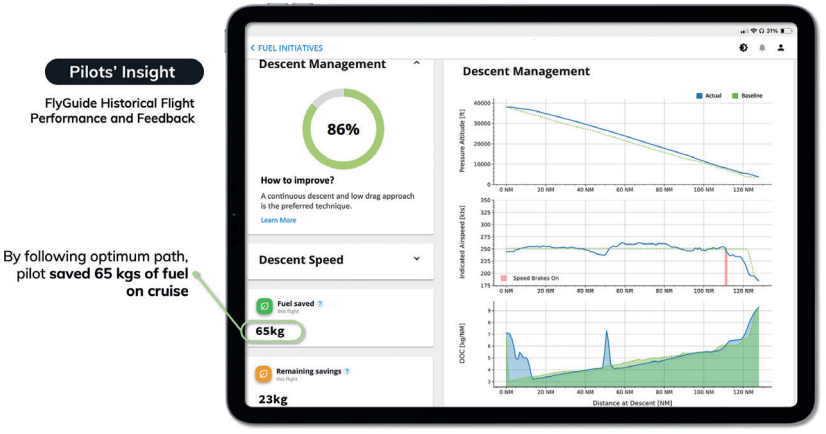

Figure 5: FlyGuide — Historical Flight Performance and Feedback

Another important aspect for Flair is that FPO, Fuel Briefing, and Post-Flight are integrated into a single EFB app, ensuring that crews are subjected to minimal workload with not having to switch between multiple applications. FlyGuide's pilot-centric design gives Flair crews and dispatchers clear insights into the rationale behind recommendations, enhancing their situational awareness and supporting more confident, informed decision-making.

After thorough testing and adjustments to Flair's policies and flight conditions, FlyGuide app has recently been released to all pilots in the airline. Flair looks forward to evaluating the impact of the app's full use in daily operations and gathering further pilot feedback to refine the solution moving forward.

PROVEN FUEL AND EMISSION SAVINGS

Implementing and integrating these advanced technological solutions has already brought remarkable results for Flair Airlines. The graph in Figure 6 on the left side presents the fuel consumption difference between the baseline (simulated unconstrained profile using QAR TOW, route and weather but assuming Cost Index 0) and actual profile (raw QAR). A significant drop can be seen at the time of integration of StorkJet's solutions — once Flair adapted flight planning and Cost Index procedures with StorkJet's recommendations, actual fuel consumption decreased by approximately 50 kgs per flight. The graph on the right side reflects this change, where the shift of fuel difference distribution to the left can be seen — meaning the reduction in fuel burn. This change was combined with minimal impact on flight time and resulted in significant Direct Operating Cost savings for Flair.

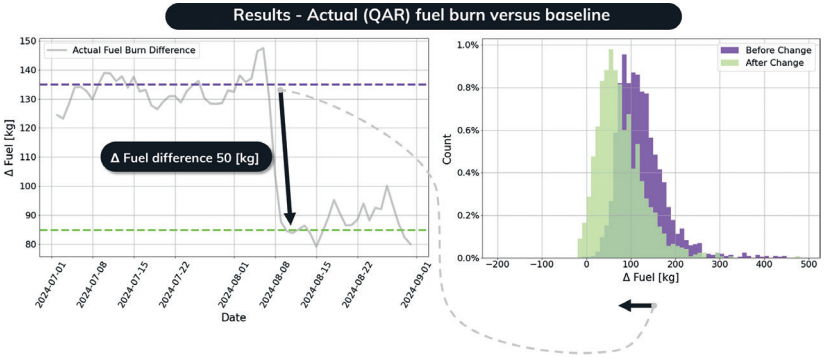

Figure 6: Results — Actual (QAR) fuel burn versus baseline

In summary, by introducing AI-driven tools to improve aircraft performance and boost fuel efficiency, Flair is on the right path to achieving remarkable goals in the

sustainability of its operations. The first results are already there in figure 7 — Flair has reduced fuel consumption by approximately 0.9% per flight, leading to an annual reduction of over 3,200 tons of CO_2 emissions. Additionally, ongoing analysis of flight data through FuelPro and FlyGuide / FPO helps to empower analysts, dispatch, and pilots with greater insights into flight operations, fostering an environment of continuous improvement. These results highlight the direct benefits of the implemented technologies and demonstrate Flair's commitment to leading the industry in sustainability.

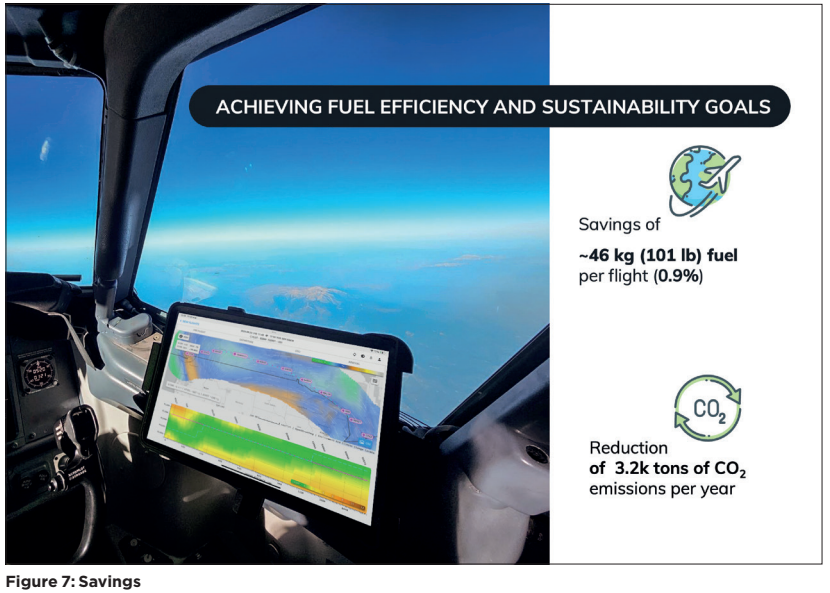

Figure 7: Savings

SUMMARY

Flair Airlines has taken significant steps to improve operational efficiency and sustainability by adopting AI-driven technologies. In collaboration with StorkJet, Flair implemented AdvancedAPM, FuelPro, FlyGuide, and FlyGuide FPO. Together, these tools function as an integrated system to optimize aircraft performance, speeds and altitudes during the flight, reduce fuel consumption, and lower CO_2 emissions.

Among these, FlyGuide FPO provides pilots with real-time guidance to optimize entire flights, but the overall synergy of the products portfolio is the reason why Flair decided to implement StorkJet's solutions. Although the efficiency and sustainability goals are still to be achieved, this comprehensive approach has already contributed to measurable fuel savings, helping Flair Airlines reduce fuel consumption by approximately 0.9% per flight, resulting in an annual decrease of over 3,200 tons of CO_2 emissions. Introducing FlyGuide FPO app to all pilots is an ongoing process, and Flair leadership looks forward to sharing the update later in 2025, following more experience and data from this product and from whole of StorkJet's portfolio. This initiative reflects Flair's commitment to improving efficiency and reducing environmental impact, illustrating how technology can support sustainability in aviation.

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FLAIR AIRLINES

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Flair Airlines is Canada's most reliable airline. As Canada's greenest airline, Flair is on a mission to provide affordable air travel that connects Canadians to the people and experiences they love. With an expanding fleet of Boeing 737 aircraft, Flair is growing to serve over 35 cities across Canada, the U.S., Mexico, the Dominican Republic, and Jamaica.

STORKJET

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StorkJet offers comprehensive, tailor-made fuel efficiency solutions for all aircraft types. Our mission is to help airlines save fuel and reduce emissions by analyzing flight data. Currently over 1,000 aircraft utilize StorkJet solutions, and over 10,000 pilots use FlyGuide EFB.