MAXIMISED AIRSPACE EFFICIENCY

The latest air traffic management system has been developed in partnership between suppliers and ANSPs to improve performance, efficiency, and safety

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Airways New Zealand and Leidos have embarked on an exciting collaboration to develop a new air traffic management (ATM) system for New Zealand – SkyLine-X.

SkyLine-X improves air traffic flow management from takeoff to landing, dynamically adjusting journeys in the air to make air traffic flow faster, safer and more environmentally friendly.

Meeting the need

Increasing delays, international airspace challenges, and growing environmental impacts are outpacing the capabilities of many existing air traffic management systems. With passenger volumes on the rise, the global aviation system faces a challenge: How to accommodate more flights without compromising safety or negatively impacting airlines' bottom-lines. Many of the world's busiest airspaces are meeting this challenge with Leidos' aviation systems and software, which are operating in terminal, en-route, in the towers and oceanic domains of some of the world's busiest airspaces.

Airspace and airports are only facing more demands, and SkyLine-X enables the ATM organization to operate on a single system. Leveraging more than US$500 million of investment and working with partner providers, SkyLine-X delivers a system that is both highly resilient and scalable, realises a lower cost of ownership, and improves safety and supportability.

Taking ATM into the future

Built from the best components of proven, globally-deployed ATM technologies and enhanced by features co-developed in partnership with Air Navigation Service Providers (ANSPs) and technology providers, SkyLine-X offers greater flexibility and capabilities than any other air traffic management solution on the market. It incorporates more precise aircraft and airspace monitoring, trajectory-based operations, data communications, and weather planning integration, enabling easier information sharing between airports, airlines, and ANSPs.

Designed to fully meet the needs of airports and air traffic controllers, the solution features robust scalability, interoperability to existing and future systems, and the ability to configure the interface for improved usability. With Airways' portfolio of automation, surveillance, and navigation services and backed by Leidos' extensive cyber, analytics, and technology expertise, SkyLine-X sets a new standard for air traffic performance, efficiency, and safety.

Key innovations

Incorporated into SkyLine-X is Time-Based Flow Management (TBFM) technology, called "SkyLine Flow", which has already shown to boost capacity in the USA. TBFM enables controllers to monitor arriving aircraft at metering points. It also provides flight crossing, delay absorption time recommendations, and speed advice, enabling pilots to make smaller adjustments earlier in the flight, lessening the need for no-notice holding and vectoring, thus reducing delays. The system uses continuous curved path navigation to help controllers merge various traffic flows into a more efficient final approach flow for improved terminal spacing and sequencing, reducing fuel burn.

The SkyLine-X system allows for the management of any sector from any suite or location – including two interoperable ATM centers. The solution enables improved trajectory, time-based flow management, medium-term conflict detection, a terminal sequence and spacing tool, and a new modern operator interface. Additionally, lifecycle technical and engineering support is available for SkyLine-X customers.

The integration of the FAA Medium Term Conflict Detection (MTCD) capability into SkyLine-X enhances air safety and efficiency. This controller decision support tool is an enabler of Trajectory Based Operations (TBO), providing outlooks for potential conflicts against active trajectories, continually updated from a full range of sensor technologies. Trajectory models that

Airways NZ and Leidos have a combined future vision for air traffic management and are developing a new ATM system for New Zealand to improve air traffic flow management from takeoff to landing

include restrictions provide a reduction in false alarms and reduce controller workload.

SkyLine-X also features an innovative Human Machine Interface (HMI), giving it a modern look and feel that provides a highly intuitive and efficient approach to air traffic control. Drawing upon operational user interface concepts and inherently understood iconography, controller acceptance and training time are significantly decreased. The easy-to-use interaction model coupled with a highly configurable user interface allows customers to shape SkyLine-X's HMI to their needs.

Reaping the benefits

With significant research, SkyLine-X's sophisticated algorithms prove to reduce flight risk and enable three-mile separation by allowing controllers to monitor and control airplanes with greater precision over a greater distance. The system easily integrates with varied surveillance sources including short range, long range and surface radars, multilateration, and ADS-B/C.

In testing, SkyLine-X has shown to improve throughput, flight efficiency, flight times, and schedule predictability using four-dimensional trajectory-based operations, which automatically inserts SIDs and STARS and supports RNAV/RNP routes. With fewer trajectory distortions and operational medium-term conflict detection, controllers are able to safely handle more traffic. Using standards-based, state-of-the-art technology, the system supports DataComm standards such as FANS 1A+. SkyLine-X also enables airports, airlines, and ANSPs to exchange operational information across flight information regions. This encourages better, lower cost information sharing for improved planning and resolution of ATM-related disruptions by providing controllers access to collaboration interfaces directly from the datablock.

Airports have a need for greater capacity and increased utilization. The SkyLine Flow time-based scheduling tool uses metering points further out from arrival airports, even across Flight Information Region (FIR) boundaries, to improve air traffic scheduling and increase airport capacity.

Using RECAT EU spacing, SkyLine Approach aims to increase runway

Skyline-X's Time-Based Flow Management technology helps controllers merge traffic flows into a more efficient final approach flow

utilization and arrival consistency through the application of a tried and tested distance based spacing tool.

A strategic partnership

Airways and Leidos entered into this innovative partnership to demonstrate a new, collaborative process for designing, developing, and implementing a flexible next-generation ATM system. These companies have joined forces to validate next-gen ATM technologies to benefit ANSPs globally, as Airways complements Leidos' capabilities with training, simulation, and technical support expertise.

The two companies have a combined future vision for air traffic management, and the partnership has thus far proven to be highly effective in delivering the building blocks to meet this shared vision, as well as providing a platform to collaborate on other commercial opportunities.

Leidos is supplying its SkyLine-X solution under a partnership agreement in which Airways participates in product design and development, taking the lead in testing and deployment. This kind of collaboration is common for HMI development, but unique for controller tools and operational functions. Given the success evident in the SkyLine-X program, the organisations have been exploring other commercial opportunities, where customers can derive the benefits that each company provides. For example, Airways and Leidos are currently developing training and simulation offerings that will complement SkyLine-X. Airways and Leidos will cooperate on several customer opportunities spanning the air traffic management sector.

When teaming up, the corporations faced the challenge of physical distance – with Airways based in New Zealand and Leidos' headquarters in Reston, Virginia. Leaders from both organisations recognised that to successfully deliver an innovative and effective system, more than just a life-cycle replacement, they would need to approach their partnership in an innovative way as well. Leaders committed to having their teams immerse themselves in each other's cultures and business practices to drive a spirit of true collaboration.

As an illustration, they formed multiple work groups meeting weekly via business conferencing. They also created a joint development environment with more than 30 combined Airways New Zealand-based software engineers and air traffic controllers working with Leidos software engineers in the USA. Both locations have software labs, with weekly updates allowing incremental testing contributing to releases for more formal testing. The result has supported a deepened level of shared understanding and a real-world perspective of ATM.

The collaboration has already seen the successful delivery on-time and on-budget of two operational releases into the current SkyLine-X system, and the partnership model has already saved Airways' customers around US$2.6 million per year or US$36 million across the life of its current ATM platform. The Airways and Leidos collaboration plays a vital role in delivering more resilient, flexible, and efficient air navigation services to aviation customers. Key to supporting those improvements is SkyLine-X's intuitive and accessible HMI interface, multi-channel architecture, TBFM, data-link and the ability to integrate an oceanic, domestic approach, en-route, and tower functions into one system.

The new SkyLine-X ATM system is on track to become fully operational in Airways' new ATM centres in 2020, with the oceanic integration operational in 2021. ❖

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