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The (flight) path to success in airport infrastructure

- Australian international air passenger movements are projected to increase by approximately 220%, between 2023-24 and 2049-50[1].

- New Zealand's air passenger traffic is expected to cross 20 million by 2028, up from 18 million in 2023[2].

Airports around the world are expanding and modernising infrastructure to fulfill growing passenger volumes and connectivity needs that are back to pre-COVID levels[3]. In the Australia and New Zealand (ANZ) region, this has led to several airports announcing significant capex investments in expanding terminals, runways, and facilities[4]. Programs like the Regional Airports Program (RAP), Remote Airstrip Upgrade Program (RAU) and Regional Airports Development Scheme (RADS) are further encouraging upgrades to regional aviation infrastructure, safety, and accessibility.

Shifting passenger demands, security needs and frequent regulatory changes warrant swift infrastructure upgrades to deliver the best passenger experience. However, upgrading an airport is complex—a multi-year process that involves working in "live" environments where physical staff and systems function under high pressure round the clock. Any layout change disrupts operations, frustrates passengers and raises safety issues.

Maximising every invested dollar requires smarter, more efficient upgrades powered by a modern, data-first approach to design and collaboration.

Adopting a data-driven approach to airport infrastructure upgrades will help you improve passenger satisfaction, reduce safety risks, and meet sustainability targets—all faster, with fewer disruptions, and at lower costs.

The business benefits of a data-driven approach

1. Streamline infrastructure upgrades and maintenance

2. Enhance passenger experience

3. Meet environmental and sustainability targets

[1] https://www.bitre.gov.au/sites/default/files/documents/bitre-rr157-summary.pdf
[2] https://www.reportlinker.com/clp/country/6309/726354
[3] https://www.ipfa.org/wp-content/uploads/2024/01/Clear-Skies-Ahead_Airports-Credit-Outlook-2024%E2%80%94Passenger-Traffic-Growth-Normalizing-in-Most-Regions.pdf
[4] https://australianaviation.com.au/2025/03/airports-to-invest-billions-in-infrastructure-over-next-decade/

1 Streamline infrastructure upgrades and maintenance

Does this sound familiar? Your team is halfway through resurfacing a major runway when you realise the new lighting system doesn't align with the latest safety requirements—because the specifications were never updated across teams. Now, flights are disrupted, costs spiral, and passengers endure delays, all because of a preventable coordination gap.

Stay on schedule

To avoid such scenarios, it's essential to streamline your infrastructure upgrades by ensuring different teams can collaborate more effectively. This is when leveraging Building Information Modelling, or BIM, can be crucial. BIM can help you with design and data management while utilising a Common Data Environment (CDE) to enable seamless collaboration across different teams.

Doing this ensures that hundreds of stakeholders can collaborate from a single source of truth. Everyone can access accurate, up-to-date information about your airport infrastructure project in their web browser, with no extra software required. This can save hours of time spent searching for, manually entering, or duplicating information.

Teams can then take things further with BIM tools like clash detection, which can automatically check for constructability issues before they become expensive to fix in the field. When that happens, the potential for time-consuming rework is reduced, even on complex projects with multidisciplinary teams and contractors.

You can also set robust data standards, validate models against them, and deliver on those standards using interoperability tools—ensuring consistency and accuracy across all project phases. By promoting standardisation and real-time validation, airports can minimise errors, rework and enhance collaboration among project teams.

Furthermore, interoperability tools can help streamline the handover process by integrating design and construction data into airport facility and space management systems. This doesn't just help create a smoother transition to operations, but it can also help you save time and resources while creating a solid foundation for efficient long-term facility management.

Optimise operations

Thanks to the improved visibility BIM brings, you can also optimise maintenance and resource allocation once your infrastructure updates are complete. BIM can integrate with other systems, such as asset management systems, airport operations databases, and building management systems, ensuring that information flows seamlessly between them for real-time decision-making.

What's more, BIM can also help enable predictive maintenance through utilising data analysis and Artificial Intelligence (AI) to identify potential issues before they become critical. That way, the likelihood of unexpected equipment failures is reduced. For example, BIM can use predictive analytics to flag signs of potential failures on a baggage handling system. That information can then be routed to the right team at the right time so that issues can be fixed without majorly impacting airport operations.

In Australia, airports operate within a fixed five-year review cycle[5], which can create challenges in long-term infrastructure planning and cost recovery. With BIM, airports can better navigate these constraints by optimising maintenance schedules, extending asset lifespan, and ensuring regulatory compliance with up-to-date infrastructure data.

[5] https://www.bitre.gov.au/sites/default/files/documents/bitre-rr157-summary.pdf

② Enhance the customer experience

As passenger volume increases, airport owners don't just need to expand and modernise facilities. They also need to ensure this is done in a way that doesn't impact the passenger experience. Today's passengers are looking for more convenience, safety, and speed when travelling, and airport infrastructure needs to keep up.

Reduce passenger wait times

When you receive and provide real-time data on assets in a CDE, you can improve workflows and make better-informed decisions without substantially impacting the passenger. This can be done by using a digital twin—a digital replica of a physical asset.

With a digital twin, you can monitor airport operations in real time and identify areas that can be optimised for efficiency. This can help you be proactive rather than reactive. For example, a digital twin can model passenger flows throughout the airport, like at the security, immigration, and check-in areas. Teams can use this information to predict when and where crowding will occur and allocate resources dynamically so that they can open additional counters or redirect passengers to less busy checkpoints.

Improve safety and security

Airport passenger volume is at an all-time high, with numbers expected to reach 5.2 billion in 2025[6]. This means that airport security and safety of passengers is more important than ever. However, instating safety measures is a task that is easier said than done. Imagine this scenario. You're managing an airport upgrade when bushfires force emergency evacuations, putting immense pressure on airport operations. As flights are redirected and passenger volumes surge, you realise critical infrastructure—like air filtration, backup power, and emergency exits—weren't prioritised in the design phase. Without a centralised system to track and update evolving requirements, teams scramble to make last-minute fixes, causing delays, safety risks, and operational chaos just when the airport needs to function at its best.

That's when using a digital twin can help enhance your airport's overall security, with the ability to detect unusual patterns or flag anomalies to the appropriate team. It can help improve your airport's security and safety measures by simulating and evaluating emergency events so that you have trained staff and an optimised evacuation procedure.

Prioritise accessibility

Beyond regulatory needs, accessibility is now a core focus in airport planning to ensure travel is a welcoming, equitable and seamless experience for all including those with disabilities, seniors, and families. Airports are prioritising accessibility in upgrades and new planning. For instance, Perth Airport is building a sensory room for neurodivergent passengers[7].

In a CDE, you can proactively manage accessibility needs during upgrades in live environments, minimising disruptions for passengers with special requirements. By centralising real-time data on construction progress, temporary access routes, and facility changes, teams can quickly adjust mobility services, signage, and assistance programs. This ensures that critical accessibility features—like step-free pathways, elevators, and assistance zones—remain functional or are swiftly adapted, preventing delays and ensuring a smooth, safe travel experience for all passengers.

[6] https://www.barrons.com/news/air-passenger-numbers-to-top-five-billion-in-2025-iata-131c2267
[7] https://blog.aci.aero/accessibility-and-facilitation/elevating-airport-accessibility-enhancing-travel-experiences-for-all/

Case study: Los Angeles International Airport (LAX)

LAX—the world's third busiest commercial airport—is undergoing a US$14 billion renovation to ease congestion and provide a better travel experience for more than 88 million passengers[8]. This includes a long-awaited connection from LAX to the Los Angeles Metro system, as well as a new $5.5 billion system designed to cut traffic on the notorious LAX horseshoe, a 1.6-kilometer airport loop that's currently the only way to reach the terminals but takes over an hour to drive around at peak times.

To do this, designers and engineers from 12 different trades needed to deliver over 180 design models, across 22 cities and five different time zones. With BIM, they were able to access information about the project from anywhere in the world, at any time of day, enabling the whole team to see and understand the project digitally before construction. Designers were also able to use automatic clash detection tools to identify errors and address them, before work was undertaken on site. This helped avoid expensive mistakes, saving time and reducing risk.

8 https://www.autodesk.com/blogs/construction/lax-construction/

③ Meet environmental and sustainability targets

Airports have a substantial carbon footprint, with an energy consumption comparable to that of a small city. Addressing these problems involves upgrading infrastructure to be more sustainable with designs that minimise environmental impact. This can be done through renewable energy sources, efficient waste management systems, and green building materials.

The sustainability opportunity

The Australian Airports Association has identified sustainability and net zero aviation as a critical need that needs addressal[9]. It's laudable that several airports in the ANZ region have already taken active steps towards sustainability.

- Many including Sydney Airport, Gold Coast and Townsville Airports aim to achieve Net Zero emissions by 2030 for scope 1 and 2 emissions.

- Newcastle Airport achieved net-zero Scope 1 and 2 emissions in 2024, six years ahead of its target.

- Brisbane Airport aims for zero operational waste to landfill by 2030.

- Regional airports in New Zealand like Gisborne and Hamilton have solar farms powering their terminals and ancillary buildings.

However, implementing sustainable infrastructure often requires a significant upfront investment. Once sustainable infrastructure is in place, assets like energy-efficient lights or HVAC systems can then lead to significant cost savings. They are also often more resilient to environmental risks like difficult terrain, extreme weather events, making sustainable airport infrastructure good for both the planet and your bottom line.

An airport that's ready for the future

Using BIM can help build more sustainable airport infrastructure by giving teams access to better data, so they can more easily identify areas that need to be carbon-efficient and reduce construction waste. A CDE can help break down data silos, making it easier to draw insights and report on carbon efficiency. Sustainable design tools can also be used to model, simulate, and assess the environmental impact of a project so that it can meet carbon neutrality and sustainability targets—all before construction begins.

Once the airport is operational, digital twins can then help monitor energy usage in real-time or even test multiple 'what if' scenarios so teams can analyse the environmental impact of your airport and continue to make data-driven decisions to help it meet sustainability targets for the future.

[9] https://infrastructuremagazine.com.au/airport-industry-calls-for-federal-spending-changes/

Case study: Dallas Fort Worth International Airport (DFW)

Occupying an area larger than Manhattan, Dallas Fort Worth Airport serves nearly 80 million passengers flying to 257 destinations each year. With CDE and BIM technology, the airport is now growing to support 20 million more passengers per year, while becoming the first carbon-neutral airport in the Americas[10].

With goals of achieving net zero carbon by 2030, DFW plans to construct a new zero carbon electric utility plant to replace its aging steam piping distribution system. Because all airport data is connected, every stage of the construction lifecycle is available in one tech stack that's being shared across the organisation. This ensures DFW Airport can keep the utility plant build on track as

anyone can report what's happening in real time. Even the smallest problems are given the attention they deserve, as they can be reported and rectified before they snowball into larger issues that can impact how quickly the plant is built.

DFW Airport is also using drones to capture aerial footage and upload it into the CDE so everyone can track how they're progressing against a project's schedule. In the past, field teams on site would manually survey the jobsite to capture images and then upload the photos back into the project. What used to take days now takes minutes, with the team estimating 85% in time savings so that airport updates get completed faster, with minimal passenger disruption.

10 https://boards.autodesk.com/faa-aip-resource-page/items/how-dfw-airport-harnesses-data-for-better-capital-planning-and-maintenance?token=9bb95e074d&fw=0207d

Sustainability: The current landscape

Aviation accounts for **2.5% of global CO_2 emissions** and has contributed around **4% to global warming to date**[11].

Current projections estimate total passenger volume in 2025 will reach approximately **5.2 billion.**

The global airport infrastructure market is projected to **grow from $77.85 billion** in 2022 to **$139.14 billion by 2030**, with a CAGR of 7.5%[12].

That increase will have a negative effect on airports, which already have a substantial carbon footprint with an energy consumption comparable to that of a small city[15].

The world population is set to **increase by 28.21% in 2050**[13], and air transport is one of the fastest-growing sectors of the global economy[14].

Implementing sustainable solutions can:

Reduce harmful emissions by 50%[16].

Lead to significant cost savings.

Buildings designed with BIM tools can reduce total energy consumption by at least 30%[17].

Attract investments from stakeholders that value corporate social responsibility.

81% of industry leaders and experts surveyed for Autodesk's latest State of Design & Make report said that investors drove their sustainability goals[18].

Increase resilience to adverse weather events.

118 runways at 89 airports are expected to have some level of flooding in 2050[19].

For Dallas Fort Worth Airport, switching to renewable energy solutions led to:

1,400 jobs created

85.8% reduction in nitrogen oxide emissions per year

15.3M kg reduction in carbon dioxide emissions per year[20]

[11] https://ourworldindata.org/global-aviation-emissions
[12] https://www.theinsightpartners.com/reports/airport-infrastructure-market
[13] https://www.autodesk.com/campaigns/sustainability
[14] https://www.statista.com/markets/419/topic/490/aviation/#overview
[15] https://www.sciencedirect.com/science/article/abs/pii/S3050475924000605
[16] https://www.sciencedirect.com/science/article/abs/pii/S3050475924000605
[17] https://www.mdpi.com/2071-1050/15/13/10293
[18] https://www.autodesk.com/design-make/research/state-of-design-and-make/sustainability/sustainability-action
[19] https://www.faa.gov/airports/environmental/resiliency/Resilience-at-Airports-Fact-Sheet.pdf
[20] https://www.dfwairport.com/business/about/investors/zerocarboncup/

Take your airport to the next level

Airports in the ANZ region have written impressionable success stories thus far, owing to the success of private investments, monitoring regimes and favourable regulatory frameworks. Be it the additional runway at Perth Airport or the massive redevelopment of Auckland Airport, the region is now set to make significant strides driven by net-zero goals and new technologies.

Autodesk is ready to be a proud partner in your airport infrastructure journey. Speak to us to find out how BIM and CDE technology can help you upgrade your airport faster and more sustainably, while maximising customer satisfaction.

Let's work together on your airport infrastructure strategy

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