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**Airport Profile:** Miami (MIA)

**Design & Build:** Accessibility, Sustainability,  
Multimodalism & New Infrastructure

**Plus:** Alternative Fuels, Orchestration Platforms,  
Reality Capture & Business Exchange



IN THE SPOTLIGHT:  
**DESIGN & BUILD**

Issue 2, 2026

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# AIRPORT WORLD®

Proudly Serving the Airport Industry for 30 Years

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Issue 2, 2025

# Forward thinking

**Editor, Joe Bates, reflects on the ‘design and build’ theme of this issue and global traffic trends.**

Sometimes I think I should have been an architect or civil engineer as impressive old buildings, dynamic new ones and pioneering infrastructure of all kinds have always fascinated me.

Schoolboy trips to London, Brussels and Paris offering the chance to take in and admire the many magnificent old buildings dotted across the respective cities only served to fire my imagination and wonder at the genius of architects such as Sir Christopher Wren or Eugène Viollet-le-Duc.

Thinking about it though, I suppose my interest in infrastructure goes back to my childhood and wondering how incredible structures like the pyramids of ancient Egypt could have been built without the use of modern technology.

Now, nobody is comparing an airport terminal to one of the Seven Wonders of the Ancient World – although someone once accused airports of trying to build the next Taj Mahal instead of focusing on the development of smaller, more user-friendly facilities – but there is no denying that their design and use is evolving and that airports are becoming increasingly sophisticated in terms of the planning, design and construction of new infrastructure.

We cover a host of ways airports are becoming smarter about building new infrastructure, and more attuned to the needs of passengers and their respective environmental responsibilities, in this ‘design and build’ themed issue of *Airport World*.

Building accessible facilities for all; the sustainability challenge; Poland’s new multimodal airport; modular construction; and ‘customer-friendly design’ are just a few of the issues we address in the themed section of the magazine.

We also look at how some US airports are upgrading their airside retail/F&B offerings to accommodate the return of non-ticketed visitors; the energy challenge facing airports; and review the opening of major new facilities in Europe and Asia-Pacific.



And if that isn’t enough, the ‘design & build’ section also contains features about modernisation projects in constrained environments, and considers the need for smarter terminals.

Our main airport feature is on Miami International Airport where we discover more about its \$14 billion Modernization In Action (M.I.A) capital improvement programme and ambition to be welcoming close to 80 million passengers annually by 2040.

Elsewhere in the issue we have articles about alternative fuels (hydrogen and SAF); reality capture technology; the complexities of managing staffing levels; and building long-term resilience into operational infrastructure.

We round the issue out with our usual ‘people matters’ column and airport supplier news and features on the ‘business exchange’ pages.

Finally, I would just like to acknowledge ACI World’s recent confirmation that Hartsfield-Jackson Atlanta International Airport (ATL) remains the busiest gateway on the planet based on the 106.3 million passengers it handled in 2025.

Dubai (DXB) with 95.2 million; Tokyo Haneda (HND) with 91.7 million; Dallas Fort Worth (DFW) with 85.6 million; and Shanghai Pudong (PVG) with 84.9 million made up the top five.

Hong Kong (HKG) retained its status as the world’s busiest cargo airport and Chicago O’Hare (ORD) its No.1 ranking as the busiest airport for aircraft movements.

ACI World director general, Justin Erbacci, noted: “These hubs keep people and goods moving, supporting global trade, tourism, and economic growth in their communities and regions.

“To help keep pace with rising demand, governments must prioritise sustained investment in airports and the broader aviation ecosystem.”





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# All systems go!

**Miami International Airport is transforming its infrastructure to equip itself for the next stage of its journey, writes Joe Bates.**

**W**ith plans to invest at least \$14 billion on enhancing its infrastructure to ensure that it is equipped for long-term growth, these are indeed busy and exciting times for Miami International Airport.

On the cards as part of its Modernization in Action (M.I.A.) capital improvement programme are proposals to reimagine and expand Concourse D, a complete revamp of the Central Terminal area, and the construction of a new Concourse K.

In essence, MIA's future-ready masterplan is designed to position the gateway to accommodate around 77 million passengers and five million tons of cargo per annum by 2040.

Its ambitious infrastructure development programme will be supported by the adoption of the latest technology that includes robotics and agentic AI, and investment in facilities, and improved procedures and procedures that further improve the airport experience.

If all comes to fruition, operator Miami-Dade Aviation Department (MDAD), believes the combination of new buildings, state-of-the-art technology and customer friendly facilities will allow MIA to expand its connectivity and enhance the travel experience to ensure that it maintains its status as America's second busiest airport for international passengers and biggest for international cargo.

MIA's director and CEO, Ralph Cutié, has no doubt that the new infrastructure, especially the new-look Concourse D, will be transformational for the airport.

"MIA ranks among the fastest-growing global hubs since the pandemic, and the North Terminal expansion, coupled with the South Terminal's future Concourse K and the Central Terminal redevelopment, will create a new future-ready gateway fully enabled to serve our millions of visitors for decades to come," enthused Cutié.

## NEW CONCOURSE D

MDAD is working hand in hand with hub carrier and anchor tenant, American Airlines, on the \$1 billion investment programme to reimagine and expand Concourse D at the Florida gateway.

The upgrade is expected to define the next generation of travel and marks a huge vote of confidence in the airport, which the US carrier has served for nearly 40 years.

Indeed, earlier this year American Airlines CEO, Robert Isom, spelt out the importance of Miami International Airport to his airline when outlining the upgrade.

"Miami is an essential hub and international gateway for American, and it's a key part of our history and our future," said Isom.

"The brand-new, reimagined D60 is a transformational project that will provide a much-improved experience for our customers and our team.

"This investment — alongside new premium lounges and new routes — reflects our shared commitment with Miami-Dade County and the airport to ensure Miami remains the preeminent US gateway to Latin America."



Set to break ground in 2027, the Gate D60 project charts the next chapter of travel at MIA, with a new concourse expansion designed for a premier airport.

Currently equipped to support ground operations for smaller regional jets, the new three-level Concourse D extension will create 17 new aircraft gates to accommodate larger aircraft and eliminate outside boarding.

All will provide convenient third-level connections to Concourse D's US Customs and Border Protection facility for international arrivals.

The project will expand a single shared boarding area to include adjoining boarding spaces for every gate to improve flow and provide customers with more space and comfort.

The expansion is designed to make international travel more seamless, something that will be particularly noticeable for international arrivals through its direct third-floor access to the MIA customs hall.

The concourse will feature bright, expansive spaces with sprawling indoor palm trees, as well as new dining and shopping options for travellers.

"The D60 expansion is one of the most monumental customer service improvements within our unprecedented airport-wide modernisation plan, which will transform the passenger experience at MIA from the cabin to the kerb over the next five years," said Miami-Dade County mayor, Daniella Levine Cava.

American accounts for more than 60% of the traffic at MIA, currently operating around 400 daily departures from the gateway. The airline plans to run its largest summer schedule ever from MIA this year with flights to 155 destinations across 45 countries.

MIA serves as its international gateway, delivering an industry-leading network to Latin America and the Caribbean and giving customers access to more than 90 unique destinations, served only by American at MIA, including new services this year to Milan, Italy, and Bimini, Bahamas.

### CONCOURSE K AND NEW CENTRAL TERMINAL

In addition to Concourse D, MIA plans opening a new Concourse K expansion in 2029, and has outlined proposals for a \$745-million Central Terminal redevelopment project, which will modernise MIA's oldest terminal area by 2031.

The new Concourse K will be a 300,000-square-foot expansion that will add six new passenger gates and boarding areas for domestic and international flights, post-security concessions offering more dining and shopping options for travellers, and a new passenger lounge.

The future three-level concourse, MIA's first terminal expansion since 2012, is slated for completion in 2029.

The \$600 million Concourse K expansion will also include a new two-level ground support equipment maintenance facility, an enhanced baggage handling system, and critical upgrades to airfield infrastructure – all designed to meet MIA's growing travel demand.

MDAD notes that Concourse K's design incorporates the highest levels of sustainable construction practices as well, earning LEED Silver certification and Envision verification.

Work is expected to start on the phased renovation and expansion of the Central Terminal area between Concourses E and G in 2028.

### OTHER DEVELOPMENT PROJECTS

The Gate D60 expansion, Concourse K and reimagining of the Central Terminal area are the biggest of more than 200 projects within the \$14 billion M.I.A Plan.

Other major projects include the new *Ibis Garage*, which opened in December; modernisation and preventive maintenance for more than 600 elevators, escalators, and moving walkways; renovation of 196 public access restrooms located on all three levels of MIA's terminal and concourses; and upgrading 126 passenger boarding bridges.



**THE ROLE OF TECHNOLOGY**

In April this year, while attending an IT conference, Miami-Dade County’s mayor showcased MIA’s AI-powered hologram chatbots, now available at four key entry points across the airport.

MDAD believes that the launch makes MIA the first airport in the world to deploy large-scale geo-aware, agentic AI across its digital infrastructure, delivering real-time, location-based assistance through natural conversation and enabling seamless interaction across web, mobile, kiosks, and on-site digital interfaces.

MIA’s hologram chatbots – developed in collaboration with Mappedin, Satisfi Labs, and HYPERVSN – enhance the passenger journey by providing intuitive, personalised support from kerb to gate, marking a major milestone in Miami-Dade County’s use of artificial intelligence to improve the travel experience.

“This is what the future looks like, and it’s being built right here in Miami-Dade,” enthused Cava. “We’re not just keeping pace with innovation. We’re leading it, harnessing artificial intelligence to transform how we serve our visitors and our community every day.

“From our airport to our seaport, we are creating a smarter, more connected, and truly future-ready Miami-Dade.”

Do developments like this suggest that technology will play a major role will in the future development of MIA?

“We’ve been leveraging technology in co-ordination with our federal partners to expedite and simplify the security screening experience at MIA,” said Cutié.

“In December, MIA became the latest US airport with CLEAR’s eGates, which allow CLEAR+ members to verify their identity within five seconds, bypass the TSA podium, and go directly to screening.

“For international arrivals, MIA last December completed the largest single deployment of Enhanced Passenger Processing (EPP) at any US airport, in partnership with CBP, to provide faster, more secure

arrivals for US citizens. EPP captures and processes biometric photos to verify travellers in three seconds by matching images against CBP’s existing records.

“EPP is scheduled to be available to legal permanent US residents this summer as well. It also allows CBP to allocate more officers to process non-US citizens, thereby benefitting all passengers entering the United States at MIA.”

**TRAFFIC TRENDS**

MIA offers more flights to Latin America and the Caribbean than any other US airport and is also the leading economic engine for Miami-Dade County and the state of Florida, generating business revenue of \$181 billion and approximately 60% of all international visitors to Florida annually.

A total of 55.3 million passengers passed through MIA last year ensuring that it broke the 55 million-barrier for the second consecutive year.

The annual total was 1.1% down on 2024’s record total of 56 million passengers (+7%), which the airport attributed to shifting immigration rules, global competition, and a softening tourism economy.

However, MDAD is quick to point out that it outperformed national trends, which it says highlights the continued strength and resilience of the region’s travel market.

Last year’s passenger totals comprised 24.8 million travellers on international services and 30.5 million on domestic flights.

And for the sixth consecutive year, MIA set a new cargo record, handling close to 3.5 million tons of freight in 2025 – 13.6% up on the previous year.

The healthy upturn in cargo volumes carried over into the first quarter of 2026, when freight shipments increased by 15.7% over the corresponding period a year ago.

Q1 passenger numbers in comparison have remained the same as last year’s first quarter volumes, but one factor that may generate growth



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going forward is the US government’s recent reopening of air services to Venezuela.

As a result, on April 30, American Airlines resumed daily Miami-Caracas services for the first time since 2019, and it will add a second daily flight on May 21. While on May 1 GlobalX began daily charter flights to Venezuela on behalf of Laser Airlines.

Venezuela formerly accounted for nearly 600,000 passengers annually at MIA, numbers that made it the gateway’s 13th busiest international travel market.

Healthy traffic numbers, of course, help power trade, jobs, and opportunities across Miami-Dade County.

**CUSTOMER SATISFACTION**

In 2025, MIA was ranked *North America’s most-improved mega airport in customer satisfaction* by J.D. Power, the Best Airport for Layovers by *Global Traveler* magazine, one of the Top 10 US Airports for Food and Drink by *Food and Wine* magazine, and the third best for US business travellers by travel platform Booking.com for Business.

MIA’s status as an important hub for international travel ensures that there is an ever increasing demand for overnight accommodation at the airport and in the surrounding area.

To help fill the void, MIA recently teamed up with Wait n’ Rest to launch the company’s first sleep rooms in North America inside Concourse D.

The 15 Wait n’ Rest luxury sleep rooms at MIA can accommodate up to four guests per unit and include luxury hotel-level bedding and linen, in-room touchscreen entertainment and access to private showers and bathrooms.

In essence, the sleep room concept allows passengers to step away from the airport crowds and rest and relax in privacy for up to eight hours in accommodation just minutes from their gate.

Wait n’ Rest is set to open a second location at MIA, in Concourse H, this summer.

**EASING JOURNEYS THROUGH THE TERMINAL**

Another way MIA is hoping to enhance the airport experience for US passengers is through the adoption of the TSA’s PreCheck Touchless ID technology in MIA’s Concourses D, E, and H.

This cutting-edge biometric technology enables eligible TSA PreCheck members to experience a faster, more seamless identity verification process without presenting a physical ID or boarding pass at the security checkpoint.

TSA’s launch of PreCheck Touchless ID at three of MIA’s busiest checkpoints is the latest state-of-the-art initiative that is streamlining and simplifying the travel experience for our customers.

The move follows the earlier full modernisation of TSA Checkpoint 2, with the newest bag screening and bin return technology in the industry designed to be 30% faster than the traditional checkpoint lane.

**SUSTAINABILITY**

In response to being asked about how high a priority is the sustainable development of MIA to MDAD, Cutié states that it is key to the future growth of his airport, and outlines some of the carefully planned sustainability features of the gateway’s new infrastructure.

“Every major project within our \$14 billion modernisation plan is designed with a sustainability component,” said Cutié.

“With up to 6.3 megawatts of on-site renewable energy generation, this initiative positions MIA as a national leader in clean energy among dense urban airports. Separately, in 2023, MIA entered into a \$547 million partnership with FPL Services to upgrade MIA’s electrical infrastructure with zero-emission equipment, net-zero backup power generators, solar photovoltaics systems, and electric vehicle charging stations.



“On Earth Day, MIA unveiled eight new solar havens at its Central Garden area on the departure level. In addition to providing shaded outdoor seating for up to eight people at MIA, each solar-powered structure generates enough clean energy to charge 20 devices simultaneously – providing both a customer service and environmental benefit.

“Moving forward, the airport’s terminal-wide re-roofing programme will include installing solar panels over 400,000 square feet of MIA’s terminal. The system is expected to generate 893,138 kilowatts of clean energy annually.”

### AIRPORT ART

Miami International Airport has long been a supporter of the arts and showcases a host of different displays throughout the year under the umbrella of its dedicated arts and exhibitions programme, MIA Galleries.

Established in 1996 and managed by the MDAD's Fine Arts and Cultural Affairs Division, its stated mission is to “enhance the travel environment by presenting exhibitions and showcasing works that celebrate the rich culture, diverse landscape, and artistic resources of the local community”.

Two of the latest exhibitions include new murals toasting 130 years of Miami’s Overtown neighbourhood and a celebration of the centennial anniversaries of the nearby cities of Hialeah, Miami Springs, and Opa-locka, along with the legacy of their founder, aviation pioneer and land developer Glenn Curtiss (1878–1930).

The latter exhibition also features a scaled model of the Glenn Curtiss and June Bug Legacy Memorial monument, an upcoming landmark in Miami Springs by local artist Natalie Plasencia.

The monument will be unveiled this August in conjunction with Miami Springs' centennial anniversary on August 23, to honour Curtiss’ innovation, courage, and imagination.

### IS MIA READY FOR EVTOLS?

If industry updates are to be believed a new era of flight with electric vertical take-off and landing (eVTOL) aircraft is just around the corner, with commercial operations coming in the next few years.

Indeed, Skyports Infrastructure has proposed a new hub for Advanced Air Mobility aircraft at Watson Island Heliport close to MIA. The airport itself appears ready for any eventuality.

“Under the leadership of Miami-Dade County mayor Daniella Levine Cava, an AAM Working Group was created in 2021 to prepare a comprehensive approach to the new technology,” explained Cutié.

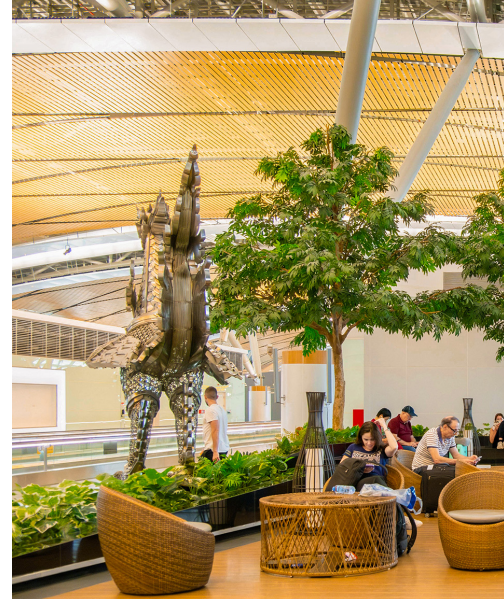
“The Working Group holds quarterly meetings with the AAM industry in an open forum to update all interested parties. MIA also continues to discuss potential AAM operations with leading e-VTOL manufacturers.

“At the Paris Air Show last June, MIA announced a memorandum of understanding with Wisk Aero for strategic planning, information sharing, infrastructure development, and policy pathways for eVTOL operations in Miami.

“MIA, in partnership with Archer Aviation and the Florida Department of Transportation, is one of eight US locations selected by the US Department of Transportation and the FAA to participate in the government’s eVTOL and AAM Integration Pilot Program (eIPP).

“As part of the eIPP, MIA and Bell Dancy Industries will begin a pilot programme to evaluate safe CONOPs [Concept of Operations] for air routes, tactical and operational programme/systems, data/technology, which will be incorporated into future co-ordinated airspace management vertiport design.”

Whether it be investing in new infrastructure, embracing new technology, enhancing the offerings in its terminals or charting a sustainable future, it is all systems go at MIA!



# Beyond accessibility

**Keith Hui, FAIA, HOK's regional leader of aviation and transportation considers the case for the creation of sensory terminals that are a welcome space for all.**

**P**ublic spaces should be universally accessible and enjoyed by everyone.

As one of the most complex and high-stress public environments, airports welcome people of all ages, abilities and backgrounds – often under strict time constraints and in sensory-dense settings.

The World Health Organization estimates that 16% of the global population lives with a significant disability, and roughly one in five people is considered neurodivergent.

For travellers experiencing physical, cognitive or sensory differences, navigating an airport can be especially challenging. Accessibility now means more than mobility. It also covers sensory, cognitive and neurological needs.

The aviation industry is beginning to rethink how terminals support these travellers. Accessibility should be embedded throughout the traveller journey, from circulation and respite spaces to wayfinding, lighting, acoustics and materiality.

While sensory rooms are an important step forward, they often isolate support into a single space. What if, instead, airports became sensory terminals with inclusive design strategies that benefit everyone?

Below are five inclusive design approaches drawn from recent terminal projects that make airport journeys more physically accessible and sensory friendly, benefiting all travellers.

## 1. RAMPS FOR LEVEL CHANGES

Lifts in airports are often located away from central circulation, forcing travellers who rely on them to bypass key public spaces.

Ramps for level changes allow users to enjoy the same experience as everyone else, including retail, dining, public art and other amenities without detours. They are also simpler to maintain and more reliable compared with lifts and escalators.

At Seattle-Tacoma International Airport's (SEA) Concourse D Annex, HOK's design added a central ramp connecting levels within the six-gate hardstand facility. The ramp improves accessibility while maintaining a clear, continuous traveller journey.

## 2. AREAS FOR RESPITE

Workshops with airport stakeholders and surveys reveal that travellers with reduced mobility want more opportunities to pause and rest, especially along long routes between check-in, gates and arrivals.

Effective respite spaces include varied seating, biophilic and organic elements, curated artwork and culturally grounded design features to create a relaxing environment.

At Suvarnabhumi International Airport in Thailand, lounge "living rooms" are strategically placed along the length of a new 900-metre midfield satellite concourse.

These spaces feature live plantings, wooden accents, expressive lighting, culturally reflective artwork and textured surfaces such as woven rattan seating, a material native to southern Thailand.

In Vietnam, HOK's design for the new Phu Quoc International Airport includes respite spaces that reflect the tropical environment.

A post-security grand hall features a gently meandering pathway with seating, palm trees and native vegetation. A viewing gallery also lets travellers pause in a daylit space to watch aircraft taking off and landing.



### 3. INTUITIVE WAYFINDING AND TECHNOLOGY

With dense signage, announcements, screens and long corridors, airports can easily overwhelm travellers. Designers can reduce information overload by streamlining visual cues and prioritising wayfinding.

Clear sightlines, simple patterns, consistent visuals and logical adjacencies reduce reliance on excessive messaging.

Digital tools further support this by delivering personalised, real-time updates such as navigation and gate status directly to travellers. This gives them more control over how they receive information and engage with retail and dining.

At SEA's North Main Terminal renovation for Alaska Airlines, HOK's design prioritised intuitive wayfinding by removing redundant entry points, underutilised equipment and a mezzanine level. These changes transformed the check-in hall into a double-height space with clear sightlines that help travellers immediately understand where to go next.

SEA is also piloting new bag-tag and automated bag-drop technology, giving travellers more choice in how they check baggage while reducing queuing and congestion. The result is a terminal that communicates through space first, with technology supporting, rather than competing with, the experience.

### 4. THOUGHTFUL LIGHTING AND ACOUSTICS

Lighting and sound play a critical role in shaping the comfort and clarity of an airport. When carefully co-ordinated, lighting can define spaces, create ambience and support task-focused activities, while acoustic strategies reduce sensory overload, especially for sensory-sensitive travellers.

Warm, biophilic lighting in lounges encourages relaxation, while neutral white artificial light in security processing promotes focus.

Complementing these strategies, acoustically absorptive materials, textured surfaces and varied finishes help minimise reverberation and reduce competing background noise.

At LaGuardia Airport's new Terminal B, full height glazing at the terminal entry introduces daylight and views to the outdoors. A clerestory window above the check-in circulation area reinforces directional movement and highlights art and organic architectural elements.

These light-filled spaces are paired with material strategies that help control sound, preventing large areas from becoming acoustically overwhelming.

### 5. BRING TRAVELLERS BACK TO NATURE

Biophilic design mimics nature through colour, forms, textures and patterns. Incorporating these elements into a terminal helps humanise the airport experience and create a calmer, more intuitive environment.

Exposed wood, warm earth-toned palettes and nature-inspired furnishings introduce visual softness into airports. Organic patterns in carpets, lighting and wall treatments also subtly reference the natural world. These strategies support neurodivergent and sensory-sensitive travellers while enhancing comfort, dwell time and overall perception of the terminal.

In Northern California, HOK is designing the new Monterey Regional Airport with nature in mind. The five-gate terminal features a mass timber structure that reflects the region's landscape, along with earthy materials and warm accents. A lush pre-security courtyard further connects travellers to the outdoors.

### CREATING A MORE ACCESSIBLE AIRPORT FOR EVERYONE

Accessible airports are created by designing the terminal as a cohesive, sensory-supportive environment. Circulation is intuitive, places for pause are embedded throughout the journey, and light, sound, materials and technology work together to reduce stress and improve clarity.

These strategies support travellers with a wide range of physical, cognitive and sensory needs while enhancing comfort and ease of navigation for all passengers.

While accessibility is the foundation, inclusion is about designing terminals for everybody who passes through them. Designers should create spaces where every traveller feels considered, not just accommodated.

For airport operators, the value is clear. Terminals that are easier to navigate improve traveller flow, reduce friction and strengthen performance.

As expectations for accessibility and passenger experience continue to evolve, sensory-informed inclusive design will become a defining feature of high-performing airports.



# Made for travel

All road, rail and air links will soon lead to Poland's new multimodal airport, writes Port Polska's Agnieszka Stefańska-Krasowska.

Poland is advancing one of the most ambitious infrastructure undertakings in its history through the Port Polska investment programme – a wide-ranging initiative designed to reshape how the country, and the wider Central and Eastern European region, connects people and goods.

At the heart of this programme is a new airport and integrated transport hub, planned as a seamless interface between air, rail, and road networks.

Scheduled to open in 2032, the development is intended not just as a standalone airport, but as a long-term engine for connectivity, innovation, and economic growth.

Port Polska marks a departure from traditional infrastructure expansion models. Instead of relying on incremental upgrades to existing, capacity-constrained airports, Poland is building a fully integrated system from the ground up.

The new hub, located between Warsaw and Łódź, will combine a greenfield airport with high-speed rail links and upgraded road infrastructure, forming a multimodal gateway designed for efficiency, flexibility, and long-term resilience.

## DESIGNING FROM THE GROUND UP

A key strength of the project lies in its greenfield approach. Unlike legacy airports that have developed over time – often resulting in fragmented layouts and operational inefficiencies – the new airport is being planned as a cohesive whole.

From terminal design and runway layout to baggage systems and digital infrastructure, every element is being developed in parallel.

This integrated planning model allows for more efficient aircraft movements, shorter turnaround times, and smoother passenger flows.

It also enables early incorporation of environmental considerations, including noise management, energy efficiency, and sustainable land use.

By aligning all components within a single masterplan, the project aims to avoid the constraints typically associated with retrofitted infrastructure.

For airlines, this translates into a more predictable operating environment, with infrastructure that can scale alongside demand and minimise common bottlenecks.

## MULTIMODALITY AT ITS CORE

Multimodal integration is fundamental to the concept. The airport will be directly connected to a new high-speed rail network, significantly expanding its catchment area and reducing dependence on short-haul feeder flights.

Regional rail services and improved road access will further enhance connectivity.

Importantly, this approach goes beyond physical links. Planning also includes co-ordination of schedules, efficient transfer processes, and intuitive passenger navigation across different modes of transport.

The goal is to create a seamless journey – from city centre to departure gate – while improving punctuality and reliability for airlines.

## EFFICIENCY MEETS PASSENGER EXPERIENCE

While operational performance is critical, passenger experience is equally central to the design. The terminal will be structured to ensure



clear, uninterrupted flows through check-in, security, border control, and boarding.

At the same time, commercial areas will be integrated in a way that complements rather than disrupts the journey.

Architectural and cultural elements are expected to reinforce a sense of place, while maintaining clarity and functionality. For airlines, this translates into smoother processes, improved on-time performance, and higher levels of passenger satisfaction.

### CAPACITY, SCALABILITY AND CARGO INTEGRATION

In its initial phase, the new airport is expected to handle between 34 and 44 million passengers annually, with provisions for future expansion.

This built-in scalability ensures that capacity can grow in line with demand without requiring major redesign.

Cargo is also a central component of the project. The airport will be integrated into a wider logistics ecosystem that includes an Airport City and a Free Customs Zone.

These will support freight forwarders, integrators, and e-commerce operators by enabling efficient, value-added cargo handling.

With strong links to road and rail networks, the hub is positioned to become a key entry point for goods moving into and out of the European Union, offering predictable transit times and streamlined logistics processes.

### DIGITAL SYSTEMS AND LONG-TERM READINESS

Digital integration is another major focus. The project aims to reduce operational fragmentation through the implementation of unified digital systems, including tools to support cargo management and information sharing across stakeholders.

By aligning with international standards and best practices, the airport is being designed to function as a co-ordinated mobility

platform rather than a standalone facility. This approach is intended to ensure long-term adaptability as technologies and operational requirements evolve over the coming years and decades.

### A COLLABORATIVE APPROACH

Port Polska is being developed with input from airlines, logistics providers, and other industry stakeholders from an early stage.

This collaborative model is designed to ensure that infrastructure and operational concepts reflect real-world needs, while also allowing for flexibility over time.

Rather than a fixed asset, the project is conceived as a dynamic platform capable of evolving alongside the aviation sector and supporting Poland's long-term economic development.

### CONSTRUCTION MOMENTUM AND KEY MILESTONES

Recent developments confirm that the project is moving rapidly from planning into execution.

A contract has been signed with TPF to design a dedicated VIP terminal, offering a high-comfort, end-to-end passenger experience from arrival to boarding, including premium retail and dining.

At the same time, Budimex has been selected to deliver deep foundations for the main passenger terminal, involving the installation of over 8,000 piles and columns forming the structural base of the future facility.

A consortium led by Hill International has also been appointed as General Contract Engineer, responsible for oversight, co-ordination, and collaboration with the ORAT consultant, as well as supporting certification under BREEAM standards.

Together, these milestones underline the strong momentum behind the Port Polska programme and its steady progress toward delivery.



# Finding room to grow

**Airport modernisation in a constrained environment is a challenging balancing act, but not an impossible one, explains Crawford Burden, AECOM's aviation lead for Europe & India.**

Increasingly, today's airports are being forced to grapple with the twin challenges of rising passenger demand and ageing infrastructure, requiring the sector to expand or upgrade – or some combination of the two.

While new runways and terminals often dominate the headlines, large-scale expansion is not always feasible – whether due to available space, cost or public scrutiny.

This means many airports must find ways to optimise the assets and facilities they already possess, which can in some instances be even more challenging.

Airports operate around the clock under intense operational and regulatory pressure. This can make them one of the most demanding environments in which to deliver major infrastructure programmes – and also explains why expansion is often the preferred route.

For boxed-in airports, however, constrained by their surroundings, upgrading critical systems, reconfiguring spaces and introducing new infrastructure within a live operational environment – often within tight windows and with no tolerance for disruption – is necessary.

For it to work first time, targeted modernisation must come down to two priorities: prioritising efficiency and improving sustainability.

## DESIGNING FOR EFFICIENCY IN A LIVE ENVIRONMENT

When expansion is constrained, the challenge is to do more with less, and therefore improving efficiency becomes the most effective way to increase capacity.

By looking at the airport as a connected system, operators are identifying improvements across airfield operations, terminals and baggage handling, unlocking significant gains.

At Heathrow Airport's Terminal 2, for example, we've supported upgrades to the baggage system within a fully operational terminal. It's the kind of work passengers rarely see, but it has a direct impact on their journey.

Baggage systems are highly complex and tightly integrated with airline operations. Introducing new technology and increasing capacity in that environment requires precise planning, testing and co-ordination.

We are also part of the project and construction management office team at Athens International Airport. Here, we are responsible for the delivery of a complex fourteen million passenger expansion in a highly constrained live environment, where capacity, operational integrity and commercial revenue performance must be maintained throughout the programme.

In both cases, work must be sequenced carefully, often taking place overnight or in short operational windows. Every intervention must be aligned with airline schedules, security requirements and passenger flows.

There is little room for error, and success depends on close collaboration between the airport, its partners and the expert delivery team.

The same principles apply on a larger scale. Most international airports expect to see passenger volumes grow significantly in the coming years, with global traffic projected to double by 2045 from the 10.2 billion expected in 2026, according to ACI World.



To support that growth, many airports are now grappling with airfield upgrades, terminal improvements and expanding gate capacity, all delivered within a live operating environment.

What is important in both cases is not just the scale of investment, but how it is delivered. Efficiency gains come from co-ordination.

By aligning design, construction and operations, it is possible to improve throughput, reduce congestion and create a smoother passenger journey without major physical expansion.

Passengers may not notice a new taxiway or a reconfigured baggage system, but they will notice shorter queues, more reliable departures and a more intuitive journey through the airport.

In that sense, efficiency is not just an operational goal. It is central to the overall passenger experience.

### INCORPORATING SUSTAINABILITY INTO INFRASTRUCTURE

Sustainability goes hand-in-hand with modernisation and, for airports looking to expand or upgrade, it should form the crux of their future planning.

Today's passengers have greater expectations for environmental sustainability, as the aviation sector comes under increasing scrutiny for its emissions and carbon impact.

The most effective approach is to treat sustainability as part of the infrastructure itself, rather than as an overlay. That is particularly important when working in live environments, where retrofit solutions must be integrated into existing systems without affecting operations.

Airports looking to introduce new sustainability initiatives, such as low-carbon energy systems, expanded electric vehicle infrastructure and on-site renewable power generation, need to take care not to treat these projects as standalone measures.

Instead, they should be designed to sit alongside operational upgrades, seeking to improve both environmental performance and long-term resilience.

Delivering this kind of change in a live airport is not straightforward. Energy systems have to be upgraded while maintaining supply. New infrastructure must be introduced without disrupting critical services.

It requires careful planning, and a clear understanding of how the airport functions as a whole.

There is also a direct link to passenger experience. Better climate control, improved air quality and more efficient buildings contribute to a more comfortable environment.

At the same time, reducing energy demand and improving system performance helps airports manage costs, boost resilience and increase agility when responding to future pressures.

### A DIFFERENT MODEL FOR AIRPORT GROWTH

Modernisation and sustainability might seem basic considerations, but they're much more than that – they're a way of living within operational means without sacrificing future growth.

Success here requires a different mindset. Programmes must be flexible, allowing airports to adapt to changes in demand, technology and regulation.

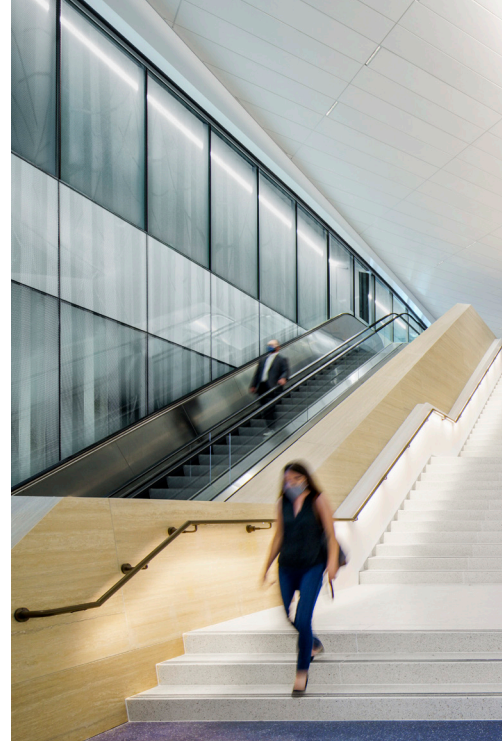
Delivery teams need to work closely with airlines and regulators to ensure that improvements are introduced without compromising performance.

The most successful projects are those that combine long-term vision with practical delivery based on innovative and leading-edge planning and design. They recognise that airports are living systems, where every change has an operational impact.

Getting that balance right enables airports to grow while continuing to deliver on services and the passenger experience.



Images of SAN, SFO and PIT courtesy of Emā Peter and Jason O'Rear.



# Green frontiers

## Gensler's Philip Galway-Witham outlines some of the sustainability challenges and opportunities facing airports today.

**T**he next generation of sustainable airports will be defined not by visible features alone, but by how intelligently they manage risk, energy and continuity in a volatile operating environment.

Airports are designed around a non-negotiable premise: they must keep operating. That expectation is baked into every system, every staffing model, every contingency plan.

Which makes what happened to Brazil's Salgado Filho Airport in Porto Alegre in 2024 so instructive; closed for five months after unprecedented flooding, its operations suspended, its revenues gone.

Climate change is making that gap between expectation and reality harder to manage. Extreme heat warps runways and overwhelms cooling systems.

Grid volatility, intensified by surging demand, threatens the stable power supply that terminals depend on. The cascade of irregular operations triggered by any of these events carries serious financial, regulatory, and passenger experience consequences.

Sustainability, in this context, cannot simply be understood as a carbon accounting exercise. It must be understood as an operational discipline; one that reinforces continuity rather than sitting alongside it as a separate agenda.

The first place this 'reframing' matters is in how we make the case for investment. Resilience measures have too often been filed under

sustainability spend discretionary, aspirational, difficult to defend against near-term capital priorities.

The more accurate frame is risk mitigation. Infrastructure and governance interventions that reduce climate exposure are insurance against operational shutdown, protection of passenger safety, and revenue continuity.

An airport that cannot operate during an extreme weather event loses landing fees, retail revenue, and potentially even the confidence of airlines and passengers.

Presenting resilience in those terms, through risk registers, business continuity planning, and asset protection language, is not a rhetorical strategy. It is a more accurate description of what resilience spend actually represents: not a sustainability line item but insurance against shutdown through programmatic adaptability, capacity to maintain operations, and durable design.

That also means planning for appropriate flexibility from the outset: master plans stress-tested against multiple climate scenarios, and governance frameworks that embed resilience review into every major capital decision.

Digital intelligence is where some of the fastest operational gains are available. The case for tools like digital twins is most persuasive when framed around operational risk rather than data sophistication.



Predictive maintenance extends asset life and reduces unplanned downtime, synergising with climate risk mitigation.

Gate sequencing and intelligent scheduling cut energy waste across terminals. Operational modelling compresses taxi times and reduces idle fuel loads at the apron.

These are measurable improvements that compound across an airport's entire throughput. And in a live operating environment, where there is almost no easy way to stress-test responses to novel scenarios, a digital twin allows exactly the kind of multi-input scenario modelling that surfaces single points of failure before they materialise.

It can inform ORAT processes and concept-of-operations planning, updating them iteratively as real-world outcomes are gathered. As demand for power at airports grows, the ability to model, simulate, and optimise energy flows becomes a core operational competency to ensure the terminal stays within load thresholds.

That growing power demand is the other defining challenge. Electrification is arriving whether airports are ready for it or not.

Electric and hybrid GSE fleets, electrified building systems, EV charging infrastructure, and on a longer horizon, supporting infrastructure for a new generation of commercial aviation driven by SAFs.

Together, these represent a transformation of the airport's energy profile that cannot be managed by simply adding new loads to existing grid connections.

Grid volatility is a growing reality in many markets. Tariff timing already matters for large energy bills; it will matter considerably more as peak demand charges increase.

The strategic response has several interconnected components. On-site renewable generation like photovoltaic installations and, where possible, geothermal systems reduce dependence on grid supply and provide a measure of energy resilience.

Supporting this, energy storage strategies such as batteries help load shift, evolving energy management from a monthly cost to an active operational lever.

All of this sits alongside the foundational work of efficiency: MEP systems optimisation, passive design strategies, appropriate envelope specification, solar gain mitigation, and daylighting.

These are not legacy ideas to be set aside in favour of more exciting technological interventions. They are the baseline upon which everything else depends.

The synthesis of these strategies; efficiency first, then renewables, then storage and demand management, all underpinned by intelligent operations, is what an energy strategy should look like.

Not a collection of individual projects, but an integrated plan that maps demand growth, models supply scenarios and makes deliberate decisions about risk and capital sequencing.

The airports that lead over the next decade will be those that have embedded sustainability into how they think about risk, how they manage energy, and how they maintain continuity when conditions work against them.

Solar canopies and low-carbon construction materials have a legitimate role and are vital in passive design best practices, but they are not sole the measure of a resilient, future-ready operation.

The more consequential work is quieter: the scenario modelled, the grid dependency reduced, the cascade failure anticipated before it happens. In a climate-changed world, sustainability and operational excellence are not competing priorities to be traded off. They can, and must be, the same discipline.

AW

### About the author

Based in Toronto, Philip Galway-Witham is Gensler's regional resilience leader.



# Big moves in airport construction

**Modular construction is reshaping how airport terminals are being built across the globe, writes Corgan's Jonathan Massey.**

**M**odular construction is emerging as a powerful tool to modernise ageing aviation infrastructure while maintaining operations, offering clear advantages to airlines and airport stakeholders at some of the busiest airports in the world.

It has various associated terminologies describing a variety of related methods, such as modern methods of construction (MMC), design for manufacture and assembly (DfMA), or a 'kit of parts'.

While all of these methods have their benefits, a handful of high-profile aviation projects in the United States have now benefitted from using large-format volumetric modules.

In this method, the major built components — 'modules' — are constructed away from the active aircraft stands and moved into place when they are in a near completion, reducing gate down time significantly relative to traditional construction methods.

Modules are transported across the airfield at night to minimise disruption to airport operations. Once positioned, they are seamlessly joined to enclose the structure and integrate building systems, enabling interior work to proceed.

Deploying this approach offers a way to make necessary upgrades to facilities with minimal disruption and with drastically reduced loss of revenue.

## **MAKE IMPROVEMENTS, NOT (OPERATIONAL) IMPACT**

Regardless of the reason for a gate closure — be it weather, security, or construction — the cost of closing a gate is high.

Corgan's estimates show that airlines and airports lose between \$300,000 and \$400,000 in revenue per day per gate when out of operation.

Off-site modular construction, along with careful phasing, can significantly reduce the financial and operational impact of upgrades on both the airport and airline.

This method was used to rapidly replace American Airlines' High C Gates at Dallas Fort Worth International Airport (DFW) while flights were on a reduced schedule during the COVID-19 pandemic.

After the original five gates were demolished, the DFW-led design-build team installed the modular envelope while the Corgan team, led by American Airlines, designed the interior fit-out of the space.

Co-ordination between the two design and construction teams facilitated early access for interior work prior to construction being completed on the shell and core, further increasing efficiency in both cost and schedule.

This overlap in construction work areas, combined with the off-site construction of the modules, saved the airport four months compared to a traditional construction approach. As a result, all gates were fully operational when flight schedules returned to normal.

By using modular construction for the current Concourse D widening project at Hartsfield-Jackson Atlanta International Airport (ATL), Corgan has enabled airlines to save an estimated \$500 million in otherwise-lost revenue.

The complex renovation and expansion is being conducted in a multi-phased approach, enabling the concourse to remain operational, significantly reducing both gate closure time and the overall project timeline.

In this case, gate closure time is reduced by combining modular and traditional methods: the modular expansions allow for new gate expansion, which in turn facilitates traditional renovation construction on the existing concourse.

At ATL, the modular construction schedule saves the airport more than 40 weeks of gate closures and reduces gate downtime by 20% compared to a traditional approach.

To increase the speed of the overall construction timeline, the team closed eight gates at once, rather than doing a few at a time. This saved nearly three years of phased construction, or a third of the original timeline.



In phase two, the team proposes to close 10 gates simultaneously, saving an additional five months.

Corgan is also leading the design of a complete reconstruction of Terminal 5 at Los Angeles International Airport (LAX) in time for the global spotlight of the 2028 Los Angeles Olympics.

To meet this ambitious schedule, the landside headhouse will be built using traditional, on-site construction methods, while the airside concourse will use prefabricated, off-site modular construction.

This approach allows demolition, early foundation, and utilities work to proceed simultaneously with construction of the new concourse, realising significant time savings compared to traditional sequential construction.

The concourse itself will be assembled in nine large, prefabricated segments, each delivered with major systems such as mechanical, electrical, and plumbing systems, as well as lighting and interior finishes, already installed.

Once transported to the site and secured, final systems connections, joint finishes, furnishings, and finishing touches will be completed on-site, seamlessly bringing the terminal together.

More airports are considering this approach where construction activity across an already busy facility is a significant challenge.

### SAFETY AND LOGISTICAL BENEFITS

Modular construction delivers substantial safety, efficiency, and logistical advantages over traditional airside methods as by relocating much of the work to the off-site mod yard, crews spend less time airside, reducing exposure to aircraft, traffic, foreign object debris, and associated risks to both workers and airport operations.

Materials, equipment, and rentals can be delivered without the constraints of airport security, and the controlled environment supports the high precision needed for seamless module-to-module connections.

From a logistics standpoint, the mod yard provides more staging space and eliminates restrictions on hot works and welding common to airside environments.

Modular construction also enables resource levelling. In traditional projects, manpower demand fluctuates sharply between phases; with a mod yard, different phases can progress simultaneously. When airside work slows, resources can be shifted to yard activities, improving overall productivity.

Positioning the mod yard beyond the restricted zone of the airport further streamlines scheduling. Work is no longer limited to badged personnel, onboarding can begin immediately while the three-week badging process runs in parallel, and workers save roughly one hour per day otherwise lost to security screening — equivalent to 10% of a 10-hour shift.

On a recent UK project, involving the construction of a new pier, the main contractor reported a 200% increase in labour efficiency with modular methods, alongside fewer site incidents and reduced operational impacts.

### THE FUTURE OF THE GLOBAL AVIATION CONSTRUCTION INDUSTRY

As we gain more experience in using modular construction at airports, we are learning how to maximise the benefits and navigate the limitations of this construction type.

For large, complex airport projects, the chief benefit of large modular construction is that existing gates remain operational longer and new gates are opened sooner.

The possibilities around greater module size and higher state of module completion (e.g. modules including glazing, lifts and escalators, ceiling and floor finishes) are evolving and our process is refined with every module completed.

The lessons learned in this process further increase the efficiency of large modular construction.

As more airports upgrade their ageing facilities, modular construction is poised to become an increasingly important tool in aviation infrastructure development, delivering a win-win for construction and operation.

AW

### About the author

Jonathan Massey, is managing principal and aviation sector leader at Corgan ([www.corgan.com](http://www.corgan.com)), which was ranked as the No.4 architecture firm in the US by Building Design+Construction in 2024/2025.



# Big and bold

**We shine the spotlight on new facilities in Frankfurt, Munich and Hong Kong and provide an update on plans for the new Terminal 2 at Phu Quoc International Airport in Vietnam.**

In most parts of the world, adding key new airport infrastructure such as terminals and runways are massive projects, and sometimes political hot potatoes that can be in the pipeline for decades before they become reality.

For this reason, any new infrastructure needs to be celebrated, especially when they are game-changing new facilities that effectively breathe new life into a gateway by transforming its operational capabilities, raising capacity and taking the passenger experience to the next level.

This article shines the light on projects that were either successfully completed in the second quarter of 2026 or subject to significant design, planning and construction updates.

## FRANKFURT AIRPORT'S NEW TERMINAL 3

The German gateway officially opened its new state-of-the-art Terminal 3 on April 22 with the €4 billion plus facility handling its first flights 24 hours later.

The inauguration marked the completion of the largest infrastructure project ever undertaken by the MDAX-listed company, ushering in a new era in Frankfurt Airport's history.

Including Piers G, H and J, the new 403,000sqm addition to the airport's core infrastructure is capable of handling up to 19 million passengers per annum.

However, with the addition of a future Pier K – Terminal 3 is already the size of 25 football pitches – this capacity is expected to rise to around 25 million passengers annually.

"With the inauguration of our Terminal 3, one of Europe's most advanced terminals, we are positioning ourselves for long-term success," enthused Dr Stefan Schulte, CEO of operator, Fraport AG.

"This brand-new structure is more than just a major step forward in our airport's evolution; it also stands as a symbol of the outstanding collaboration among all those involved in the project. Each of them has contributed to its success with their expertise, lifeblood, and abilities."

The new terminal will initially be home to 57 airlines, all of which are scheduled to have completed their move to it by June 9.

In addition, Condor – the second-largest airline at Frankfurt Airport – will be switching to Terminal 3 in the summer of 2027.

Fraport is confident that airlines, concessionaires and passengers alike will benefit from T3's "timeless architecture, short paths and leading-edge technology".

As well as fully automated luggage check-in and security checks with CT scanners, the terminal offers passengers a wide range of food and beverage outlets and shopping opportunities.

Indeed, T3 boasts 64 shops and F&B outlets spread across a total floor area of 12,000sqm. Frankfurt Airport Retail – a joint venture of Fraport and Gebr. Heinemann – is the main concessionaire.

During the peak of its construction, some 3,000 skilled workers were on site at the airport.



Fraport's AG significant investment in the new terminal ensured that it is Europe's largest privately funded infrastructure development project to date.

Fraport Ausbau Süd GmbH (FAS), a wholly owned subsidiary of Fraport AG, was responsible for all facets of the construction project.

"FAS was the driving force behind the project's success," noted Schulte. "It takes credit for completing Terminal 3 on time without exceeding the budget."

Upon opening, Terminal 3 became the 'greenest' of all FRA's terminals courtesy of its eco-friendly construction, and the fact that the entire building is designed to be very energy efficient, consuming significantly less power than Terminals 1 and 2.

Sustainable features worthy of note include highly thermally insulated building envelopes, photovoltaic systems on the roof, optimised use of daylight, water recycling and consistent use of LED lighting.

While a displacement ventilation system ensures a supply of fresh air everywhere from check-in to the gates.

Fraport AG is also quick to note that from July 26, all electricity consumption at the airport is expected to be sourced from renewable energy.

### NEW TERMINAL 2 AT PHU QUOC INTERNATIONAL AIRPORT

Working in collaboration with the Sun Group, HOK has unveiled the interior design for the departure spaces in the planned new Terminal 2 at Phu Quoc International Airport in Vietnam.

The design brief, says HOK, is for the terminal to be an iconic, hospitality and nature-inspired facility that supports the airport's goal to serve 24 million passengers annually.

Phase I of the project is currently under construction and includes 21 gates in the terminal's east wing for international and domestic travellers.

HOK's interior design is said to blend Vietnamese culture with clear, intuitive wayfinding to create a calm and welcoming departure experience.

In the check-in hall, a triple-height ceiling will feature narrow, oval forms inspired by Vietnamese fishing boats.

Describing the finer details of the terminal's design, HOK said: "Integrated metal baffles evoke the feathers of a phoenix, a sacred creature in Vietnam. Between these forms, softly illuminated, wave-like ceiling patterns reference water around the boats.

"At floor level, a radial sun motif anchors the heart of the space, establishing a central gathering point before travellers proceed to security screening.

"Self-check-in kiosks are grouped on warm-toned carpeting, while adjacent circulation zones are finished in terrazzo flooring, clearly distinguishing areas intended for pause from movement.

"Palm trees and terraced landscaping reinforce the airport's tropical setting and enhance traveller comfort. Skylights and expansive glazing draw natural daylight deep into the hall, supporting orientation and wayfinding."

After security, travellers will arrive on an upper mezzanine overlooking the grand hall, with views of lush plantings below and floor-to-ceiling windows framing the airfield.

As people descend to the main level, they will encounter a curated mix of local and international dining and retail offerings, a gently meandering pathway through palm trees and native vegetation, and a viewing gallery for aircraft departures and arrivals.

Inspired by local craftsmanship, the interior palette will incorporate materials such as rammed earth and oak wood, celebrating natural texture, warmth and authenticity.

"Our client's vision for Phu Quoc International Airport is a visionary gateway that celebrates the island's natural beauty while acting as a



catalyst for growth and transformation,” said Paul Collins, HOK’s principal-in-charge on the project.

“Our design translates that ambition into a modern, light-filled departure experience that reflects Vietnam’s culture and positions Phu Quoc as a distinctive, world class destination.”

Scheduled for completion by 2027, the terminal will boast the latest technology from SITA in a move the Sun Group say will enable a seamless, fully automated airport journey, from check-in and bag drop to biometric boarding.

SITA’s technology will include the gateway’s Airport Operational Database (AODB); Flex Hybrid, supporting 204 common-use workstations for passenger processing; 150 biometrically enabled Smart Path kiosks for check-in, seat selection, boarding pass printing, and tagging check-in bags; 100 Smart Path Bag Drop (Scan & Go) units for self-service baggage drop; and 38 dual-lane Smart Path Gates for automated boarding.

Sumesh Patel, SITA’s president for Asia-Pacific, commented: “Vietnam is one of the fastest-growing aviation markets in the region, and this partnership with Sun Group marks a key milestone in supporting that growth with future-ready infrastructure.”

In terms of the bigger picture for the gateway, Sun Group and Changi Airports International (CAI) have signed a strategic co-operation agreement to support its overall development.

Under the partnership, CAI will provide advisory services to enhance the airport operations, commercial programme, air connectivity and capacity and service enhancements.

The partnership aims to transform Phu Quoc International Airport into a travel destination, delivering world-class service standards

and a seamless travel experience ahead of the APEC 2027 Summit, when the airport is expected to welcome global leaders and international visitors.

The collaboration further strengthens Phu Quoc’s position as an emerging aviation and tourism hub in the Asia-Pacific region.

Indeed, the airport’s rapid growth in recent years – it welcomed around six million passengers in 2025 but is projected to be handling up to 24mppa within the next five years – was the catalyst for the Vietnamese government approving the master plan for a new runway and Terminal 2.

Eugene Gan, CEO of CAI, noted: “We are impressed by Sun Group’s vision for developing Phu Quoc as the next upcoming travel destination.

“Its integrated tourism and entertainment eco-system provides a strong foundation for the long-term development of Phu Quoc International Airport as a key gateway for the island.

“We look forward to contributing our expertise to enable Sun Group to create a world-class airport experience.”

**NEW PIER AT MUNICH AIRPORT**

Describing the impact the new Terminal 1 Pier is expected to have on Munich Airport, CEO, Jost Lammers, simply noted that it represents the future.

“More capacity, more comfort, more international connections. As a modern gateway to the world, it strengthens our role as a leading European aviation hub,” he enthused.

The new €665 million addition is said to combine high-quality architecture with state-of-the-art technology and holistically planned passenger experience.



Spanning an area of approximately 95,000 square metres, the 360-metre-long pier has the capacity to handle up to six million additional passengers per year.

The six-level facility features modern check-in areas, centralised security checkpoints equipped with the latest CT technology, spacious waiting areas, and a host of retail and dining options.

Three of the levels are dedicated to passenger operations and will also include dedicated rest and quiet zones and prayer rooms for those that want them.

According to MUC's fact sheet, the new pier can handle up to twelve short and medium-haul aircraft or six wide-body jets simultaneously. It is currently home to 40 international airlines.

Other highlights include the opening of two new lounges (Airport Lounge World and the Alpine) – the former offering spectacular views of airfield.

Eligible Emirates customers can enjoy the airline's signature service and hospitality at the Emirates Lounge located in the pier – Terminal 1 A, Level 4.

With the opening of the new pier, Munich Airport states that it is introducing a completely revamped dining concept focused on high-quality products, modern design, and a comfortable atmosphere.

Five new restaurants – operated by the airport's subsidiary Allresto – combine regional specialties with international trends, while also offering halal, vegetarian, and vegan options.

At the heart of the pier is a central marketplace, which MUC hopes will stand out for its appealing atmosphere. Surrounding it are some 20 retail and service areas that invite visitors to linger, relax, and shop.

The shopping experience includes Munich Airport's first 'walkthrough duty free' area. Munich Airport's managing director and chief operating officer, Thomas Hoff Andersson, was on hand to welcome passengers to the new pier on its first day of operations.

### HONG KONG'S EXPANDED TERMINAL 2

The new passenger departure facilities at Hong Kong International Airport's Terminal 2 welcomed its first passengers on May 27, 2026.

While the full airside concourse and dedicated gates are unlikely to open until 2027, passengers can easily reach T2 via the Airport Express, where the same platform will be used for both terminals with doors opening directly into the new area.

The expanded T2 will offer a new generation of smart check-in facilities and automated technologies and is designed to provide a trendy and vibrant space for leisure travellers, served by some 15 airlines which mainly operate short-haul and regional routes.

According to Airport Authority Hong Kong (AAHK), the May opening will enable HKG to meet the anticipated surge in passengers during the summer peak season, providing "a new and pleasant travel experience for passengers".

It is estimated the new-look Terminal 2 could handle around 15 million passengers by the end of 2026, and up to double that within a few years.

As part of the T2 project, HKG has gained a new Coach Hall that is currently served by tour buses, cross-boundary coaches, limousines, crew and resident coaches and has ticketing counters for cross-boundary transport connecting with more than 110 destinations in the Greater Bay Area.



# Food for thought

**Jennifer Reynolds, CEO & founder of *Ideation Design Group (IDG)*, considers how some US airports are rethinking their retail/F&B models to accommodate the airside return of non-ticketed visitors.**

**F**or decades, airport terminals have been a controlled environment defined by an overwhelming sense of urgency.

Passengers move through them with purpose, and nearly every element of their design, from circulation paths to dining concepts, have been optimised around that singular user: the ticketed traveller.

This premise is beginning to change across the United States, however, as a growing number of airports are piloting programmes that allow non-ticketed visitors to pass through security and access airside spaces.

While still limited in scale, these initiatives introduce a fundamental change to how terminals function, and more importantly, for whom they are designed.

For a global industry, the implications transcend security protocols. The ripple effects are poised to reshape one of the most commercially significant aspects of the terminal environment: food and beverage (F&B).

## FROM THROUGHPUT TO DWELL

Airport dining has historically been governed by speed and predictability. Concepts are designed to deliver consistent, high-volume service to travellers working within tight time constraints.

Even sit-down restaurants are calibrated for turnover, with layouts, menus, and staffing models built to accommodate fluctuating passenger flows. The introduction of non-travelling guests disrupts this equilibrium. Bringing in users who are not bound by boarding times may arrive earlier, stay longer, and use the terminal as a destination rather than a waypoint.

This subtle but critical shift challenges long-standing assumptions about dwell time. Where airports traditionally focused on minimising friction, they are now faced with an opportunity to intentionally extend the visitor experience.

F&B spaces are at the centre of this transition, evolving from convenience-driven amenities into primary gathering points.

For F&B operators, this raises new questions: How should spaces accommodate both high-speed travellers and lingering visitors? What balance of quick service versus full-service concepts is needed?

How does design support both, without compromising operational efficiency?

## REPOSITIONING THE TERMINAL AS A SOCIAL SPACE

One of the most immediate impacts of guest access is the reintroduction of the airport as a place of connection.

Prior to security changes implemented after the September 11 attacks, US terminals routinely functioned as spaces where families and friends could accompany travellers to the gate.

This experience largely disappeared, replaced by kerbside drop-offs and separation at security.

Guest access programmes signal a partial return to the earlier model, but within a vastly different operational context.

Today's terminals are larger, more complex, and more commercially driven. Reintegrating social use requires smart spatial planning. For example, seating configurations must go beyond purely functional arrangements.

A mix of communal tables, lounge-style seating, and flexible dining areas can better accommodate guests with varied needs, including those sharing a meal, waiting together, and simply spending time before departure.



### A CATALYST FOR LOCAL IDENTITY

As terminals welcome a broader audience, the expectations around dining experiences begin to shift. Non-ticketed visitors are less likely to view airport restaurants as a last-resort option and more likely to compare them with outside alternatives.

This makes a compelling case for airports to deepen their connections to local culture through F&B. Rather than relying on standardised concepts, there is increasing value in introducing regionally recognised brands and culinary experiences that resonate with both travellers and local guests.

In the US, where guest pass programmes are already driving incremental foot traffic in airports such as SEA and BNA, this trend is gaining traction, with operators seeing greater incentives to invest in locally rooted concepts alongside established national brands.

### DESIGNING FOR VISIBILITY AND ENGAGEMENT

As competition for attention intensifies within the terminal, design plays an increasingly strategic role. F&B spaces must now appeal to a wider spectrum of users, each with different expectations and behaviours.

Visibility becomes critical. Open kitchens, transparent facades, and clear sightlines can draw in guests who are exploring rather than navigating quickly. Wayfinding and intuitive layouts also remain essential for passengers who need to identify options that fit within their limited time.

There is a growing emphasis on experiential design that feels distinct, memorable, and worth seeking out. This does not necessarily mean more elaborate or expensive environments, rather it involves a thoughtful use of materials, lighting, and branding that adds character while remaining durable and easily maintainable.

Durability, too, becomes even more important as increased access leads to higher volumes of use. Materials need to withstand constant traffic without sacrificing aesthetics, requiring a careful balance between performance and visual appeal.

### OPERATIONS IN A DUAL-USE ENVIRONMENT

While the opportunities are significant, the introduction of guest access also introduces complexity. Airports must now manage a more diverse user base without compromising security or operational flow.

For food and beverage operators, this translates into new demands on staffing, service models, and supply chains. Peak periods may become less predictable, influenced not only by flight schedules but also by local visitation patterns.

Flexibility is key. Concepts that can shift seamlessly between high-speed service and more relaxed dining will be better positioned to succeed. Technology may also play a role, from mobile ordering to dynamic seating management, helping to accommodate varying demand throughout the day.

### BEYOND THE UNITED STATES

While guest access programmes are currently concentrated in the US, their implications are global.

Airports worldwide are continuously exploring ways to diversify their revenue streams and enhance passenger experience. The idea of expanding access to airside spaces presents both opportunities and challenges.

Each market will approach this differently, shaped by regulatory environments, cultural expectations, and infrastructure constraints. However, the underlying concept that reimagines the terminal as a more inclusive, experience-driven place, has broad relevance.

### A NEW CHAPTER FOR TERMINAL DESIGN

The evolution of guest access marks a subtle but meaningful turning point in airport design. It challenges the industry to think beyond the traditional passenger journey and consider how terminals can serve a wider community.

F&B will play a central role in this transformation. As one of the most adaptable and visible components of the terminal environment, it has the potential to bridge the gap between efficiency and experience, between movement and connection.

The success of these initiatives will ultimately depend on balance. Airports must continue to function as highly efficient transportation hubs while embracing new opportunities to create spaces that people actively choose to spend time in.

If achieved, the result is not just a better dining experience, but a more dynamic and resilient airport ecosystem that reflects the changing expectations of travellers and visitors alike.



# Nuclear alternative

**Thomas Roddey, vice president, business development for commercial nuclear at AtkinsRéalis considers what real fuel resilience looks like for future airports.**

**A**irports sit at the leading edge of the energy transition. They are among some of the most energy-intensive pieces of infrastructure in the economy, while also being expected to decarbonise operations, electrify vehicle fleets, support new fuels and maintain absolute resilience.

Airport power demand will only increase because of the adoption of new fuels, charging infrastructure and widespread electrification of operations.

That combination of demands means the question is no longer which fuel wins, but how multiple energy sources can be co-ordinated into a resilient system that is able to deliver continuously, securely and at scale.

There is an acute need for resilient energy supply across the economy, and airports bring this challenge into sharper focus.

Nuclear power, particularly new nuclear technologies, is increasingly being recognised as the backbone within a technologically diverse, resilient energy system.

## WHY RELIABILITY MATTERS FOR FUTURE AIRPORT DEMAND

Nuclear plants routinely operate at full power for 18 to 24 months continuously. Very few other sources of generation can do that.

The wind does not always blow. The sun does not always shine. Nuclear plants operate 24 hours a day, every day, across the entire fuel cycle, regardless of geography.

For infrastructure like airports, where power interruptions are not just inconvenient for tens of thousands of customers but potentially safety-critical, that level of predictability matters.

In a future system that includes more intermittent and emerging sources, nuclear energy can provide stability by providing baseload generation around which other generation capabilities can remain supportive.

## SMRS AND MICROREACTORS FIT AIRPORT MICROGRIDS

Airports are, by nature, self-contained energy ecosystems naturally suited to microgrids, with clearly defined boundaries, predictable demand and critical loads that simply cannot fail. That makes them fundamentally different from much of the wider grid.

Similarly, modern nuclear plants are also fundamentally different from those that have gone before them, and they are no longer entirely bespoke, first-of-a-kind builds.

Modular design aims to improve efficiency in development and deployment and can make new nuclear far more economically viable than previous generations.

You have almost certainly heard of one technology of this kind; small modular reactors, known as SMRs.

As they move towards commercial deployment, SMRs and microreactors will be well-suited to the kind of infrastructure environment that airports occupy.



They could provide power for electric buses and service vehicles, terminals, lighting, data systems and, eventually, electric aircraft support infrastructure. Crucially, they could allow airports to scale in a way that matches how demand grows.

Rather than starting with a gigawatt-scale plant, a 20-megawatt small reactor could be used, and units then added incrementally as demand increases.

I often describe it like lightbulbs: if you need more light, you don't build a new power station, you just plug in another lamp. That ability to add capacity in steps reduces upfront risk, avoids over-commitment and builds resilience through redundancy rather than relying on a single point of failure.

In my view, nuclear doesn't replace other power generation sources in this model. It can underpin them, providing continuous power and stability while other energy sources, including electricity, hydrogen and sustainable fuels, evolve and scale around it.

#### WHY NEW NUCLEAR NOW?

The demand signal is already here. Power demand from AI data centres, industry and transportation is growing faster than we can bring new generation online through conventional routes.

Once a nuclear plant comes online, however, the amount of output it delivers from a single unit is significant.

What makes this moment different is the alignment we are seeing across the market. Advanced reactor designers, venture capital,

evolving regulatory approaches and renewed interest from engineering and construction organisations are all converging at the same time.

These conditions are not perfect, but they are credible in a way they have not been for decades.

It is also important to be clear-eyed: no small modular reactor has yet been commercialised on a utility grid.

Early projects must prove delivery discipline and integration as much as technology, but for airports planning over multi-decade horizons, the real question is whether energy systems are being designed early enough to meet future demand safely and reliably.

#### FROM AMBITION TO RESILIENCE

Energy generation resilience is not about choosing a single technology, it is about designing diverse systems that can operate continuously under stress, adapt over time and absorb shocks without failure.

Nuclear energy's value in that system comes down to economics, reliability and scalability.

For future airports, the most pragmatic path forward is integrated planning: multiple energy sources, co-ordinated from the outset, with resilience, integration and delivery treated as design principles rather than afterthoughts.

That is how energy systems move from aspiration to operation, and how airports remain both sustainable and secure as demand continues to rise.



# Improving the experience

**Enhancing terminals and the airport experience requires passenger centric planning, writes Joe Barden, executive vice president for terminal planning at Landrum & Brown, a Sidara company.**

**A**s airports continue to evolve, so too must the experiences they offer throughout their facilities. Indeed, enhancing the passenger experience has become one of the most important aspects of improving airport performance overall.

But airports can no longer rely on a one-size-fits-all approach. To truly elevate the journey, operators, designers, and tenants must better understand passenger expectations and recognise that not all travellers behave the same way.

Airport terminals are unique environments because they bring together the full spectrum of human emotion every day. They are intense hubs of activity that require highly specialised and complex design, yet they must also respond to people under stress, time pressure, excitement, confusion, and uncertainty.

For many people, one of the strongest emotions associated with air travel is stress. The path from ticketing to the boarding gate can be chaotic and overwhelming. Transportation to the airport, uncertain security wait times, poor wayfinding, unclear signage, and last-minute gate changes all add to the burden.

While many travellers think of the experience as only the time spent in the air, the true journey, of course, begins when they leave home and continues until they reach their destination.

That is why airports are increasingly becoming a combination of digital infrastructure and adaptable physical design, both of which can reduce friction and better align with how today's passengers move, behave, and make decisions.

Airports are no longer just buildings people pass through on the way to somewhere else. They are emotional environments where excitement may

begin a vacation and stress may rise quickly because of delays, confusion, or time pressure.

Understanding what passengers want and need from that experience is now essential. While every traveller is unique, many can be understood through four behavioural groupings: the Camper, the Roamer, the Explorer, and the Sprinter.

The Camper is an efficiency-driven traveller who heads directly to the gate or lounge and limits unnecessary interaction with the terminal environment. This passenger values reassurance, comfort, and convenience.

Providing a variety of seating arrangements, access to power, semi-private work areas, and even food and retail delivery to the gate through digital tools can help meet the Camper's needs.

The Roamer is the mainstream, commercially engaged traveller. Roamers expect intuitive wayfinding, good food options, comfortable places to sit, and a mix of both familiar and interesting retail opportunities along the path to the gate. They are open to engaging with the terminal, but only if the environment is clear, convenient, and easy to navigate.

The Explorer is among the most valuable passenger segments in today's market. Often arriving well before departure, Explorers are looking for premium experiences and unique offerings, and they are willing to pay for them.

These may include paid lounge access, premium dining, fast-track security, and memorable airport experiences ranging from public art to live music.

The Sprinter, by contrast, presents a different challenge. These travellers do not want to spend time in the terminal at all. They want frictionless



movement, grab-and-go retail, takeaway meals, and quiet spaces near the gate. They value speed, simplicity, and clarity above all else.

Understanding these passenger types matters because airports can no longer be planned around one generic traveller. Different passengers seek different levels of engagement, different amenities, and different kinds of reassurance.

As passenger volumes continue to grow, operators must find ways to improve their facilities not only for the traveller, but also for airport performance.

Full terminal reconstruction is not feasible for many airports, but much can still be accomplished through better planning and thoughtful adoption of technology.

Too often, design still starts with infrastructure rather than the traveller. Check-in remains stressful as passengers manage bag drops, confirm baggage policies, and prepare for security.

Once through screening, they are often left to gather their belongings, get reoriented, and search for directions or gate information in spaces that offer little clarity.

The added burden of switching between airline apps and airport platforms to find gates, amenities, or updates only increases frustration and can also reduce dwell time and commercial engagement.

This is precisely why airport operators should step back during planning and design and think carefully about what each passenger type needs along the path to the gate.

A more seamless experience does not come from adding more features. It comes from delivering the right experience for the right passenger at the right moment.

A combination of thoughtful physical pathway design and digital guidance is a strong step forward. Passengers increasingly expect digital tools to function as a reliable travel companion throughout the journey.

They want timely information, intuitive navigation, and a greater sense of control. If airports fall short in delivering clarity, confidence, and control through both facility design and digital tools, they risk losing not just passenger satisfaction, but also loyalty and revenue.

The future of airport planning will depend on how well digital systems and physical environments work together. Biometric screening, more seamless processing, real-time updates, personalised wayfinding, and adaptive accessibility all point in the right direction.

But technology alone is not the answer. It must be implemented in a way that is reliable, intuitive, and aligned with how passengers move through the airport.

Digital infrastructure should increasingly become part of airport design. It should inform terminal planning, circulation, and the sizing and placement of key spaces. Physical spaces must support this shift through flexible layouts that can respond to changing passenger demand, including additional seating, modular counters, dynamic signage, and sensory-friendly zones.

Terminal architecture and engineering systems should be designed to allow check-in, security, dwell, and boarding spaces to expand, contract, or shift functions over time in response to real-time demand.

Concession programmes should also move toward more flexible formats that respond to passenger flow and changing needs, helping airports improve both traveller experience and commercial performance.

The use of self-bag tagging is also increasing and is likely to continue growing. Remote baggage drop at parking or rental car hubs, paired with real-time tracking, has the potential to reduce stress, improve circulation, and free terminal space for higher-quality passenger environments and revenue-generating amenities.

Air travel is no longer just about moving people. It is about creating journeys that feel intuitive, predictable, and enjoyable.

Airport leaders can begin by embedding digital-first thinking into terminal planning and engineering and committing to accessibility through both technology and space.

As operators continue to rethink the terminal, flexible layouts and passenger-centred planning must be part of that future.

## Terminal 2 | The Queen's Terminal



# All opinions on the table

**Arup's aviation business leader for EIMEA, Alan Newbold, considers how the industry is rethinking airport expansion, and that raising capacity goes beyond the physical.**

**A**irports across the UK, Europe, and the US are actively investing to increase capacity as the aviation industry enters a transformative era, with global air traffic expected to double by 2045.

These hubs play a vital role in global aviation by enhancing connectivity, streamlining airline operations, and supporting economic growth. Yet for many operators, expansion is not a blank-sheet exercise. It must take place within some of the most operationally constrained environments in global infrastructure.

The challenge is not simply to build more. Airports must increase capacity while maintaining passenger throughput and preserving the experience travellers now expect.

Many major airports are expanding while fully operational. Terminals are being upgraded, security processes modernised, and airfields reconfigured, all while flights continue to depart every few minutes. In these environments, growth and operational performance cannot be treated as separate conversations.

During the delivery of Heathrow Airport's Terminal 2, Arup's transformation programme demonstrated that operational readiness is as critical as physical construction.

Co-ordinating stakeholders, delivering over 175 operational trials, including simulations with thousands of participants, and training tens of thousands of terminal staff in new procedures ensured systems functioned effectively from day one.

The Queen's Terminal set new standards for airport design and operational planning. As designers for the passenger experience and

baggage programmes, Arup ensured each intervention responded to Heathrow's evolving needs and wider vision.

This included developing a digital operations blueprint for baggage handling. By mapping end-to-end process flows and integrating technology, the team helped create a more efficient, seamless baggage experience.

With Heathrow currently operating at capacity, small efficiencies can have a significant impact. Using advanced simulation, Arup developed digital airfield models to improve performance and resilience. Analysis of an enhanced airfield layout showed it could save an average of 30 seconds per departure, reducing taxi time by around 2,000 hours annually.

At Los Angeles International Airport, the Delta Sky Way project demonstrates how operational strategy and design can work hand in hand. Arup led the design for the consolidation and modernisation of Terminals 2 and 3, improving passenger experience and airline operations.

Delta Airlines first needed to move their base of operations from Terminals 5 and 6 before construction could begin. A complex relocation of operations, completed in just three nights, enabled the move to be completed without disruption.

Beyond upgrading terminal and airfield infrastructure, operators must also plan for the passenger experience, ensuring journeys through the airport remain seamless even as capacity grows.

As one of the largest infrastructure projects ever undertaken at Luton Airport in the UK, the DART light rail link was designed not only to improve connectivity between rail and the terminal, but also to support the airport's long-term growth.



Arup considered the airport's evolving requirements over the life of the asset, including expansion, increased train frequency, additional passenger facilities and operational readiness, supporting scalable capacity growth without requiring major future intervention.

Carriages can be added to the DART as passenger numbers increase, with platforms designed to facilitate longer trains and minimise the need for future disruption.

The scheme comprises two stations, a viaduct, a landmark bridge and a 'cut-and-cover' tunnel beneath a live taxiway. The Arup team aimed to create a sense of place for passengers, with intuitive and easy-to-navigate spaces.

DART Parkway and Central Terminal stations are characterised by a simple and functional style that deliver a consistent, high quality and unified experience from start to finish.

Optimising existing processes can also deliver significant capacity gains. At Dublin Airport, a user-centred approach to terminal design and ongoing modernisation of security and processing systems has improved efficiency and passenger flow, while maintaining flexibility for future demand.

At Birmingham Airport in the UK, master planning, from runway developments to baggage studies, is strengthening operational resilience while supporting future investment and passenger growth.

Security processes, baggage systems, airfield movements, and passenger flows are interdependent. Expanding one element without understanding the others can create bottlenecks.

Increasingly, airports are looking beyond the visible passenger journey, rethinking logistics, security, and back of house operations to improve efficiency.

These examples reflect a broader industry shift. Capacity is no longer defined purely by physical space. It is defined by how intelligently that space is used. This shift is also shaping how passenger experience is designed.

At JFK Terminal 1, Arup collaborated with the JFK airport team and leading creative professionals to develop art, branding, film, and digital media collectively to enhance the passenger experience in the 2.6 million-square-foot terminal.

Rather than treating the elements as separate steps, the project integrated them to reflect the energy and character of New York City, creating a passenger experience within the terminal that encourages travellers to arrive early and enjoy the amenities as they prepare for long flights.

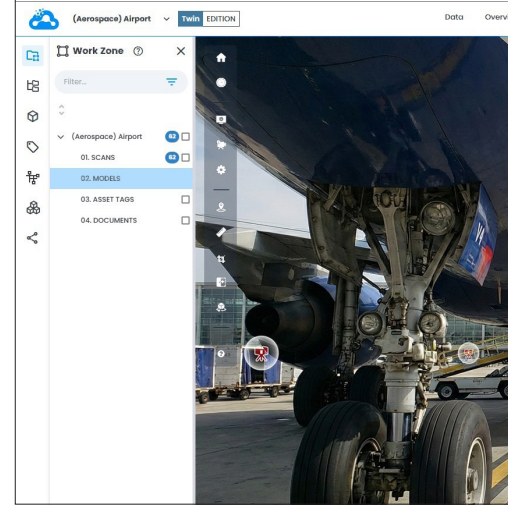
By embedding cultural experience into the core of the terminal design, the project demonstrates how passenger-focused strategies can support growth in international travel while creating a distinctive sense of place.

The industry often frames expansion as a balance between growth and experience, but in reality, the two are inseparable. Poor passenger experience is frequently the symptom of operational friction. Conversely, well-optimised systems create smoother journeys, even in high-demand environments.

As global traffic increases, airports face a simple truth, building more is the visible part of expansion, but operational strategy determines whether that investment succeeds.

Capacity growth without operational readiness creates congestion. Capacity growth with integrated planning creates resilience.

Airports that recognise this distinction will be best placed to expand without compromising the journeys they are there to serve.



# For the record

**Cintoo's Simon Shaw argues that data capture will be key for airports as they race to expand and modernise to meet demand and stay competitive.**

In many cases, the age and complexity of airport infrastructure make the planning and execution of construction, maintenance and refurbishment projects both time-consuming and challenging.

With multiple stakeholders involved at different project phases, from airport owners and operators to architects and contractors, collaboration is essential from conceptual and detailed design stages right through to construction and ongoing maintenance.

A lack of integration between horizontal and vertical digital systems means any exchange of information is highly inefficient, which also makes standardising building and asset data nigh on impossible because of this lack of interoperability.

The pressure to operate efficiently is constant, but making the right decisions relies on having accurate information in order to optimise performance while minimising costs.

## RECORDING THE PRESENT REAPS REWARDS IN THE FUTURE

It is, however, a common misconception to think that reality capture is purely suited to construction projects. In fact, reality capture provides high-precision 3D data for effective asset management and decision-making.

Laser scanning devices are ideal for capturing the as-built condition of airport infrastructure and facilities, both indoor and outdoor.

3D scans and BIM models of new sites and infrastructure help asset and facility managers generate a reliable source of information on which to base decisions during an asset's lifecycle.

Far from being a peripheral technology limited to specialists during the construction phase, 3D spatial data offers immense value to both airport owner-operators and general contractors as a long-term asset.

Airport facilities are managing information both above ground and below the surface. As more organisations become data-centric, having

reliable and reusable information at one's fingertips is necessary to make quick and confident decisions.

Furthermore, the integration of reality capture with BIM modelling, GIS and IoT systems supports the development of digital twins and an airport's overall common data environment.

By integrating reality capture data into digital twins, asset management and maintenance workflows are greatly enhanced.

## WHY AIRPORTS SHOULD BE LEVERAGING LASER SCANNING

Airports consist of complex and diverse geospatial environments where laser scanning technology can be used for precise planning and measurement.

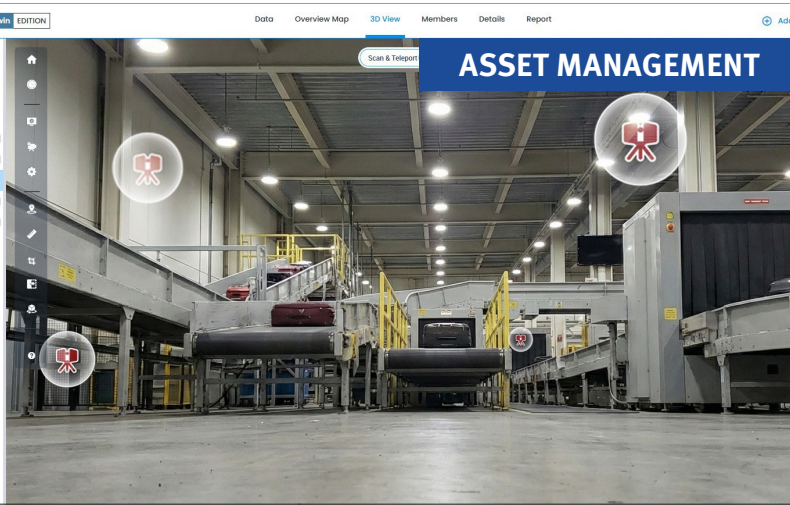
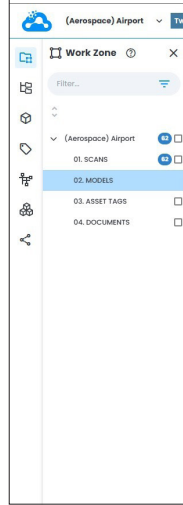
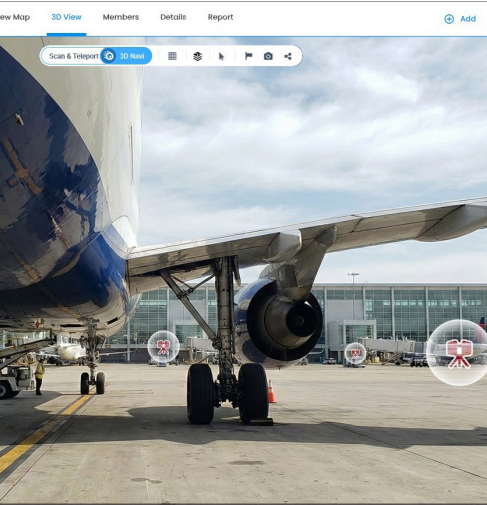
Public areas such as passenger check-in, baggage handling, security, retail environments and passenger lounges are typically large and long terminal buildings. In these locations, mobile mapping systems are ideal for fast capture while terrestrial scanners provide surveyor-grade inspection and measurement data.

These busy, crowded environments with constant foot traffic can make projects complicated to plan and execute.

However, once an area is scanned, review and inspection work can be performed remotely by the airport operator, the general contractor and others involved in a project with the right data management tools.

As a result, airport and contractor teams can perform remote inspection and reduce the costs required to perform physical inspection, maintenance and surveys, potentially avoiding the need to shutdown airport infrastructure.

BIM modelling processes are then faster, more accurate and less prone to error when based off a scan-to-BIM process that uses the scan data as the basis for the model.



When it comes to technical environments and infrastructure, like air traffic control towers, runways, aprons, taxiways and bridges, terrestrial scanners perform high precision inspection and quality workflows on machinery and equipment as part of maintenance reviews, quality checks and planning replacements.

Several airlines, such as KLM and Lufthansa, use a combination of drones and laser scanners to perform aircraft maintenance reviews and to replace equipment.

By capturing high-precision 3D data and managing it through a reality capture data platform, teams can conduct remote inspections instead of on-site reviews, reducing operational disruptions, errors, and rework, while improving planning efficiency and worker safety.

Regularly scanning runways, aprons and taxiways, and comparing the current condition with previous scans, can identify deterioration over time and help with proactively planning fixes and upgrades.

This scan data can then feed into a bigger asset management programme, consisting of 3D models, 2D plans, IoT, GIS systems and digital twins.

Digital twins, for example, are transforming maintenance strategies at airports where sensors have been embedded in critical infrastructure to enable AI to monitor elements like temperature and energy consumption to detect failure patterns.

By monitoring assets over time, digital twins will predict maintenance needs, identifying when equipment needs to be inspected or replaced before problems occur and unexpected downtime is needed.

Data platforms that bring fragmented information together can put an end to data silos and provide one accurate source of truth. This can then be shared with multiple stakeholders, from air traffic control to ground operations providing enhanced situational awareness.

Going forwards, airports are likely run on platform-based solutions that power AI-driven tools for everything from spotting anomalies to personalising passenger experiences.

## SCANNING FOR THE FUTURE

Airports are among the most complex infrastructure environments in the world. Using reality capture technology airports can instantly

improve visibility to facilitate better decision-making not just for specific projects but on an ongoing basis.

Reality capture data can feed digital twins, mirroring physical environments so that assets can be monitored throughout their lifecycle.

Advanced 3D scanning is replacing traditional surveying methods, cutting data collection time by up to 80% in large, active environments like Vienna and JFK airports, where teams can now map thousands of square metres daily without disrupting operations.

At Melbourne Airport, Arup used a reality capture data platform to perform remote inspections and plan work in advance, minimising on-site exposure and reducing costly downtime.

While Aéroports de Montréal leveraged the same cloud-based platform to compare scans with BIM models for precision QA/QC, all while ensuring strict compliance with SOC 2 Type 2 and ISO 27001 data protection standards.

Across these airports, faster data capture, safer workflows, and enhanced collaboration are redefining how infrastructure is maintained and expanded.

Teams can map thousands of square metres daily and then upload this data where it can immediately be accessed by stakeholders.

Stakeholders can make informed decisions without visiting sites physically, reducing the need to travel and making projects more transparent and collaborative.

Unified platforms further break down information barriers between stakeholders.

Merged with artificial intelligence, this data enables anomaly detection and predictive maintenance, turning reactive processes into proactive management strategies.

Reality capture technology is bridging the gap between physical infrastructure and digital management systems all in aid of more efficient operations and reduced costs.

In adopting these solutions, airports can better tackle macro and micro challenges and adapt with greater agility.



# Hydrogen hub

**Ever innovative Incheon has more liquid hydrogen charging stations for vehicles than any other airport on the planet, writes Joe Bates.**

**W**hen Incheon International Airport (ICN) embraces a challenge, it does so whole heartedly and without compromise, which is why nobody should be surprised to learn that it is now home to the largest liquid hydrogen hub at an airport with more charging stations than any other gateway.

And, according to operator Incheon International Airport Corporation (IIAC), it is making a real difference at the South Korean hub.

The brand new facility features a liquid hydrogen charging station capable of fuelling up to 240 hydrogen buses per day, which combined with two existing stations means that ICN can now deliver a world-first of 420 kilogrammes of hydrogen per hour.

The \$200 million public-private partnership (PPP) project involved the participation of South Korea's Ministry of Land, Incheon Metropolitan City, and major energy companies.

Located at Terminal 2's bus garage, the new state-of-the-art liquid hydrogen fuelling hub is currently handling around 40 buses daily, easing congestion and wait times across the airport for the airport fleet of 115 hydrogen powered vehicles.

To date, 36 of ICN's 68 shuttle buses have been converted to hydrogen from petrol or diesel, the move alone reducing more than 2,000 tons of greenhouse gasses every year, the equivalent of planting 288,000 pine trees.

Looking ahead, the airport plans to add seven more hydrogen buses this year and expand its charging facilities by 2028 to meet growing traffic demand projected for 2030.

Explaining a little about the airport's renewable energy strategy, IIAC's director for international relations, Vin Kim, says: "To keep pace with global efforts to become more eco-friendly, we have established and implemented a management strategy focused on energy transition.

"Our goals are to transition to solar-electric renewable energy for airport buildings in line with our commitment to the RE100 initiative led by Climate Group, and transition to hydrogen-powered vehicles and buses for transportation.

"Hydrogen offers shorter refuelling times and longer driving ranges compared to electric vehicles (EVs).

"We have initially prioritised converting general shuttle buses to hydrogen, with the added benefit that it allows passengers to directly experience the airport's eco-friendly initiatives.

"As a result of this strategy, we are actively installing and operating hydrogen refuelling stations as critical infrastructure to support the transition of route buses connecting the airport to the Seoul Metropolitan Area.

Converting so many vehicles to hydrogen and investing in its own transport hydrogen hub is certainly a bold step forward for the airport



## Incheon Airport: Scaling the World's Largest Liquid Hydrogen Hub

Incheon International Airport and SK Innovation E&S have established the world's largest liquid hydrogen refueling hub to power a zero-emission transport ecosystem. By transitioning from gaseous to liquid hydrogen, the hub achieves unprecedented fueling efficiency and massive reductions in greenhouse gas emissions.

### The Superiority of Liquid Hydrogen

1/800th Volumetric Compression



7.5x Higher Transport Capacity



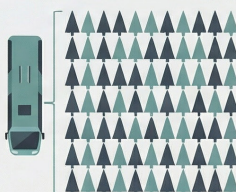
320kg per Hour Fueling Power



| Feature          | Gaseous Hydrogen     | Liquid Hydrogen        |
|------------------|----------------------|------------------------|
| Transport Volume | 800x                 | 1x                     |
| Storage Pressure | 200+ Bar (High Risk) | Atmospheric (Low Risk) |
| Truck Capacity   | 200 - 400 kg         | 3,000 kg               |

### Real-World Environmental Impact

1 Bus = 8,000 Pine Trees



300,000 Trees Already Replaced



4,000kg Daily Demand by 2030



**56 Tons**  
Annual GHG Eliminated

Converting one diesel bus to hydrogen eliminates 59 tons of annual greenhouse gases.

**36 Shuttle Buses Converted**  
2,000 Tons of GHG Already Offset

Converting the first 39 shuttle buses has already offset 2,000 tons of GHG.

### Future Demand (2030)

100% City Bus Conversion  
Incheon City plans to convert 100% of its city buses to hydrogen by 2030.

NotebookLM

and a strong signal that Incheon Airport is serious about leading the global shift to cleaner, greener aviation.

And with 172,000 vehicles travelling to and from the airport every single day, IIAAC is more than aware of the need to reduce CO2 emissions.

Is the long-term plan to make revenue from the hydrogen hub by selling liquid hydrogen to third party customers on, and possibly off airport?

Vin Kim says: "This is not a consideration at the moment as the production and sale of liquid hydrogen is a business that requires specialised production facilities.

"Currently, these activities are being managed and operated by specialised private sector companies."

Looking at the bigger picture, is Incheon on target to reach zero emissions by 2045?

Without hesitation, Kim relies: "Yes, we are faithfully implementing our roadmap to achieve carbon neutrality.

"Key milestones and actions in this journey will include our RE100 membership, the phased transition of all shuttle buses and corporate vehicles to eco-friendly models, and the more widespread use of sustainable aviation fuel [SAF].

"SAF is core to decarbonising for the aviation industry. We are working in close co-operation with the government and the airlines to introduce SAF. This includes implementing policies to gradually increase the fuel blending ratio."

AW



# Hydrogen power

**Dr Lee Juby looks at the growing momentum around hydrogen-powered ground support equipment (GSE) and the pilot projects that are leading the way.**

**H**ydrogen is one of the more promising pathways through which aviation can decarbonise, both as a direct power source for future aircraft, and as a feedstock for the production of electro-sustainable aviation fuel (e-SAF).

Commercial hydrogen-powered flight remains some way off, and there are currently around 40 e-SAF production operations in the early stages of planning across Europe.

However, in addition to these applications, there's significant potential for emissions reductions based on the equipment on the runways and aprons of every airport.

## WHY HYDROGEN AND WHY NOW?

Ground support equipment (GSE) – the baggage tractors, pushback tugs, ground power units (GPUs) and other equipment that service every aircraft turnaround – have typically run on diesel.

Research conducted at Exeter Airport in the UK found that ground operations consumed over 78,000 litres of diesel in a single 12-month period, emitting nearly 200 tonnes of carbon.

Exeter is a small, regional airport. Scale those figures to a major European hub with hundreds – even thousands – of GSE assets, and the opportunity to significantly reduce aviation emissions through hydrogen-powered ground operations is hard to ignore.

Battery electric-vehicles have made some inroads into GSE, and they have a role to play, but the abilities of hydrogen make it well-suited for the operational demands of a working apron.

Refuelling times are comparable to diesel, which helps with fleet availability and aircraft turnaround times.

Hydrogen vehicles can also perform reliably in varied weather conditions, particularly in colder climates that impact battery performance.

Hydrogen GSE has now been tested and operated at -17°C at Helsinki Airport under real winter conditions, with hydrogen refuelling from HyQube infrastructure and the GSE itself delivering consistent, dependable performance throughout.

Policy and technological readiness also lend impetus to hydrogen GSE adoption. Across Europe and the UK, regulations support the use of hydrogen to meet emissions targets, such as those outlined within the UK's Jet Zero Strategy and Europe's industry-led roadmap Destination 2050.

Hydrogen GSE is readily available and relatively mature. Manufacturers are producing both hydrogen fuel cell (HFC) and hydrogen internal combustion engine (H<sub>2</sub>-ICE) vehicles, alongside dual diesel-hydrogen ground power units (GPUs) for powering parked aircraft.

Early trials have also demonstrated the viability of converting diesel GSE to hydrogen, which, given the long lifecycle of most GSE and the size of their fleets, could save operators a significant sum when it comes to fleet renewal compared to battery-only assets.

## HYDROGEN REFUELLING – THE STORY SO FAR

The story of hydrogen refuelling at airports will start with the use of gaseous hydrogen for GSE, and so far, over the past few years, we've



witnessed several successful trials progressively and methodically de-risking hydrogen for GSE operations.

Bristol Airport, for example, hosted the first airside hydrogen refuelling trial at a major UK airport in 2024 as part of Project Acorn.

Working with easyJet, the UK Civil Aviation Authority (CAA) and Cranfield University, a HyQube modular refueller was used to fuel a hydrogen-powered baggage tractor during live turnaround procedures, gathering the real-world data needed to help shape regulation and standards for safe airside hydrogen use.

The project was recognised with the Large Aviation Innovation Award at that year's Aviation Industry Awards UK.

Exeter Airport took the concept further. In a world first, a TUI Boeing 737 completed a full commercial turnaround using multiple hydrogen-powered vehicles simultaneously: a fuel cell baggage tractor, a hydrogen combustion pushback tug, and a hybrid hydrogen-diesel GPU.

This trial proved that a fully hydrogen-supported turnaround is viable today.

While Amsterdam Schiphol – the fourth busiest airport in Europe in 2025 based on passenger traffic – demonstrated that this is not purely a story for smaller European airports.

As part of the TULIPS programme, the airport has run successful hydrogen GPU trials. It also recently completed a hydrogen ground vehicle trial, using a modular refueller to supply hydrogen to a pick-up truck and a specially developed aircraft tug, which routinely tows Boeing 737s between parking zones, hangars, taxiways and gates.

### FROM PILOT TO PROVEN... TO PERMANENT?

These successful trials demonstrate that the widespread use of hydrogen GSE is achievable, while providing valuable insight

for other airports seeking to duplicate these pilots and decarbonise their operations.

Knowledge-sharing throughout the industry is key, and many of the successful projects are positively contributing to the development of regulations and guidelines for the sector.

This evidence base is essential given that in both the UK and EU there aren't yet any fully formalised regulatory frameworks or operational guidance for hydrogen storage and refuelling in the airside environment.

However, ensuring a successful trial or pilot project requires first-hand experience. Storage and refuelling options will need to be calibrated to the individual needs of each airport, along with the operational requirements of the GSE fleet.

This means working with a partner that has successfully demonstrated their ability to deliver the assets and support required – across multiple airports, multiple countries, multiple vehicle types and in the full range of conditions a European operation might encounter.

Going from pilot to more permanent hydrogen GSE usage will also be a large undertaking, and that same experience will be a necessity for scaling.

With more GSE operating in busier environments, different storage and refuelling assets will be needed, and airports will need to consider their hydrogen delivery schedules and the potential for on-site production.

The location of refuelling must also be looked at. Static refuelling sites have so far been successful, but mobile refuelling from tankers or trucks may be required for refuelling GSE assets – and even aircraft themselves – at remote stands.

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### About the author

Dr Lee Joby is CEO of Fuel Cell Systems, which facilitated each of trials mentioned in this article and more across Europe.



# Work in progress

**Alina Viehweber, ICF's manager for sustainable aviation, provides an update on the industry's adoption of sustainable aviation fuel (SAF).**

**S**ustainable aviation fuel (SAF) is widely recognised as the most important near to mid-term pathway for decarbonising aviation. Unlike longer-term technologies such as hydrogen or electrified flight, SAF can be used in existing aircraft and airport infrastructure without major system redesign.

This makes it the only scalable decarbonisation lever that can deliver meaningful emissions reductions within the constraints of today's aviation system, where fleet renewal cycles are long and infrastructure lifetimes extend over decades.

## SAF MARKET DEVELOPMENTS

Governments have increasingly recognised the importance of SAF as a key decarbonisation lever and have implemented concrete policy mechanisms to drive uptake.

This includes SAF mandates such as the EU's ReFuelEU Aviation framework and the UK mandate, alongside new instruments like Singapore's SAF levy and emerging policy discussions in Australia and New Zealand.

These developments mark a more structured, compliance-driven market where SAF demand is increasingly defined by regulation rather than voluntary action.

In response, supply has begun to scale, reaching an estimated 1.9 million tonnes in 2025 and projected to grow to around 2.4 million tonnes in 2026, according to IATA.

However, momentum is beginning to slow. Policy uncertainty, such as delays in implementing the UK's Revenue Certainty Mechanism, combined with the high cost of SAF, are constraining growth.

IATA estimated SAF added around \$3.6 billion in fuel costs in 2025. At the same time, production remains heavily reliant on HEFA pathways, while newer technologies like Alcohol-to-Jet, Fischer-Tropsch, and Power-to-Liquid are not yet scaling at pace, despite early successes such as LanzaJet's Freedom Pines facility.

Looking ahead, ICF estimates SAF supply to increase to 22 to 26 million tonnes by 2030, but this remains far below the approximately 500 million tonnes IATA estimates will be needed by 2050.

This gap highlights the scale of the challenge and the need for faster progress across policy, cost reduction, and technology deployment.

For airports, this is highly material. While most decarbonisation efforts focus on Scope 1 and 2 emissions, over 90% of an airport's footprint typically comes from Scope 3, primarily aircraft fuel use.

As a result, SAF is becoming central to airport net zero strategies, positioning airports as active enablers of SAF deployment through infrastructure, partnerships, and market facilitation.

## THE EXPANDING ROLE OF AIRPORTS

Airports are increasingly acting as enablers of the SAF market, moving beyond their traditional role as passive providers of fuel infrastructure.



Historically, their involvement in fuel supply chains has been largely operational, focused on storage and delivery within the airport boundary.

As aviation decarbonisation accelerates, this role is expanding, with airports emerging as active system participants that can influence how SAF markets develop, connect, and scale.

This shift is being driven by the growing recognition of emissions beyond direct airport operations. Through frameworks such as ACI's long-term carbon goal, net zero commitments are now widely adopted across the airport sector.

The introduction of Airport Carbon Accreditation Level 5 marks a step change in ambition, requiring airports to achieve net zero for Scope 1 and 2 emissions while also addressing selected Scope 3 emissions, including those associated with aircraft operations.

This effectively formalises the airport's role in value chain decarbonisation and embeds SAF within airport-led climate strategies rather than treating it solely as an airline responsibility.

As a result, SAF is becoming an increasingly important lever within airport decarbonisation approaches. However, this role is shaped by a fundamental constraint: physical SAF supply remains limited and unevenly distributed across markets.

Airports and airlines therefore cannot rely on consistent local availability in the near term. This has elevated the importance of mechanisms such as book-and-claim systems, which allow the environmental attributes of SAF to be allocated independently of physical fuel delivery.

For airports, these mechanisms provide a practical pathway to support Scope 3 emissions reductions even where direct SAF supply is not yet accessible.

Early reflections of implementation of the ReFuelEU Aviation framework illustrates this dynamic. While SAF deployment is increasing under the mandate, supply remains concentrated in a limited number of Member States, highlighting how the first phase of policy implementation is shaping real-world distribution patterns.

This uneven rollout reinforces the need for co-ordinated infrastructure development, policy alignment, and market design to enable broader access.

Within this context, airports are evolving into three distinct roles across the SAF ecosystem – Observer, Facilitator and Leader.

Airports in the Observer category are monitoring SAF market developments and assessing implications for future operations. This includes tracking policy evolution, evaluating potential demand from airline partners, and identifying long-term infrastructure requirements without making immediate investments.

Examples include Sydney Airport, which is facilitating domestic SAF industry development and handling Australia's largest-ever SAF imports, and Munich Airport, which is studying technical and operational readiness such as storage, pipeline, and quality-specification upgrades without committing to large-scale blending yet.

Facilitator airports are supporting early-stage SAF deployment through enabling actions such as planning for fuel infrastructure upgrades, co-ordinating with airlines and fuel suppliers, and preparing for mechanisms like book-and-claim.

This role often includes stakeholder engagement and ensuring operational readiness as supply becomes available. For example, Brussels Airport is participating in Green Deal Stargate-related book-and-claim-oriented SAF initiatives, while Dallas Fort Worth Airport is supporting circular-economy SAF pilots by supplying used cooking oil (UCO) feedstock and hosting SAF-delivery pilots with Avfuel and Neste.



Airports in the Leader category are among a small but growing group of gateways taking a proactive role in shaping SAF markets.

This includes co-investing in SAF production, forming strategic partnerships across the value chain, aggregating demand, and actively attracting supply to their region to accelerate market formation.

Examples include SAF incentive schemes implemented at Heathrow Airport, Vancouver International Airport, Milan Malpensa Airport, and Swedavia to name a few, as well as Pittsburgh International Airport, which is developing the first on-site SAF production facility in the United States on airport-owned land.

Lack of engagement with the SAF market, could risk competitiveness and misalignment with the direction of the aviation sector's decarbonisation pathway.

As mandates tighten and airlines face increasing compliance obligations, carriers are likely to prioritise routes and hubs where SAF access is more readily available or where supportive mechanisms are in place.

This could impact airport competitiveness, particularly for transfer traffic and airline partnerships. In parallel, airports may struggle to meet evolving net zero commitments, especially under frameworks that require Scope 3 emissions reductions.

Over time, this may also affect access to sustainable finance, stakeholder perception, and alignment with broader industry decarbonisation pathways.

However, airports operate within a complex set of operational, financial, and regulatory constraints, and must balance SAF engagement with a wide range of competing priorities.

While only a small group of airports have the resources to take on a leading role, any level of engagement across the SAF ecosystem represents meaningful progress and contributes to broader market development.

### CONCLUSION

SAF is recognised as a central pillar of aviation decarbonisation, with policy, supply dynamics, and market structures evolving in parallel.

For airports, this creates both a clear imperative and a practical challenge: to engage in a way that aligns with their role, resources, and operational priorities while still contributing to sector-wide progress.

A first step for airports is to assess their position within the SAF ecosystem and identify targeted, achievable steps to support market development, whether through strategy, infrastructure planning, partnerships, or enabling mechanisms.

Even incremental progress will be critical in accelerating SAF deployment and ensuring that airports remain aligned with the wider industry.

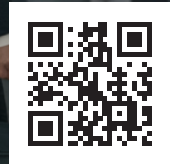
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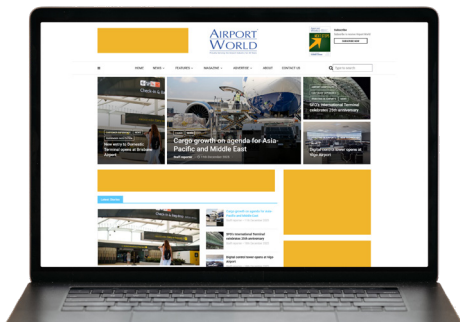
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# Building resilience

**Netcompany's Daniel Ezban wonders whether it's time for major international airports to rethink their operational technology as passenger numbers grow and operational complexity increases.**

**A**s demand for air travel grows, technology will play a key role in delivering seamless, reliable experiences in an increasingly complex operating environment.

Modern operations depend on co-ordination with the airlines, ground handlers, security teams, border agencies and air traffic control, each operating within their own systems and processes.

What was once a relatively linear operation has evolved into a highly dynamic, interdependent environment.

Ongoing geopolitical tensions across the Middle East have highlighted just how interconnected and fragile this system can be. Airspace closures, fuel shortages, flight cancellations and last-minute re-routing, have not only disrupted operations within the region, but have created cascading effects across the global aviation network.

Extended flight times, fuel stock availability, crew displacement and aircraft rotation challenges have placed additional strain on already complicated airport environments.

These events reinforce a critical reality: disruption is not localised. It propagates rapidly across the network, and airports must be able to respond not only to what is happening on-site within their operation, but to what is unfolding across the wider aviation ecosystem in real time.

Many airports are now recognising that the digital infrastructure underpinning these operations has not evolved at the same pace.

Legacy systems were designed for a different era, where the primary challenge was managing and standardising data. Today, the challenge is fundamentally different: enabling fast, co-ordinated action across an increasingly complex ecosystem.

## THE LIMITS OF LEGACY AIRPORT SYSTEMS

For decades, the Airport Operational Database (AODB) has been at the centre of airport operations, providing a single, authoritative source of flight data and underpinning processes such as stand allocation, resource planning and flight information display.

That model made sense when the primary challenge was standardising data. Today, the challenge is different. Modern airports operate as complex, fast-moving ecosystems where multiple stakeholders must act in co-ordination in real time.

The issue is no longer how to share information, but how to act on it quickly and consistently across organisational boundaries.

Against this backdrop, the limitations of the traditional AODB have become clear. Built around flight data, constrained in its ability to integrate across the broader ecosystem, and often tied to slow, vendor-driven roadmaps, it struggles to support the dynamic nature of modern operations.

This challenge is compounded by a wider landscape of legacy systems. Critical functions such as stand and gate allocation, passenger flow management and day-of-operations planning are often distributed across multiple, disconnected products with limited upstream and downstream synchronisation.

The result is fragmented data, duplicated processes and reduced visibility. During routine operations this creates inefficiencies; during disruption, the impact is far greater.

Decision-makers can struggle to establish a single, accurate operational picture, slowing response times when they matter most.

More fundamentally, these environments are designed to manage data rather than co-ordinate action. In a world where performance depends

on the precise alignment of multiple stakeholders in real time, this creates a critical gap.

### SHIFT TOWARDS INTEGRATED OPERATIONAL PLATFORMS AND ORCHESTRATION

To address these challenges, airports are moving toward integrated operational platforms that consolidate data, processes and collaboration into a single operational backbone.

However, this evolution goes beyond integration; it represents a broader shift toward operations orchestration.

Across the industry, terms such as ‘Connected Airport’, ‘Intelligent Airport’ and ‘Total Airport Management’ all point to the same underlying transformation: a move away from fragmented, system-led environments toward a model where operations are co-ordinated end-to-end in real time.

This marks a fundamental change in how airports approach control. The focus is shifting from sharing information to aligning decisions and executing actions across organisational boundaries.

It is no longer enough to know what is happening; airports must be able to respond collectively and immediately.

A new orchestration layer is emerging to support this model. Sitting above existing systems, it connects and contextualises data from across the airport, provides a cross-domain operational view and enables workflows to be co-ordinated dynamically.

Platforms such as Netcompany’s AIRHART exemplify this approach, bringing together operational data, planning capabilities and collaboration tools into a unified environment. This allows stakeholders to work from a shared operational picture while ensuring that processes are synchronised in real time.

This is not a theoretical shift. Our partnership with Heathrow represents a significant step in modernising the airport’s operational backbone, introducing a more integrated and joined up approach to managing one of the world’s most complex aviation hubs.

Crucially, orchestration does not require wholesale system replacement. Airports can introduce this layer across their existing landscape, unlocking value quickly while reducing risk, and transitioning from system-centric operations to a more flexible, outcome-driven model.

### HOW REAL-TIME DATA AND AI ARE CHANGING AIRPORT DECISION-MAKING

The adoption of orchestration platforms is unlocking the full value of real-time data. With a unified, continuously updated operational view, airports can achieve far greater situational awareness across their operations.

Artificial intelligence is accelerating this shift. By analysing large volumes of operational data, AI can identify patterns, anticipate issues and recommend actions before disruptions fully materialise.

In an environment shaped by global connectivity, this capability is increasingly essential. Airports must understand not only what is happening locally, but how external events, such as delayed inbound aircraft, or airspace restrictions, will impact operations.

This enables earlier intervention, more efficient use of capacity and dynamic adjustment of plans as conditions change. The result is a shift from reactive to proactive operations, from understanding what has happened to shaping what happens next.

Rather than replacing human expertise, AI enhances it, providing decision-makers with timely, data-driven insight in complex, fast-moving environments.

### WHY COLLABORATION ACROSS ECOSYSTEM MATTERS

As ecosystems, airport operations are inherently collaborative. Every flight depends on multiple stakeholders working in parallel, each contributing to a tightly co-ordinated sequence of events. When this breaks down, delays and inefficiencies escalate quickly.

Orchestration platforms play a critical role by providing a shared operational environment where airlines, airports and ground handlers can align around a single, real-time plan.

This is already being demonstrated at leading European airports. At Copenhagen and Munich for instance the shift toward orchestration-led platforms is translating into tangible operational gains.

By bringing stakeholders into a shared, real-time environment, these airports are breaking down traditional silos and creating more aligned and responsive operations.

The impact is not just improved efficiency, but greater resilience. When disruptions occur, whether local or global, these airports are better equipped to respond quickly, co-ordinate effectively and minimise knock-on effects.

### BUILDING RESILIENT DIGITAL INFRASTRUCTURE FOR CRITICAL TRANSPORT HUBS

As critical national infrastructure, airports must prioritise resilience across every layer of their operations. Digital systems need to be secure, scalable and capable of supporting continuous, high-volume activity in a fast-changing environment.

The move toward orchestration enables a more flexible, future-ready architecture.

Rather than relying on rigid, monolithic systems, airports can adopt modular platforms that evolve over time, integrating new capabilities such as AI and automation without disrupting core operations. This ensures airports can adapt to growing complexity and increasing disruption while maintaining stability.

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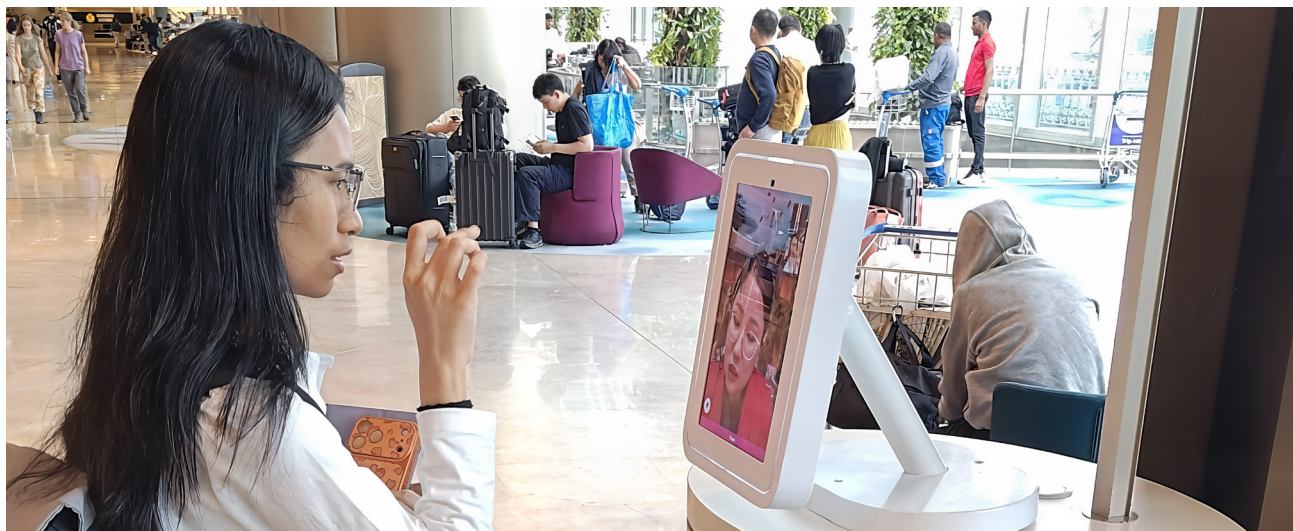
### About the author

Daniel Ezban is CEO at Smarter Airports and global enterprise lead at Netcompany.

# Business exchange

We provide a snapshot of the latest news stories and features from some of the companies that support the growth and development of the world's airports.

## AI-POWERED CONCIERGE SERVICE



Voncierge announced its entry into the US market at the recent 98th Annual AAAE Conference & Exposition in Los Angeles when it introduced its AI-powered, human-augmented concierge service.

Designed for high-traffic environments such as airports, the platform utilises lifelike AI avatars, multilingual automation and, if required, seamless escalation to live agents to assist passengers with everything from wayfinding, flight transfers and missed connection queries to urgent traveller needs.

It notes that its high-tech concierge service debuted at Singapore Changi Airport in 2025 and has supported over half a million

passenger interactions at the gateway to date, significantly reducing the strain on frontline staff.

Voncierge is also keen to stress that the new addition is not about replacing humans, stressing that it can absorb routine traveller needs so staff can focus on other duties.

“Airports do not have a passenger volume problem. They have a service scalability problem,” says Nikhil Gupta, founder and CEO of Voncierge. We help them deliver instant, consistent support without asking already-stretched frontline teams to do more with less.”

## ABM EXPANDS ROLE AT SCOTTISH AIRPORTS

ABM, a leading provider of facility, engineering, transport and infrastructure solutions, has been awarded the service contract for passengers with reduced mobility at Glasgow Airport.

It has also secured a passenger experience contract at Edinburgh Airport which it claims will ensure a “welcoming, smooth, and reassuring experience” for the almost 17 million people who travel through the airport every year.

Myles Grima, head of service delivery and transformation at Edinburgh Airport, says: “Every touchpoint across the passenger journey plays an important role in shaping the experience people have when they travel through Edinburgh Airport. We are pleased to expand our partnership with



ABM, whose teams have been a trusted presence at the airport for more than 15 years.”

## NEW F&B OUTLET AT DXB

Magardère Travel Retail UAE has opened STORY Kitchen & Bar at Dubai International Airport (DXB), the first outlet to launch within the new Concourse B West precinct in Terminal 3. Developed in line with Dubai Airports' vision for the precinct, the concept is a contemporary dining destination that combines cutting-edge design, curated gastronomy and a strong sense of place, reflecting both the sophistication of Dubai and the expectations of its diverse mix of international visitors.

## ROME AIRPORT OPERATOR EMBRACING PHYSICAL AI SOLUTIONS

Aeroporti di Roma (ADR) and spatial intelligence solutions provider Oversight have announced a major expansion of their collaboration to enhance operational efficiency, passenger experience and data-driven decision-making at Rome Fiumicino Airport.

This deepened collaboration is marked by a large-scale deployment of Oversight’s technology across nearly all common-use areas within the Schengen zone.

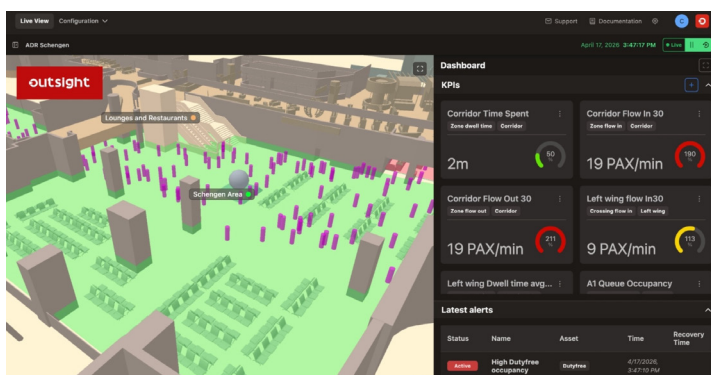
Oversight first deployed its technology at Rome Fiumicino through ADR’s ‘Runway to the Future’ innovation programme. Following a successful initial phase that delivered tangible benefits in the Arrivals immigration area, the project is now moving to an industrial scale.

Deployed across Schengen common-use areas, Oversight’s Physical AI solution transforms real-time Lidar data into actionable insights on people flows, queue formation and congestion patterns.

This gives ADR, a Mundy Group company, an end-to-end view of the passenger journey, enabling more agile resource allocation, supporting data-driven process re-engineering, and laying the digital foundation for predictive, agentic AI-driven airport operations.

This large-scale deployment signals ADR’s confidence not only in Oversight’s spatial intelligence platform, but also in the broader potential of combining LiDAR, advanced analytics and artificial intelligence to shape the next generation of airport management systems. This major contract will also drive the continued optimisation of the technology within the unique complexities of a major international hub like Rome Fiumicino.

Emanuele Calà, ADR’s senior vice president for transformation and technology, said: “At Aeroporti di Roma, we see innovation



as a practical lever to continuously improve operations, service quality and the passenger journey. The decision to expand Oversight’s technology across common-use areas within the Schengen zone, reflects our confidence in solutions that can turn airport data into actionable intelligence.

“Having full visibility over traveller flows in a sensitive environment enables us to act more proactively, optimise processes and support a more seamless and predictable experience for our passengers.”

## ADB SAFEGATE’S ADVANCED DOCKING SOLUTION

ADB SAFEGATE has announced that JetBlue Airways has selected Safedock Flex — the company’s latest generation Advanced Visual Docking Guidance System (A-VDGS) — for a multi-airport technology refresh across four of its major US stations.

The programme spans Boston Logan (BOS), New York-John Fitzgerald Kennedy (JFK), Fort Lauderdale-Hollywood (FLL), and San Juan Luis Muñoz Marín (SJU), and reflects JetBlue’s continued confidence in ADB SAFEGATE as its long-term gate technology partner.

“We are delighted to deepen our partnership with JetBlue on this important programme,” said Doug Woehler, ADB SAFEGATE’s business development director. “By deploying Safedock Flex across their network, we are helping JetBlue achieve their goal of continuous innovation — delivering a scalable, integrated apron platform that will support safe and efficient operations well into the future.”




 Security

# Doing the job

**Clare Williams Fannin of Templemere talks to Kasper Hounsgaard, president and co-founder of Copenhagen Optimization, about the complexities of managing staffing levels.**

**M**anaging staffing in an industry that is often subject to dramatic and often rapid change has always demanded dexterity.

Whether the catalyst for change is new restrictions on passenger movement post-Brexit, or the requirement to bring large numbers of staff back into the workforce during the recovery from COVID, or the introduction of new entry/exit requirements for non-EU travellers visiting the European Union, the ability to respond quickly is essential if service levels and the passenger experience are to be maintained and profitability protected.

The introduction of new security CT-scanners that mean passengers no longer have to remove liquids from their hand-luggage has prompted a similar step-change in staffing needs, according to Kasper Hounsgaard, president and founder of airport operations optimisation specialists Copenhagen Optimization.

He says: “Based on our experience of working with airports of different sizes and markets, the introduction of new CT scanners typically improve the passenger process, but can also make the security operation more staff intensive.”

Staffing requirements tend to increase more than the lanes’ throughput, which leads to higher security operating costs.

“Airports can therefore plausibly find themselves facing a 20-40% increase in staffing-related OPEX, with 30-50% seen in more staff-intensive configurations or transition periods. As a result, there is likely to be a much stronger incentive to optimise staffing, along with a greater need for lane opening plans and operational control from the airport side,” adds Hounsgaard.

From a planning and operational perspective, the shift to CT lanes adds new layers of complexity. “Continuous changes in regulations

and having to operate several different lane setups during the change overs can add to the challenges,” says Hounsgaard.

It also brings opportunities. “The new processes mean that data will become more easily accessible and of higher granularity, which will be a gamechanger for planning and execution,” he notes. “This includes the potential to understand how operations are performing in different locations and where there are bottlenecks.”

The new lanes can lead to more operational efficiency if they are used in the right way. “Throughput can be increased significantly compared with traditional lanes,” says Hounsgaard. “But airports invest considerable sums in the new lanes with a view to improving efficiency, and if these lanes are not staffed at the correct levels, that investment will be wasted.”

Clearly there is a need for staffing levels to be changed at different times in different locations, but it’s a complex task. Many airports are struggling with this because the human resource management systems they use are not able to cope with the demand or keep pace with changing conditions. Similarly, they may be tackling these tasks manually.

Others, however, are getting to grips with the challenges, according to Hounsgaard. He notes: “In the post COVID period, we worked with Manchester Airport Group, for example, to help it modernise its operations as passengers returned in numbers resulting in considerable improvements in operations.”

Hounsgaard concludes by stating that change is inevitable. He says: “We don’t know what form that change might take, but it’s important to be prepared, and to respond in an appropriate and timely fashion.”

## NUREMBERG AIRPORT'S NEW SECURITY SCANNERS



Nuremberg Airport in Germany has officially unveiled its modernised passenger security checkpoint.

Christian Bernreiter, Minister of State for Housing, Construction and Transport, the deputy mayor of the City of Nuremberg, and airport COO, Jan Bruns, were among those to attend a special ceremony to mark the event.

The security checkpoint has been gradually refurbished over the past few months. The switch to Smiths Detection's HI-SCAN 6040 CTIX technology allows liquids, gels and electronic devices (such as smartphones, tablets or laptops) to remain in hand luggage during security screening.

The German gateway, officially known as Albrecht Dürer Nuremberg Airport, notes that each screening lane at its new security checkpoint has several storage areas for placing jackets, bags, etc. on the conveyor belts.

This, it says, will allow passengers who need more time to be 'overtaken', which in turn reduces waiting times.

## NEW CHAPTER FOR RETAIL AT FRANKFURT AIRPORT



Frankfurt Airport Retail GmbH (FAR) – the joint venture between Fraport AG and Gebr. Heinemann – has opened more than 3,000sqm of new Duty Free and Travel Value retail space in Frankfurt Airport's new Terminal 3.

FAR operates a diversified portfolio of duty free, travel value and mono-brand shops across the Schengen and Non-Schengen areas.

The central marketplace in Terminal 3's Non-Schengen area is designed to invite travellers to discover, explore and engage.

While at the heart of the Non-Schengen area is the central duty free and travel value covers which is complemented by a pier shop, mono-brand boutiques from Hugo Boss, Polo Ralph Lauren and Montblanc as well as a Gatezero Store.

"Our goal is to actively shape and continually enhance the customer experience at the airport with unforgettable offerings that inspire and amaze," said Fraport AG board member Julia Kranenberg.

## EXPANSION ON AGENDA FOR VEOVO

Veovo has entered into an agreement to acquire Dubai Technology Partners (DTP), a Dubai based airport technology and services provider with deep roots across the Middle East. The acquisition strengthens Veovo's regional presence and brings new operational and AI-enabled capabilities into its Intelligent Airport Platform.

These include DTP's AirportView mobile app for the whole airport community and tNexus, an integration and messaging framework, with ML models.

"Joining Veovo feels like the right next chapter for what we've built at DTP. We've spent the last few years working alongside the Veovo team, and there's a real shared belief in where airport technology is heading," enthused DTP's managing director, Abdul Razzak Mikati.

"Nothing about our commitment to customers in the region changes – if anything, we now have more behind us to deliver on it. For me, staying on to lead this means continuing to back the people who made DTP what it is, and helping them grow into something bigger."

Veovo CEO, James Williamson, noted: "Bringing our teams and technology together strengthens how we can continue to raise the bar and support more airports globally as complexity continues to rise."



AW

# PEOPLE matters



## User friendly buildings

**Terri Morrissey and Richard Plenty discuss the importance of remembering the human factor in airport design.**

**W**hether you like it or not, travel can be a stressful business. The idea of a dream holiday or business trip can feel like a bit of a myth as reality sets in.

Oftentimes we are faced with long queues, delays, stressful checks, extremes of temperature, missed connections, getting lost in vast terminals ... it is almost as if there is a plot afoot to deter people from travelling at all!

While it is impossible to make travel entirely stress-free, airport design that puts passengers first can make a significant difference. The key is to see the experience of both passengers and airport workers from the user's perspective.

Involving future users in the design process, clearly mapping the passenger journey through the airport, and applying new technologies and advanced design approaches can all help to create human-centred environments.

Psychology and anthropology are disciplines that underpin this approach. Observation tools, questionnaires, predictive analysis of behaviour, and understanding the nature of stress, can all be used to build the human into the design of the airport space.

'Wayfinding', for example, can be studied to observe how people make decisions when navigating through an airport.

Studying key points in the journey from public transport or parking to baggage handling, to security checks – right through to boarding a plane – can influence design resulting in a more efficient and less stressful process.

Attention to the human interface is key. Travelling to a recent meeting at the ACI EUROPE head office in Brussels by Metro provided a perfect illustration of how a failure to do so can cause confusion in any transport system.

The closest station, 'Arts Loi', was clearly indicated on the Metro map in the train carriage, but the sign on the station platform at the expected stop said 'Kunst-Wet'. It turned out that this was the Flemish name for the same station but there was no indication on the station signage!

Looking ahead, the introduction of modern biometric technology is reshaping airport design and some airports, such as Incheon with its Smart Pass biometric boarding system, have already invested in this area.

Passengers can pass through immigration checkpoints and boarding gates using facial recognition rather than documents. Biometric should ultimately enable smoother journeys and customised individual support for the passenger journey.

There are many other areas where attention to the human factor can make a difference to the passenger. A sense of belonging can be created through use of displays and interactive experiences.

The aesthetic experience should not be forgotten and is a feature of some 'sustainability inspired' airport designs which aim to bring aspects of the natural environment into the airport. This makes sense as sustainable design is something that demands particular attention in the airport context.

Physical comfort is always important and can be enhanced through controlling temperature, access, seating arrangements, ventilation and noise levels. We find that noise levels can be particularly annoying in some airports when waiting for a flight.

Catering outlets with loud music, high pitched sounds from coffee making machines; staff shouting orders and the inevitable screeching of small children can be enervating. Strategically placed screens; plants; and design of the layout with the customer comfort in mind could go a long way to making the experience much more comfortable!

Putting thought into the design of building and spaces coupled with the use of emerging technologies in sustainability can help create more user friendly and accessible buildings, create human centred environments and make the journey less stressful for all.

It just takes some imagination – and thinking more about the user!

AW

### About the authors

Terri Morrissey and Dr Richard Plenty run ACI's Human Resources training. They received a Presidential Citation from the American Psychological Association in June 2022 for their leadership in advancing global psychology. Contact them at [info@thisis.eu](mailto:info@thisis.eu)

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# AI in Airports

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