The Airfield of the Future

Re-evaluating the need for connectivity in the next generation airfield or airport

Avlite®

"We Believe Technology Improves Navigation."

The aviation industry has been through its most challenging year due to the COVID-19 pandemic. The Economic Impacts of COVID-19 on Civil Aviation report by ICAO showed the effects continue to be dramatic:

- Capacity halved with 50% fewer seats offered in 2020 with international air passenger traffic.
- A decrease of 2.699 billion passengers.
- Airport revenues down 66.3%, an estimated USD$ 125 billion.
- An estimated airline loss of revenue of USD$ 371 billion.

The global economy has taken a hit, as Civil Aviation and supporting industries help directly and indirectly employ 65.5 million people and accounts for 3.6 per cent of global GDP. The global pandemic has crippled many airports and businesses.

But what is the outcome of the total upheaval in the industry? It has called for a complete rethink of how the industry, particularly airports and airfields, operate and use their resources. Managing and maintaining an airport will require a pivot to the next generation of thinking and the utilisation of connectivity technology, systems and assets.

The pandemic has shown how under-prepared airports and airfields were for rapid transformation. Connected systems and devices will help play a crucial part in the change.

Revolution is needed – why now?

The revolution is needed now as the business model for airfields globally has changed drastically.

Airfields will need to keep the same physical infrastructure maintained and running to serve the same type of aircraft but with less traffic. Budgets to run and renew airfields will be reduced in line with the traffic downturn, but continued use will mean the same level of service will need to be provided. Regulations dictate the lighting requirements, so the change will need to be on more intelligent operational systems, including asset management, maintenance, monitoring, and control.
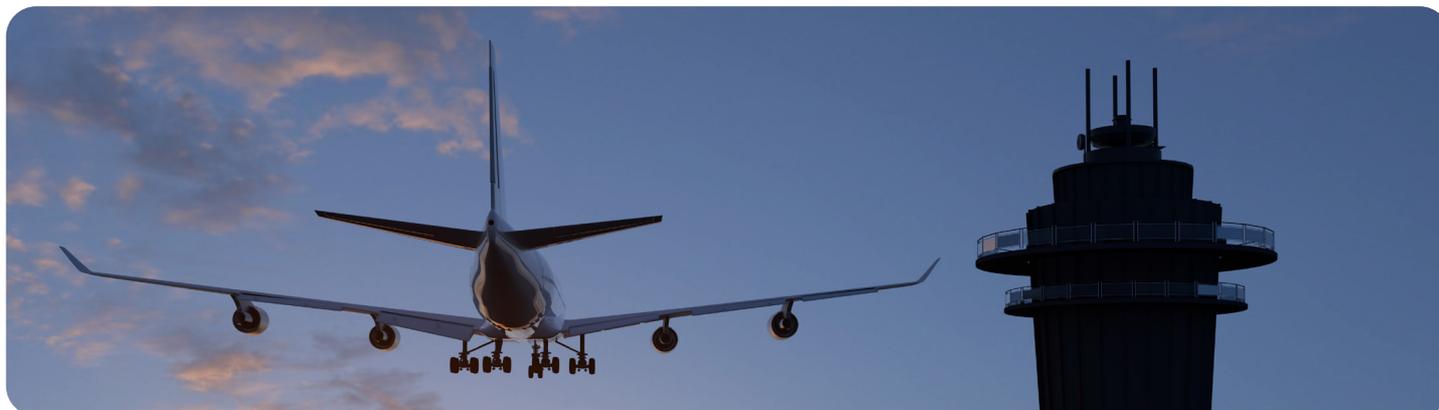
Trends linked to industry changes and market forces:

More complexity

Individual aviation assets and fixtures are being released with increased feature sets and additional capabilities. They are not as simple as they once were. Items such as inbuilt telemetry or the ability to be included in a more extensive system are required to successfully integrate into an airport management structure. This translates to the more complicated products being added to your airfield or airport system.

As we encounter this new level of complexity in the assets, digital technology is the new frontier where integrated intelligent assets will be linked into smart centralised systems.

Virtual modelling and simulation will allow airports to allocate resources better to respond to peak times. It will also enable them to foresee the impact of flight delays and make optimal runway use.

And the biggest complexity change will be in the use of big data and analytics. This will help airports provide effective decisions to remain cost-efficient.

Technology improvements

Technology improvements in the past 20 years have been revolutionary. As technology moves to unified systems and into the world of IoT, the role of the asset on the airfield is to be incorporated seamlessly into a system and only require attention for rare faults, maintenance or end of life replacement.

Flexibility in any system used is going to be vital as interconnectivity will play a major part in airport or airfields futures.

Less reliance on labour

An essential item to come from the recent pandemic, airfields and airports will have to utilise their workforce more efficiently. This also includes monitoring infrastructure, automating processes and most importantly, intelligent and proactive maintenance cycles compared to the current reactive constant deployment.

In the debate of brute force against the analysis of operational need, you will do a factual investigation and be honest with your physical requirements. The contraction of throughput also means adjusting your planning and spares metrics.

The new question will be: What is the best way to deploy your capital and obtain greater value out of your money?

More immediacy required

Connectivity incorporated into asset management systems allows for airfield and airport managers to act immediately. They can make decisions that affect safety in a manner of seconds without putting personnel in harm's way.

Immediacy is a crucial element to realise the efficiency gains connectivity adds to an airport or airfield.

Redundancy – safety is paramount

The duplication of vital systems for use in the event of failure is critical for safety in the aviation sector. Redundancy is one of the most valuable tools for reducing the probability of a significant fault affecting the safety of the aircraft and any passengers.

Adding redundancy through connectivity adds a layer of failsafe to your system. It can also mean systems are activated immediately. It will be a key driver in the implementation of connectivity technology.

What connectivity systems are available?

Asset management

Asset management refers to a systematic approach to the governance and realisation of value from what an airport or airfield is responsible for over their whole life cycles. It incorporates the systematic process of developing, operating, maintaining, upgrading, and disposing of tangible and non-tangible assets in the most cost-effective manner (including all costs, risks and performance attributes).

In this white paper, we refer to the use of asset management in the world of business and infrastructure sectors to ensure a coordinated approach to optimising costs, risks, service/performance, and sustainability.

Operation and maintenance systems are a subset of an asset maintenance system. They feed the actual data to the system to make informed and proactive decisions about how the asset should be attended.

Control and monitoring systems

Control and monitoring systems are designed to automate the control of large and complex processes, feeding into an asset management system. They are usually composed of digital and mechanical parts that together can capture, analyse, and act upon a higher volume of information faster than human staff could safely or effectively manage.

These systems usually comprise of a combination of:

- Sensors
- Network connections
- Central computer systems
- Interfaces for human input
- Actuators, which are mechanical or electronic devices that take action based on user or system feedback

Control and monitoring systems often work remotely and are essential for complying with several different industrial standards, such as ISO 9001. They are used across industries for various functions, including industrial automation, IT network security, public transit controls, patient monitoring in healthcare, and physical asset management and distribution.

Why include connectivity in your airport or airfield management system?

Firstly, it is important to understand what airport and airfield connectivity are. In this white paper, we discuss the ability of airfield technology to be connected to assist in running the individual airfield or airport, or more simply, airfield or airport management.

The question that airports and airfields need to ask is: can your airport make the right, real-time decisions using accurate data? If your airport or airfield can't answer this question, then change is needed to remain efficient. Managing your airport of the future will mean data intelligence is required to make the best decision for your more limited passenger numbers.

Airfield technology is undergoing a revolution as connectivity using telemetry, or a more extensive system is the primary enabler to progress in management and maintenance.

Airfield or airport assets are classified as critical. In the case of aviation lighting, it must work as pilots require this guidance to land safely. Adding connectivity assets such as lighting allows for preventative maintenance schedules with much improved and finite centralised control.

Your connectivity type will dictate what information you receive. It will also allow you to see how your information will be used on the broader airport management system.

There will be restrictions on what connectivity types are available to use, with encryption and redundant controls essential for reliability and total airport system security.

Why are next-generation airfield assets needed?

To make the future airfield a reality, the individual fixtures need to be upgraded, or intelligence needs to be added.

An airport of the future will always require the same infrastructure for the safety of the aircraft and its passengers, but it will be used less. The infrastructure must be maintained and made constant despite less revenue being earned at the airport. Providing a safe airport is a fixed cost. The aim now is to reduce the variable costs associated with running the airport or airfield.

By adding intelligence to your airfield or airport asset base, you increase your fixed upfront cost and optimise and reduce your ongoing costs. This allows your airfield to work smarter, not harder.

Difficult times ensue as upgrades are put on hold due to capital expenditure reduction. Data is needed to see if this is the correct long-term option as maintaining old fixtures inevitably means more failures and additional ongoing costs.

Next-generation airfield assets are needed because informed decisions require an entire data set to make the right call, especially when you have a mix of assets and need to keep the old infrastructure running.

What is the next generation airfield?

Based on the latest trend, market force and systems available, the next generation airfield looks far more integrated and connected. Integration comes from the use of methods to manage items without physical input. The reason for connectivity is to harness the correct data to make the proper, immediate decisions. Combining integration and connectivity will support decision making and real-time implementation.

Airfields and airports will need to factor in greater operational resilience by proactively managing and leading processes to reduce disruptions. More predictable and powerful ways to optimise operational efficiency are required to offer better situational awareness, which also aids better and faster real-time decision making

There will also be the requirement to improve throughput and traffic handling capacity as resources are reduced, but the remainder are used to their fullest potential.

The simple fact is that airfields and airports will have

to reduce their operational costs to survive due to macroeconomic factors while understanding every aspect of what is occurring in their airfield or airport.

Total airport and airfield management will be achieved through control, monitoring, maintenance and operational systems. It "supports data-driven decision making, holistic KPI management, and the integration of operations by interlinking processes and systems across the airport."

Airfield and airport management will encompass performance-based airport operations that enable the creation of an "operational strategy ensuring fairness and mitigation of conflicting interests between stakeholders and guaranteeing that everyone is working efficiently toward common goals."

The next generation airfield includes wired or wireless assets, through various telemetry types, integrated into one management system for quick decisions. The type of connection is not as important as the ongoing costs, provided the technology is reliable. Airport managers will need to make rapid and informed decisions, and connectivity in the airfield network is the answer.

Want to utilise connectivity?

Aviation Assets include solar-powered and fixed wired airfields, heliport and obstruction lights, and other equipment designed to safely guide, land, and protect aircraft. Monitoring the performance of this equipment is essential to reduce the risk of product failure and proactively alert personnel in the event of potential issues.

The Star2M® platform offers customers a suite of applications designed to support their Asset management life-cycle. This gives all of your departments – from Asset owner, installer, manager, maintainer – a single shared view of all assets.

Star2M® is compatible with a wide range of telemetry types. Since Star2M® is partnered with Iridium® for its satellite connectivity, it can provide the reliable, high-integrity data customers require. Star2M® stores performance history, alarm conditions, maintenance records, Asset reporting, and many other features vastly improve access to information and client efficiency.

About Avlite

Avlite is a global manufacturer of aviation navigation aids. The company is headquartered in Australia, with manufacturing and office locations in the United States, Singapore and the United Kingdom.

The Avlite team is dedicated to servicing the aviation industry through efficient design and leading-edge products.

Through close working relationships, aviation authorities and private customers around the globe trust Avlite to enhance the safety of their operations.

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