Illuminated Insights

FROM THE EDGE OF AI, FOR AIRFIELDS

AI's Moment in Airfield Operations

WANT TO TRY FOD^{AI}?
JOIN OUR 60-DAY PILOT PROGRAM

LAUNCHING SNOWPRO^{AI} FOR
WINTER OPERATIONS

WINTER 2026
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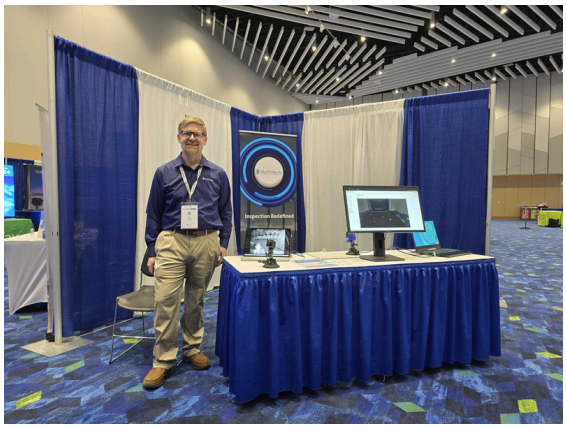


By Brian Freed, CEO

As we welcome 2026, I'm excited to reflect on the progress and lessons of the past year, and to share a glimpse of what's ahead. 2025 was a year of hands-on learning, collaboration, and real-world deployments. Our FOD^{AI} beta program successfully concluded, and the system is now commercially available for 60-day no-obligation pilots, giving airports the chance to try before they buy and experience firsthand how AI can support airfield safety and efficiency in operational settings. These pilots are designed to demonstrate value, integration into daily workflows, and highlight AI's complement to human decision-making on the airfield.

We are also actively developing Surface^{AI}, a multi-million-dollar project supported by an OVIN grant and the GTAA. This solution, targeted for Beta deployments in Q4:26, aims to drive a profound change in airfield surface maintenance by allowing operations to economically identify those defects that showed the greatest rate of change over a short period of time (e.g. 30, 60, 90 days) vs the current standard PCI scoring which typically cost $0.02-$0.03 per square foot and occurs only once every one to three years. The goal is to provide high-frequency actionable data that can enhance safety while delivering significant ROI by extending the useful life of the most critical airport asset, airfield surfaces, the runways and taxiways that define an airport.

In January, we began deploying beta versions of SnowPro^{AI} which is designed to provide precise, geolocated snowbank measurements while crews work, even in challenging conditions. This product addresses a critical gap in winter operations. A drift profile measurement is time consuming (manually inserting measuring sticks into snowbanks) or at best rough guesstimates. SnowPro^{AI} reflects the practical realities of winter operations and offers insights that go beyond what manual checks can provide.

Looking forward, 2026 is about building on these solutions, enhancing our existing products based on real-world learning and customer feedback, while executing our product development roadmap for additional detectors and airfield intelligence applications.

To all our partners, airport teams, and colleagues in the broader community: thank you for your collaboration, curiosity,and openness. The lessons we learn together will continue to shape safer, smarter, and more resilient airfield intelligence in the year ahead.

FOD^{AI} Pilots: Openings for Spring/ Summer 2026

How many pieces of FOD did your airfield operations team detect and recover last month? For most airports the answer is unknown. This operational reality stems from airfield teams being asked to do more than ever; maintain safety, manage risk, and keep operations moving, often with limited time and constrained staffing. The result is that recovered FOD is seldom logged and data that might support remediation (source, frequency, location) is not available.

Through intensive testing across multiple airports, alongside committed beta partners, FOD^{AI} has been evaluated in live, operational environments. The result is a system designed to support existing inspection SOPs. Mounted on inspection vehicles to alert and log airfield FOD during your normal daily self-inspection process. No fixed on-airfield infrastructure to deploy. Instead, real-time alerts, delivered to trained airfield staff when and where they can assess and remediate.

Illuminex AI is offering a 60-day FOD^{AI} pilot program for airports that want to experience deployment in their own environment, testing how Human + AI can reduce the burden on inspection teams while strengthening surface safety outcomes.

The pilots provide airports with the opportunity to evaluate real performance, integration, and impact, with the flexibility to make informed decisions at the end of the pilot period.

Reach out to our team to learn more and reserve a pilot window.

During a pilot, airports can experience:

- **Greater confidence that debris risks are identified early**
- **Less time spent on manual logging and repeat inspections**
- **AI that integrates smoothly into existing airfield workflows**
- **Clear, usable data that supports operational decisions**

AI's Moment In Airfield Operations

Artificial intelligence has moved from emerging curiosity to strategic priority across nearly every major industry. In aerospace, it offers hope for overcoming pressing operational realities: talent shortages, rising passenger demand, aging infrastructure, while supporting the shift toward data-driven regulatory compliance. The timing is significant. AI arrives at a moment when airports must deliver more safety, efficiency, and resilience with limited resources, smaller teams, and tighter margins.

Within terminals, AI adoption has accelerated. Passenger flow modeling, queue prediction, biometric verification, baggage reconciliation, and self-service kiosks demonstrate clear, measurable value. Terminals provide controlled environments: consistent lighting, stable networks, and well-defined data inputs. These systems are insulated from many of the safety-critical constraints that define airside operations. Terminal AI has evolved quickly, sometimes outpacing the policy and procurement frameworks that govern airfield technology.

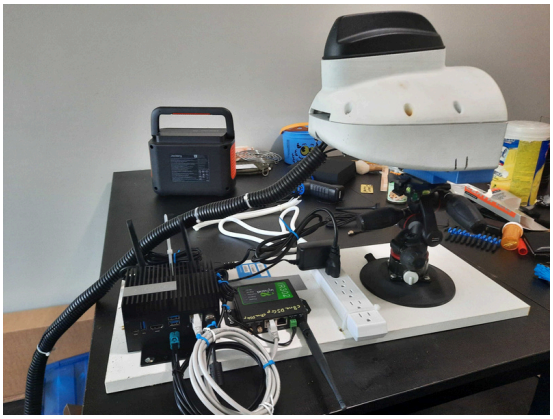
By contrast, the airside remains complex, unpredictable, and high stakes. Discussions of "digital transformation" often focus on information systems, enterprise data, or passenger-facing technology. Yet much of the airport's economic and safety burden sits on the airfield, where operations occur under conditions that resist digitization. Manual processes, visual inspection, radio communication, and human experience remain essential but bring variability. Two operators inspecting the same runway may see different risks, prioritize differently, or work at different speeds. Winter operations amplify these differences.

AIRFIELD OPERATIONS

The conversation around airfield intelligence requires clarity. AI is already present on the airfield, but its introduction, maturity level, operating conditions, and expected outcomes must be considered carefully. Treating airside AI as an operational decision, evaluated with the same rigor as any capital investment, is critical.

Generative AI, while exceedingly powerful, offers little value in a world where visual perception and physical infrastructure maintenance are the central focus.

The term “artificial intelligence” now describes many technologies: predictive maintenance models, generative systems, anomaly detection, and computer vision for runway inspection. Each has a distinct risk profile, technical maturity, and operational burden. Generative AI is powerful but still maturing for safety-critical environments. Predictive analytics is mature but depends on structured, high-quality data often unavailable in airside settings. Reinforcement learning shows promise for autonomous decisions but remains largely experimental. Computer vision and edge AI have reached reliability, explainability, and repeatability, essential traits for airfield deployment.

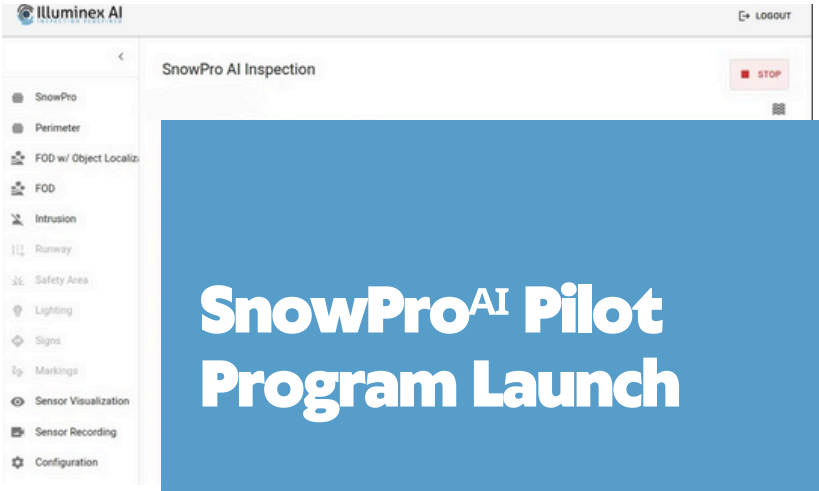


External expectations continue to rise. Regulators require robust surface condition reporting, wildlife hazard management, SMS documentation, and FOD prevention. Airlines demand faster turnarounds, consistent operations, and reduced delay propagation. Insurers increasingly assess airports’ data practices. These pressures come from operational and financial realities, not technology vendors. Airports face a unique moment: do more, document more, and operate with greater consistency, without significant increases in staff or capital. AI offers a pathway, but success requires realistic deployment. Premature or overhyped automation can have serious consequences, as seen in autonomous vehicles.

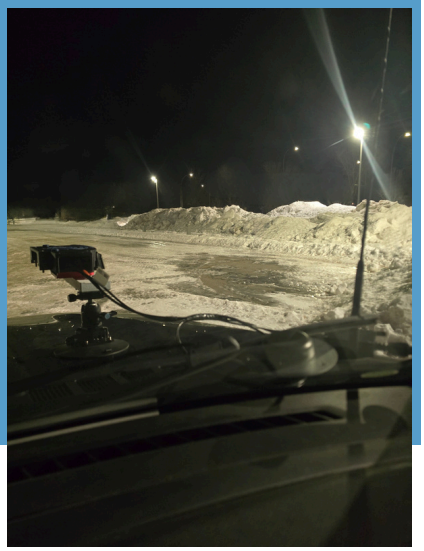
Successful airside AI deployment requires understanding AI maturity, relevant technologies, operational characteristics of the airfield, and the organizational capacity of each airport. Understanding AI as a spectrum clarifies what is ready for airside deployment, outlines the business rationale for investment, and presents practical lessons and a forward-looking roadmap for scalable, sustainable, and safe AI implementation.

Computer vision and edge AI have reached reliability, explainability, and repeatability, essential traits for airfield deployment and thus the optimal technology to emerge as a human force multiplier in the “built world” of airside.

The transformation extends beyond technology. It shifts how airports think, measure, and manage risk, from reactive to predictive, from subjective to observed, from fragmented to integrated. AI is the catalyst, while human judgment, institutional knowledge, and operational rigor remain central. Those who harmonize these strengths will set a new benchmark for aviation safety and performance.



SnowPro[AI] Pilot Program Launch



Snowbanks accumulate along runways and taxiways, and airfield teams are tasked with measuring and reporting their height, slope, and location to maintain safety and comply with FAA Advisory Circular 150/5200-30D and Transport Canada CAR Standard 322 regulations.

Does your airfield team ride in inspection vehicles, peering through limited visibility, getting out to measure and record manually, making judgment calls? Reporting observations into NOTAMs or runway condition documentation rely heavily on human perception, line of sight, and timing, creating variability and leaving room for uncertainty.

SnowPro[AI] transforms this reality. By combining LiDAR and precision GPS, it captures three-dimensional, geolocated profiles of snowbanks in real time as the inspection vehicles move along the runway, alerting the inspection vehicle when not in compliance.

SnowPro[AI] provides airfield teams with objective data, allowing them to monitor snowbank height, slope, and volume with a level of accuracy and consistency that is difficult to achieve with traditional methods. No more trudging through drifts with a measuring pole, or making a best guess, SnowPro[AI] delivers precision and speed to this task.

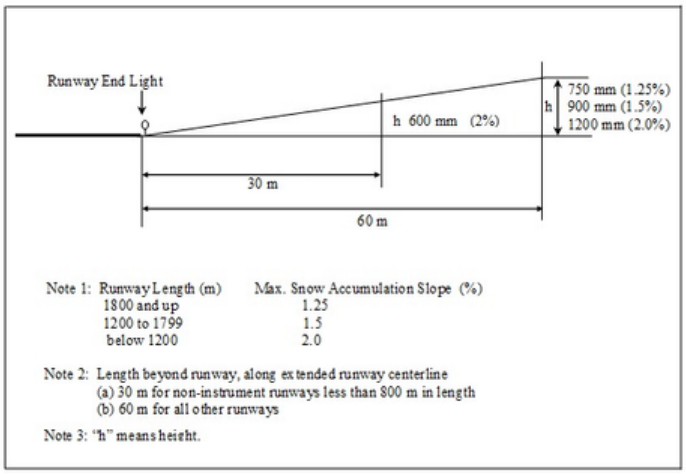
Using LiDAR and GPS, SnowPro[AI] captures snowbank profiles in real time, alerting the crew when height is not in compliance.

SnowPro[AI] is designed to operate in real conditions, capturing precise information at speeds up to 20 miles per hour, allowing teams to maintain safety and compliance without disrupting airport operations. In essence, SnowPro[AI] turns episodic, judgment-based inspections into continuous monitoring, providing confidence and insight that enhances operational safety.

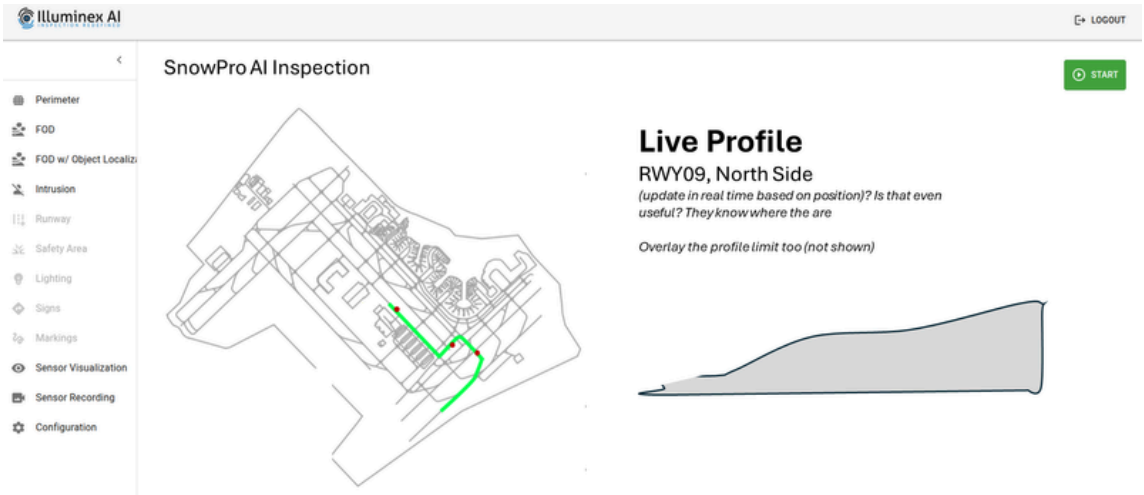
This winter, we are beta testing at several airports including arctic sites. These programs give airports the opportunity to experience SnowPro[AI] firsthand and are essential for validating performance in real operational environments, understanding how the system integrates into workflows, and demonstrating the tangible benefits of AI-driven snowbank monitoring.

If your airport has interest in participating in the Beta program or want to learn more about purchasing SnowPro[AI] before next winter, you can contact our team directly or reach out through resellers such as Fortbrand Services.

For winter operations, we don't intend to end with snowbank profiling. Looking ahead, multiple developments are underway to assist your airfield crew next winter.



SnowPro[AI] offers a new perspective on monitoring snowbanks, helping teams anticipate risks and make decisions based on precise, actionable data. Results and lessons learned from these pilots will be shared in the Spring edition of Illuminated Insights, highlighting its real-world impact on airport operations.



*View **during an inspection** – display contour map at end of inspection? Or just send to cloud and view it there?*

AI-Powered Airfield Insights: OVIN, GTAA, and Illuminex AI Collaboration

Airports are complex systems, where safety and efficiency depend on monitoring every inch of runway and taxiway. A recently announced collaboration between Illuminex AI, the Ontario Vehicle Innovation Network (OVIN), and the Greater Toronto Airports Authority (GTAA) is bringing cutting-edge AI to airfield infrastructure inspection, marking a step toward data-driven operations.

Illuminex AI is deploying its InspectEx™ platform, integrating camera feeds, LiDAR, GPS, and inertial sensors to create two specialized AI models: Surface^{AI} and Markings^{AI}. Surface^{AI} analyzes pavement conditions, detecting cracks, wear, andanomalies. Markings^{AI} evaluates pavement markings, highlighting faded or degraded lines that could confuse pilots or ground crews.

The technology is flexible, deployable from ground vehicles, drones, or fixed installations, and delivers real-time insights directly to operations teams. Alerts and diagnostics are logged to a central cloud system, helping maintenance teams prioritize interventions proactively.

> *"Next-generation AI solutions like Surface^{AI} and Markings^{AI} empower our airfield operations team and the broader smart mobility ecosystem in Ontario."*
>
> **Todd Browne, Associate Director of Airside Operations at GTAA.**

This multi-million-dollar product development initiative is supported jointly by Illuminex AI, the Government of Ontario through an OVIN stream-2 grant and the GTAA. The goal is to provide airfields with the ability to deliver truly proactive surface management by comparing the rate of change in surface defects over relatively short time periods. PCI scoring which offers a point in time snapshot of the state of the airfield, but lacks the frequency to provide meaningful data to support rapid mitigation of emerging defects.

Illuminex AI CEO Brian Freed added "the collaboration represents a milestone in AI-driven infrastructure management, with applications extending to roads and other public assets, creating a unified, predictive maintenance framework."

By making previously invisible details measurable and actionable, this collaboration shows how airfields can evolve into smart, connected, predictive operational environments, setting a model for airports worldwide.

AI, Digital Twins, and Innovation Take Center Stage in Warsaw

This fall, the International Association of Airport Executives (IAAE) North American / Central Europe Airport Issues Conference in Warsaw, Poland, brought together government officials, industry leaders, and airport operators to explore the future of global airport innovation.

Darren S. Large A.A.E., ACE from Morristown Airport (KMMU), presented our digital twin during his panel discussion regarding emerging digital tools for airfield simulation.

The focus was clear: AI, digital twins, and simulation technology are becoming essential tools for addressing operational challenges, improving safety, and optimizing airport efficiency. In sessions filled with lively discussions and demonstrations, attendees examined how emerging technologies can enhance airfield operations, support regulatory compliance, and help teams make faster, smarter decisions.

A highlight of the conference was the presentation by Darren S. Large A.A.E., ACE from Morristown Airport (KMMU), who discussed our digital twin as a developing tool for simulation. He highlighted its potential to model operational scenarios, evaluate risks, and explore a wide range of applications, demonstrating how this technology could support smarter, more informed decision-making on the airfield as it continues to evolve.

The energy in the room reflected a global momentum toward smarter, more connected airports. Delegates shared experiences and exchanged ideas on integrating AI into airside operations, emphasizing the importance of pilot programs, real-world testing, and data-driven decision-making. The conference underscored that AI's value is realized not just through technology, but through operational expertise, collaboration, and structured deployment.

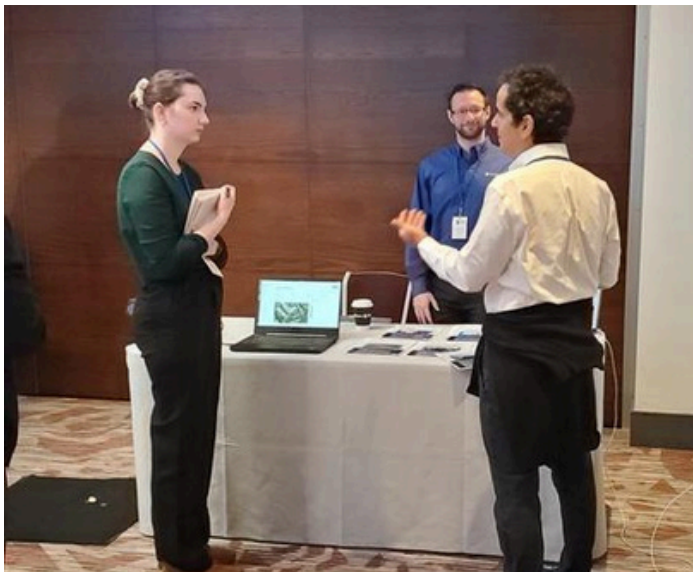
For those exploring AI in airfield operations, the Poland conference was a reminder that the future of airport management lies in combining innovative technology with human judgment and operational rigor, creating smarter, safer, and more resilient airports worldwide.

AI in Airports: Insights from the UK Conference

On December 8 and 9, industry leaders gathered at the **AI in Airports Conference** in the UK, hosted by Airport World and the Egremont Group, to discuss artificial intelligence in airport operations. While most of the focus was on terminal-side applications, Illuminex AI was honored to highlight the opportunities for AI to transform airfield operations.

Daniel Connolly, CIO of Illuminex AI, spoke about the unique challenges and opportunities for AI on the airside. He shared insights from deploying FOD^AI in complex, data-scarce environments, demonstrating how airside teams can detect foreign object debris, monitor infrastructure, and make faster operational decisions without disrupting ongoing activities. His presentation highlighted both the practical constraints and the real-world benefits of AI in supporting safety and operational efficiency.

Leveraging AI in challenging operational environments, can deliver tangible safety and efficiency improvements for airside operations and asset management.



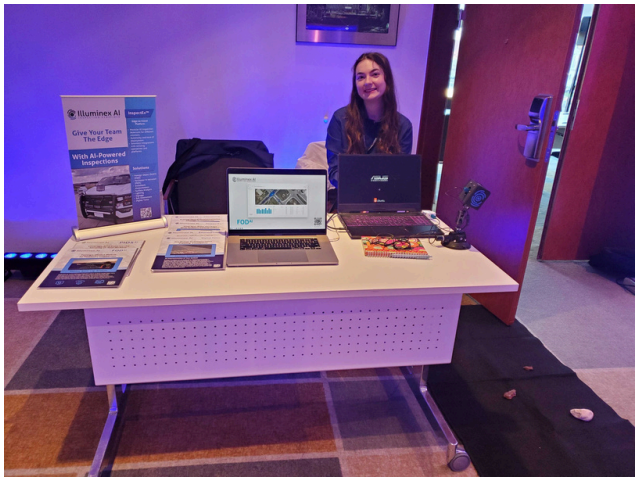
The conference underscored that AI in airfield operations requires careful integration and real-world testing. Attendees discussed how predictive and computer vision tools can enhance safety, compliance, and resilience, and emphasized that technology must complement human judgment to achieve reliable, actionable insights.

For airport operators, the UK conference reinforced the importance of pilot programs, structured testing, and data-driven decision-making when introducing AI to airside operations. Daniel Connolly's presentation offered a clear roadmap for leveraging AI in challenging operational environments, demonstrating that airside innovation can deliver tangible safety and efficiency improvements.

Look Forward to Seeing You

NEC AAAE Airports Conference — Hershey, PA | March 2–4, 2026 at the Hershey Lodge, Fortbrand Services booth

SEC AAAE Annual Conference — Savannah, GA | March 29–April 1, 2026 at the Hyatt Regency Savannah, Fortbrand Services booth



Want to Learn More?

At Illuminex AI, we always enjoy connecting with industry experts to explore challenges where we can apply our cutting-edge expertise and innovative solutions. Whether you're an airfield operator looking to optimize operations with AI-driven tools, a vendor interested in collaborative integrations, a strategic partner seeking synergistic opportunities, or a venture capital investor eager to discuss our vision for the future of aviation technology, we'd be happy to set up a call, just email us at info@illuminex.ai.

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