FALL 2025, ISSUE #2

Aerial Evolution Magazine

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Aerial Evolution Association of Canada

Association pour l'Évolution Aérienne du Canada

2025 AEAC ANNUAL CONFERENCE

NOVEMBER 4-6, 2025

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Contents

GREETINGS

FEATURE STORIES

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- **Multiple Sensor Integration:** Integrate sensors into your RPAS platform faster deployment and increased capability
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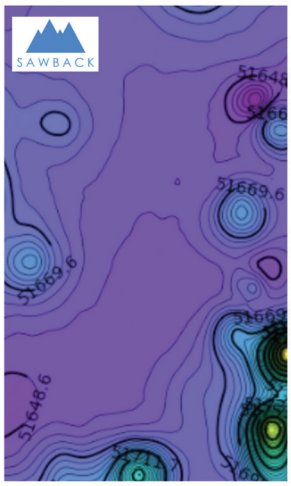

Magnetic data collected by RPAS and processed by EdgeFuse, showing buried Oil/Gas wells

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A Message from the Chair

Welcome to the second edition of the Aerial Evolution Association of Canada's (AEAC) national commercial drone magazine, *Aerial Evolution*. Our publication reflects the strength and maturity of Canada's remotely piloted aircraft systems (RPAS) community; where innovation, leadership, and collaboration are driving real-world results.

This year, we proudly celebrate the outstanding student teams who participated in the 2025 AEAC Student UAS Competition held in Medicine Hat, Alberta. The teams' wildfire detection and response solutions showcased the future of RPAS in Canada, which is making an intelligent, agile, and built for real-world impact.

Across the country, drones have become essential tools in industries such as mining, oil and gas, construction, critical infrastructure, and forestry, and are transforming how we inspect assets, manage resources, and respond to challenges. AEAC plays a central role in supporting this shift through advocacy, networking, and knowledge sharing.

I invite you to join us at the AEAC 2025 Annual Conference and Exhibition, taking place November 4-6, 2025, at Edmonton International Airport. With the theme *'Elevating Aerial Innovation – Canada's Leadership in the Evolving Global Drone Ecosystem,'* this event is Canada's essential gathering for drone professionals, regulators, and technology leaders. Don't miss the live demos, Beyond Visual Line of Sight (BVLOS) updates, strategic workshops, and the relationships that drive our industry forward.

Let's connect in Edmonton – and keep building what's next.

About AEAC

AEAC is the nation's premier industry association dedicated to advancing the commercial drone and RPAS sector. With a legacy spanning more than 20 years, AEAC (formerly the Unmanned Vehicle Systems Canada and Unmanned Systems Canada) has been at the forefront of RPAS innovation, policy development, and national collaboration both in Canada and on the global stage.

AEAC represents a dynamic and growing community of industry leaders, researchers, educators, and innovators committed to shaping the future of RPAS technology in Canada. Our members operate in a wide range of sectors where drones are making a major impact, including mining, oil and gas, construction, critical infrastructure, forestry, and public safety. These industries rely on drones for safer inspections, improved data collection, and operational efficiency. Together, we work to ensure that Canada remains a global leader in aerospace innovation, sustainability, and safety.

At AEAC, we advocate for policies that support the responsible integration of drone technology into various industries, fostering innovation, economic growth, and global competitiveness. Through our quarterly meetings with Transport Canada, our members have direct access to regulators, ensuring their voices are heard in shaping policies that directly impact their business operations. We also provide unparalleled networking opportunities through events like Canada's only national drone conference, where members engage face-to-face with government officials, regulators, industry leaders, and future collaborators.

Innovation knows no boundaries

We are proud to support the next generation of innovators through initiatives like the annual Student UAS Competition, connecting members with top talent from 19 leading Canadian universities and colleges.

Jordan Cicoria
Chair, AEAC

AEAC continues to bring together passionate individuals from all walks of life – united not by labels, but by their ideas, their work, and their drive to build the future of RPAS in Canada.

Go to www.aerialevolution.ca/join to join AEAC today and become part of this transformative journey. Together, we can harness the power of drone technology to drive innovation, foster sustainability, and ensure Canada's leadership in the global aerospace industry.

Land acknowledgement

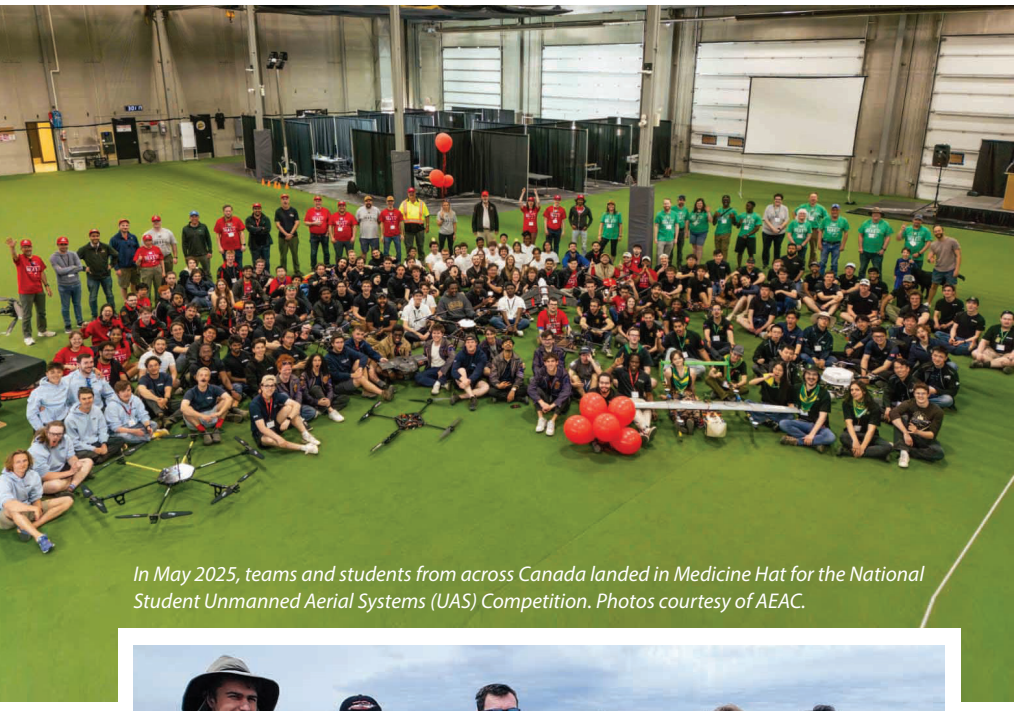
AEAC acknowledges that our work takes place on traditional territories of Indigenous Peoples across Canada. We are thankful for the Traditional Knowledge Keepers, the ancestors who came before us, and the youth from all Nations who inspire us on our shared path toward Reconciliation.

FEATURE

Igniting Innovation:

2025 AEAC Student UAS Competition Lands in Medicine Hat

By Declan Sweeney, Executive Director, Aerial Evolution Association of Canada



In May 2025, teams and students from across Canada landed in Medicine Hat for the National Student Unmanned Aerial Systems (UAS) Competition. Photos courtesy of AEAC.

Phase I First Place winner: UVic Aero – University of Victoria Team.

In May 2025, 15 university teams and more than 175 students from across Canada touched down in Medicine Hat, Alberta, for the Aerial Evolution Association of Canada (AEAC) 16th Annual National Student UAS Competition. With 19 schools registered and 15 completing Phase II, this event marked a full return to national scale and showcased the next generation of Canadian remotely piloted aircraft systems (RPAS) talent.

The 2025 challenge asked students to develop autonomous wildfire detection and response systems – a scenario rooted in one of the most pressing issues facing Canada today. The competition format included two phases: a written design report (Phase I) and an operational flight demonstration (Phase II), with the goal of simulating a real-world wildfire emergency and demonstrating how drone systems could detect fire hotspots, assess risk areas, and deliver water to targeted zones.

Hosted at the Len Young Memorial Airfield by the Medicine Hat RC'ers, the field demonstration had teams test their platforms in a tightly scripted mission profile. Task 1 focused on hotspot detection using visual and IR cues, while Task 2 required aerial water delivery to simulated wildfire zones.

A two-phase national challenge

The AEAC Student UAS Competition is structured to reflect real-world project cycles. In Phase I, teams submit detailed design reports that outline their systems architecture, component integration, mission strategy, and safety protocols. These submissions are evaluated by an expert panel on innovation, feasibility, and completeness.

The Phase I winners for 2025 were:

- **First place:** UVic Aero – University of Victoria
- **Second place:** WARG – University of Waterloo
- **Third place:** UTAT UAS – University of Toronto

These three teams demonstrated forward-thinking design strategies that balanced innovation with practical execution. Their concepts laid a strong foundation heading into the operational demonstration phase in Medicine Hat.


Phase II First Place winner: WARG – University of Waterloo Team.

Phase II then moves from paper to prototype, as teams conduct live flight operations that simulate wildfire reconnaissance and aerial water delivery. The mission involved two complex tasks: mapping infrared (IR) fire hotspots with georeferenced KML files and autonomously retrieving and releasing water over designated zones.

Celebrating the top performers

After months of design, fabrication, and flight testing, three teams rose to the top in Phase II flight performance:

- **First place:** WARG – University of Waterloo
- **Second place:** UBC UAS – University of British Columbia
- **Third place:** Blackbird UAV – Carleton University

Their success reflects technical mastery, mission readiness, and operational efficiency – all essential skills for Canada's evolving RPAS sector.

Special recognition awards

Four additional teams were honoured for standout qualities that embody the spirit of AEAC's competition:

- **Innovation Award (*Sponsored by McElhanney*):** UTAT UAS – University of Toronto
- **Pip Rudkin Memorial Award for Perseverance (*sponsored by Stinson Aerial Services Inc.*):** McGill Drones and Vertical Flight Society
- **Judges Award (*sponsored by QinetiQ Target Systems*):** UVic Aero – University of Victoria
- **Team Spirit Award (*sponsored by Lockheed Martin Canada Skunk Works*):** Zenith – Polytechnique Montréal

Each of these awards reflect ingenuity, resilience, and teamwork – qualities that extend beyond any flight line or design brief.

The challenge in detail

This year's mission was themed '*Protecting Lives, Advancing Technology: Pioneering Autonomous Systems for Wildfire Response*' and it tested the limits of the teams' creativity and coordination. In Task 1, teams visually located simulated smoke columns and IR hotspots, identifying fire sources and logging coordinates into KML geospatial files. In Task 2, teams were challenged to autonomously pick up and release water over specific fire zones with precision.

These tasks mirrored real conditions faced by emergency responders, highlighting how student-designed RPAS systems could be deployed in forestry, national parks, and remote regions threatened by fire.

Medicine Hat: A host community of innovation

The 2025 competition was made possible by the incredible support of community partners in Medicine Hat and Southeast Alberta. AEAC's national organizing committee worked closely with:

- Community Futures Entre-Corp
- APEX Regional Innovation Network of Southeast Alberta
- Foremost UAS Test Range
- Medicine Hat College
- Medicine Hat Economic Development
- Medicine Hat RC'ers Flying Club
- Prairie Rose School Division
- Super T Aviation
- Tourism Medicine Hat

Together, these organizations created a vibrant and welcoming experience for students and visitors alike. Many attendees were visiting Alberta for the first time and were greeted with genuine Western hospitality and a deep sense of pride in the region's growing aerospace sector.

Partners and sponsors who made it possible

The success of the AEAC Student UAS Competition is grounded in strong industry and institutional support. This year's event was proudly supported by the following:

- NAV CANADA
- DND - Innovation for Defence Excellence and Security (IDEaS)
- Community Futures Entre-Corp
- Calgary Economic Development
- McElhanney
- QinetiQ Target Systems
- Stinson Aerial Services Inc.
- Lockheed Martin Canada Skunk Works
- ARA Robotique Inc.
- Canadian UAVs
- UVA Dynamics Inc.
- Landing Zones Canada
- AIRmarket
- Threshold UAV
- NGC Aerospace
- ComQuest Ventures LLC - SIMNET

This collective support enabled AEAC to deliver a world-class competition experience and offered sponsors the chance to engage with future talent and showcase their leadership in the RPAS sector.

Building the future of RPAS in Canada

The AEAC Student UAS Competition continues to play a pivotal role in Canada's innovation pipeline. Each participating team operates as a mini company – managing logistics, budgeting, technical design, and risk management. These students leave the competition with real-world skills and industry connections that prepare them to lead in Canada's growing commercial drone industry.

The competition also reinforces AEAC's broader mission: to bring together operators, researchers, manufacturers, and service providers in a shared vision of aerial evolution.

Looking ahead: Ottawa 2026

As we close the book on Medicine Hat, excitement is already building for next year's competition at Area X.O in Ottawa, Ontario, Canada's premier research and development complex for connected, autonomous, and aerial systems. The 2026 challenge promises even more complexity, more integration with real-world airspace management tools, and deeper collaboration between the students and industry.

Get the full recap

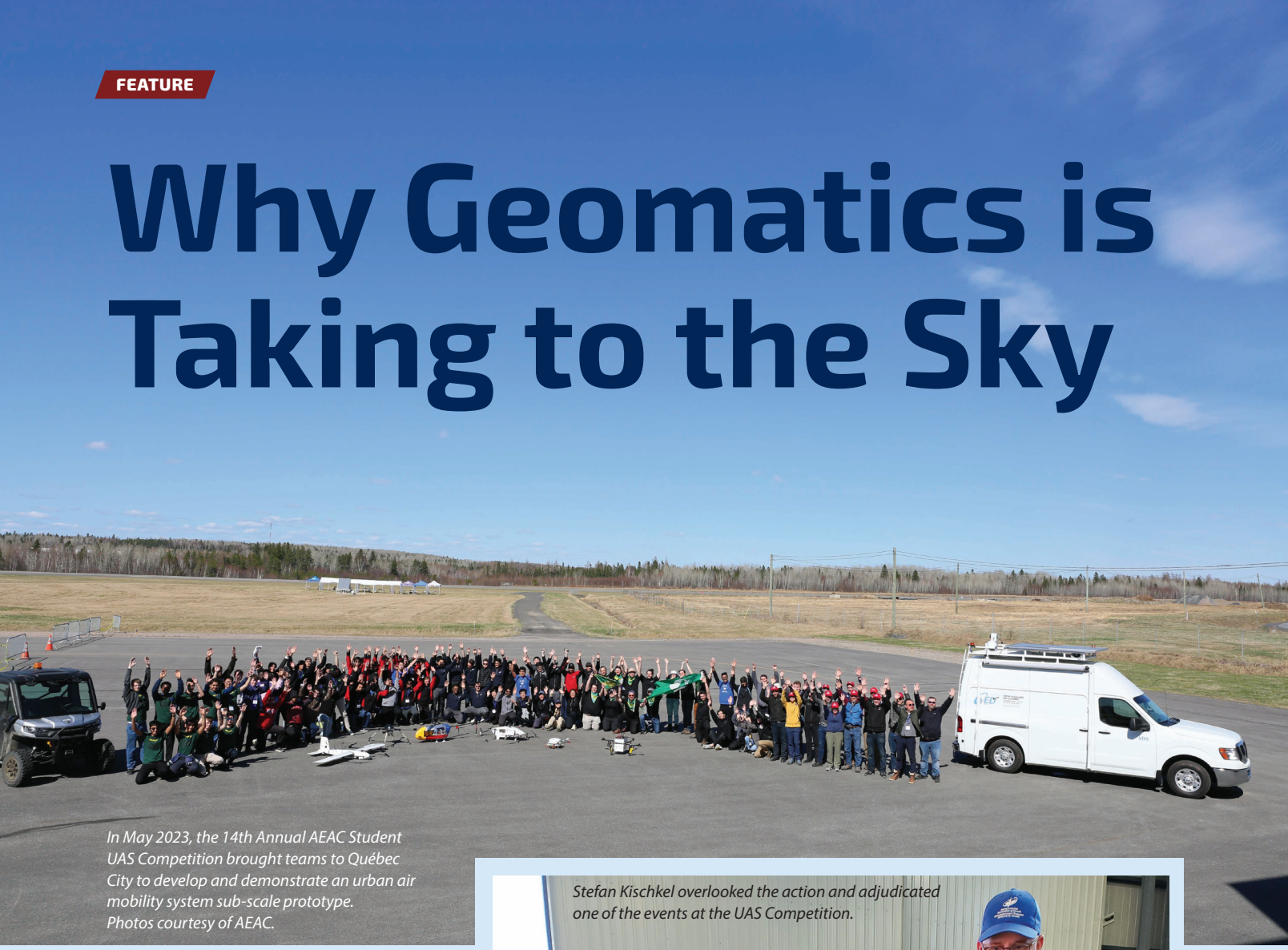
The full post-event booklet – complete with team spotlights, sponsor profiles, and event photography – is available online at https://bit.ly/2025StudentCompetitionBooklet.

We thank all students, volunteers, judges, and community members for making 2025 a landmark year. Let the countdown begin for 2026 in Ottawa!

Declan Sweeney leads AEAC as Executive Director, bringing over two decades of experience in RPAS policy, operations, and industry strategy. A recipient of the Pip Rudkin Award for individual achievement, he is a passionate advocate for education and mentorship –championing inclusive pathways to build a skilled national talent pipeline and empower the next generation of drone professionals to lead Canada's evolving aerospace sector.

FEATURE

Why Geomatics is Taking to the Sky



In May 2023, the 14th Annual AEAC Student UAS Competition brought teams to Québec City to develop and demonstrate an urban air mobility system sub-scale prototype. Photos courtesy of AEAC.

Stefan Kischkel overlooked the action and adjudicated one of the events at the UAS Competition.

By Andrea de Vries, Marketing Specialist, Cities & Communities, McElhanney

Like many drone enthusiasts, Stefan Kischkel remembers the time when folks would build their drones in garages with parts ordered from online mail-order catalogues – and nobody concerned themselves with what happened next.

"It really was the wild west for drones," remembers Kischkel.

During those early days, Kischkel was racking up hundreds of survey and mapping projects in roles that got his hands on every kind of data collection and processing tool available, from LiDAR (Light Detection and Ranging) and total stations to geographic information systems (GIS) and project automations.

After more than a decade in the field, however, Kischkel zeroed in on a tool with an undeniable emerging stake in the survey

and mapping geomatics landscape: remotely piloted aircraft systems (RPAS).

In 2021, Kischkel became the RPAS Program Coordinator at McElhanney Ltd., an engineering consulting firm in Western Canada.

He says, "My immediate concern after moving into that role was to get involved with an industry body that was building consensus around drone operations. And that's when I came across this national student competition."

A student competition for remotely piloted aircraft

Alma is an agricultural and recreational hub on the shores of Lac Saint-Jean, just over two hours from Québec City. In May 2023, brimming sprinter vans and rental cars converged in Alma for the 14th Annual AEAC (Aerial Evolution Association of Canada) Student UAS (Unmanned Aircraft Systems) Competition. Teams from as far west as Vancouver packed their soldering guns, circuit boards, and brightest minds to resolve the competition's 2023 challenge: to develop and demonstrate an urban air mobility system sub-scale prototype.

Kischkel found himself in the middle of the action, adjudicating one of the events. The competition specifics didn't relate to Kischkel's survey and mapping work at McElhanney, but the bigger context did; Kischkel had found the industry body that was building consensus around drone operations in Canada. At the same time, he'd found the people that held the future of Canada's RPAS systems in their bright minds... and in the backs of their sprinter vans.

"AEAC's events, working groups, and committees keep members at the forefront of standards and regulation development, and the annual student competition connects that body of knowledge with the next generation of RPAS business leaders."

– Declan Sweeney, AEAC

A voice at the table

Participating as a judge at the student competition was just the beginning of AEAC involvement for Kischkel, and he quickly integrated further into the organization. For the past 20 years, the association had dedicated itself to the protection and representation of Canada's RPAS community interests. At the AEAC table, Kischkel found himself beside drone manufacturers, regulators, and other service providers.

"We're here to bring all these users together to share ideas without taking away individual competitive advantages, and to make a global impact with Canadian airspace," says AEAC Executive Director, Declan Sweeney. "To that end, AEAC's events, working groups, and committees keep members at the forefront of standards and regulation development, and the annual student competition connects that body of knowledge with the next generation of RPAS business leaders."

For Kischkel, being at the AEAC table means having a voice in how the standards and regulations dictating McElhanney drone usage are developed.

"We solve all kinds of classic geomatics challenges with drone technology at McElhanney," says Kischkel. "Because of our involvement

Continued on page 10

with AEAC, we know that we're developing our processes, and the surrounding regulations, so they function at the highest level."

AEAC involvement also means that Kischkel is plugged into the most promising stream of up-and-coming RPAS business leaders in the country.

Reflecting on his 2023 adjudicating experience, Kischkel recounts, "There are 230 young technical minds that attend this, from computer science majors to business majors, all performing different roles as part of their competition team. There's an immediate impact when you're there in person and can say, 'look, I work at a multidisciplinary engineering firm called McElhanney and we use a lot of drones across every geomatics application imaginable.' It makes a connection that helps students see a career opportunity that uses their major and their university experience in a different way."

The future is out of sight

The students competing in Alma, Québec in 2023 sent several different drone prototypes into the air to meet that year's challenge. There were crashes, payload failures, and programming errors. There were also unequivocal successes. But every flight was limited by a parameter beyond their control – visual line of sight.

Today, the frontier of RPAS is headed places drone operators have never seen, quite literally. A world where operators can fly a drone beyond their visual line of sight (referred to as Beyond Visual Line of Sight or BVLOS) remains out of reach for all but the most well-funded and savvy drone service providers.

Establishing broad access to commercial BVLOS flights will open possibilities drone service providers like Kischkel are itching to explore.

"We know that using drone technology reduces our carbon footprint and helps us capture more comprehensive and accurate data on everything from volumetric earthworks projects to constructability assessments," says Kischkel. "And we know that there are even more projects just waiting for drone application as soon as BVLOS is made more accessible."

AEAC connected Kischkel with AirMarket, an Alberta-based organization aiming to unlock BVLOS airspace for drone operations across Canada. Within AirMarket, Kischkel works alongside service providers, regulators, and technology suppliers to run trials that generate data on BVLOS flights. Working shoulder-to-shoulder with users across the business cycle remains important in the Canadian drone industry; this is something AEAC has always known.

As Sweeney says, "If you don't have the end user community involved, then you'll never know what they know. They know their business best. At the end of the day, we all must work together to provide something that is going to work for everybody."

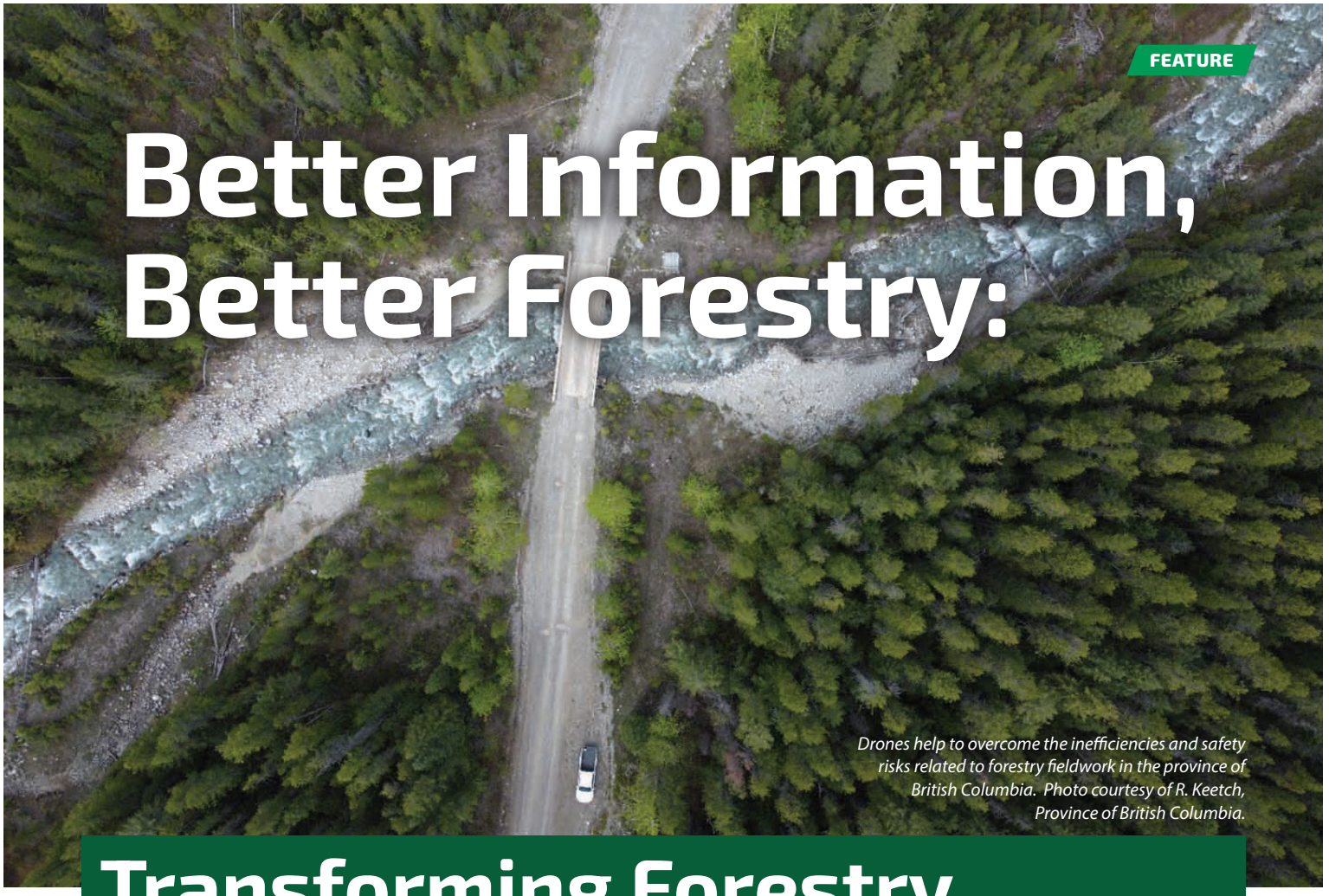
The future was in Medicine Hat

McElhanney was back at the 16th Annual AEAC Student UAS Competition in May 2025, this time as a sponsor of the Innovation Award. 2025's event was hosted in Medicine Hat, Alberta, making the competition more accessible to students from Central and Western Canada. Participants showcased their prototypes in actual flight scenarios to demonstrate automated UAS first response to small-scale wildfires.

Kischkel is looking forward to another year of progress with AEAC. There are regulations to contribute to, BVLOS airspace to unlock, and future drone operators to mentor and learn from. The survey and mapping geomatics landscape is looking pretty good from up here in the sky.

Andrea de Vries is a marketing strategist and content writer with McElhanney. Her work focuses on McElhanney projects and people that build a world for future generations in city and community environments. Andrea lives on Gidimt'en-Bear Wolf Clan territory, home of the Witsuwit'en Nation since time immemorial.

Better Information, Better Forestry:



Drones help to overcome the inefficiencies and safety risks related to forestry fieldwork in the province of British Columbia. Photo courtesy of R. Keetch, Province of British Columbia.

Transforming Forestry Fieldwork in British Columbia

By Matt Sakals, PhD, PGeo: Provincial Drone Specialist and Senior Research Geomorphologist, Province of British Columbia

Forestry fieldwork in British Columbia has traditionally been fraught with inefficiencies and safety risks due to the rugged, remote terrain that defines much of the province. Field crews often face exposure to terrain hazards, dangerous trees, wildlife, and the constant risk of slips, trips, and falls. On top of safety concerns, there are significant costs associated with accessing remote sites; whether by helicopter or through time-consuming and resource-draining surface methods. Additionally, conventional in-person inspections may lead to assessments of low-priority areas, while more critical sites are overlooked. This inefficient field reconnaissance not only hampers data collection but also delays decision-making and increases operational costs, all of which burden the forest sector as it contends with a changing climate.

In response to these challenges, the Government of British Columbia is increasingly turning to drone technology as a safer, more efficient solution for essential forestry operations. Drones are enhancing data collection, improving communication, and streamlining decision-making across the sector.

The advantage of drones in forestry

Staff and managers within the natural resource ministries of the Government of British Columbia, including the Ministries of Forests; Water, Land and Resource Stewardship; Mining and Critical Minerals; Environment and Parks; Energy and Climate Solutions; and Agriculture and Food, are discovering the benefits of drone technology. Even basic drone operations can significantly expand the situational awareness of field staff. For example, drones can increase the realm experienced by field staff from 10 to 75 meters (depending on forest and terrain characteristics) to 100 to 1500 metres. This enhanced awareness enables field crews to better target their efforts, maximizing efficiency while minimizing exposure to hazards.

Drone-based oblique imagery offers another advantage; it helps convey the state of field conditions to colleagues back in the office, providing a shared visual reference. This shared perspective improves alignment between managers and field staff on key issues, facilitating better coordination and communication.

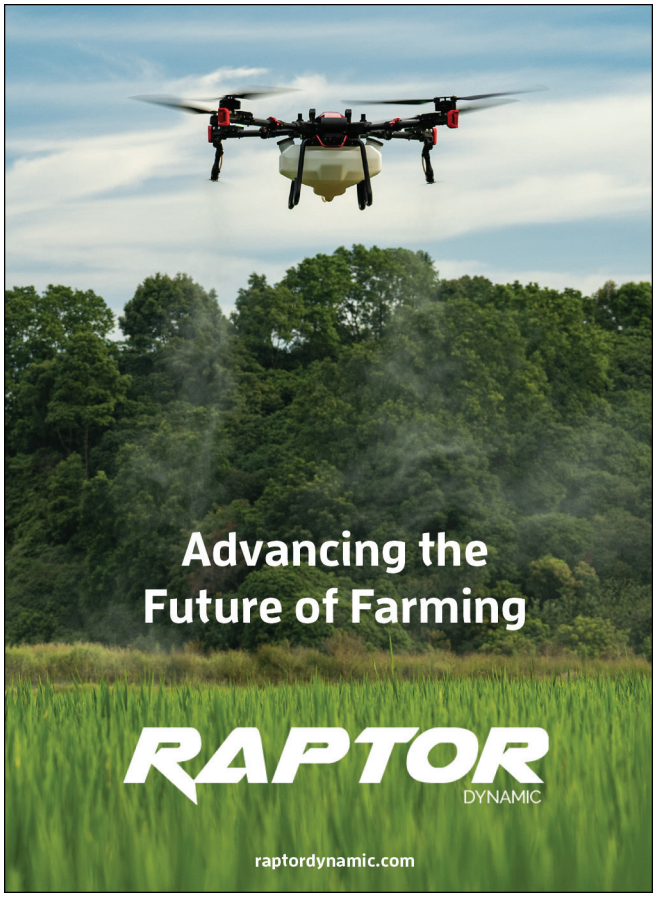
Micro drones, due to their ease of transport and lower cost, are the preferred platform for many applications. In the simplest drone operations, staff are using these pocket-sized drones within visual line of sight (VLOS) and below 400 feet above ground level (AGL) to boost productivity.

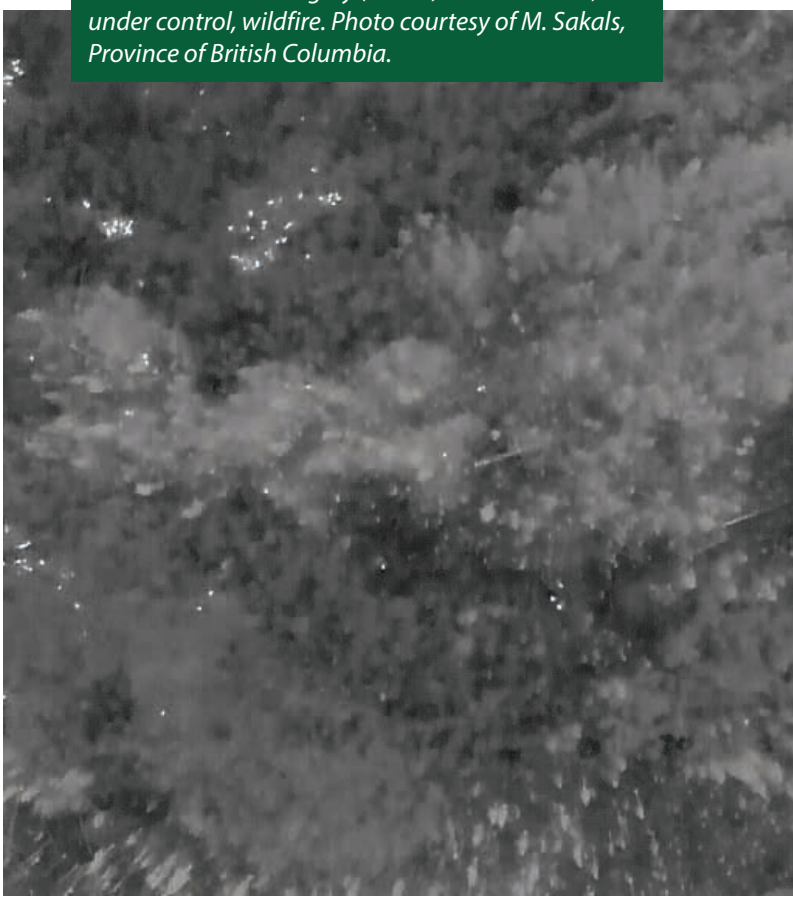
For instance, engineers can evaluate road alignments and critical elements like the skew of bridges more quickly and cost-effectively than traditional methods. Compliance checks are also more thorough, as aerial perspectives allow staff to gather evidence of potential infractions related to environmental and forest regulations.

While micro drones are the primary tool for most operations, more complex flights are also part of the equation.

Through the Natural Resource Ministries Drone Program, staff gain the expertise needed to operate micro drones beyond visual line of sight (BVLOS) and above 400 feet AGL in select environments. This requires significant knowledge of airspace, aerodrome operations, weather, human factors, and more. Among these, aviation communications are crucial. The ability to communicate effectively to maintain aviation safety is paramount. With knowledgeable pilots, capable technology, permissive regulations, and quiet airspace, drones are achieving impressive results. Under ideal conditions, orthophotographs and three-dimensional models with a ground sample distance of 15 centimetres can be collected

A comparison of RGB imagery (upper left) and thermal infrared imagery (below) over an active, but under control, wildfire. Photo courtesy of M. Sakals, Province of British Columbia.





at a rate of 150 hectares per hour. This meso-scale forest data facilitates detailed forest harvest planning, supporting applications ranging from watershed management to monitoring individual trees for insect infestations.

The future of drones is here

Advanced applications are driving further innovation. Drone-based LiDAR (Light Detection and Ranging) is being used to identify areas vulnerable to landslides after wildfires. LiDAR payloads are also used to evaluate forest road construction, offering a much more point-dense characterization than traditional survey methods.

The use of thermal infrared imagery is growing as well. In the later stages of wildfire suppression, BC Wildfire utilizes drones to locate 'hotspots' – areas where the fire continues to smolder and may re-ignite. Drones help reduce the need for hazardous, time-consuming patrolling by crews, who face the risks of falling trees, ash inhalation, and slips, trips, and falls. A single drone scan can replace hundreds of hours of patrolling or several hours of less safe, more costly, helicopter-based scans.

Drone technology is also making strides in forest wildlife management. For example, evaluating elk calving success can be challenging with traditional rotorcraft due to the need for close proximity and the disruption caused by the associated noise and wind. A drone with a thermal payload is far less intrusive, allowing biologists to remotely assess individual cows and calves shortly after birth through a stable, zoomed-in image.

These innovations are redefining the nature of forestry fieldwork – enhancing field time, improving data collection, and creating efficiencies that make the work safer, more cost-effective, less carbon-intensive, and more responsive to real-time information needs. These all contribute towards the province's goals for sustainable forest stewardship.

Looking ahead, the Natural Resource Ministries Drone Program continues to expand, currently with 300 certified pilots-in-command and more than 250 aircraft. Drone applications also continue to evolve, with new ideas being conceived and tested regularly. In the future, we envision drones playing a more active role in wildfire management, moving beyond reconnaissance to tasks like transporting fuel and equipment, or even helping to douse flames (just as in this year's Aerial Evolution Association of Canada's student competition!). Forestry is a broad field, and the dedicated professionals within the British Columbia public service are continuing to innovate, applying drone technology to their specific areas and pushing the boundaries of sustainable forest management.

We invite forestry professionals, policymakers, and innovators to explore the transformative potential of drones. Join the Aerial Evolution Association of Canada to connect with a community of experts, share knowledge, and help lead the next phase of technological evolution in natural resource management.

Together, we can build a safer, smarter future for forestry – one flight at a time.

Matt Sakals works for the B.C. Ministry of Forests in Smithers, in northwest British Columbia. He co-leads British Columbia's Natural Resource Ministries Drone Program and conducts research on drone technology and how land use affects earth surface processes. Matt is especially passionate about using drones to gather data on landslides, helping to improve land management and public safety.

FEATURE

Beyond the Nest:

Like a bird of prey, the RoBird gently guides birds away from danger zones as a safer, quieter alternative to other bird mitigation solutions. Photos courtesy of AERIUM Analytics.

How Drones Are Reshaping Wildlife and Habitat Management

By Jordan Cicoria, President and CEO at AERIUM Analytics and Chair of Aerial Evolution Association of Canada (AEAC)

Wildlife management has traditionally been reactive, focused on solving problems after they arise. In industries like aviation, agriculture, energy, and mining, this often leads to costly interventions, habitat disruptions, and increased safety risks for workers.

But as industries face more pressure to balance environmental responsibility with operational safety, traditional methods might have some limitations.

Today, drones are changing how we think about wildlife and habitat management. By shifting from reactive methods to proactive, data-driven strategies, drones offer a smarter, safer, and more sustainable way forward—protecting both people and ecosystems.

Drone solution: A three-step approach to smarter wildlife and habitat management

Managing wildlife risks around industrial sites takes more than just quick fixes. It's about understanding the full picture and having the right tools to act at every stage. That's why we approach wildlife and habitat management through three connected steps: monitor, prevent, and respond.

Step 1: Monitor

It starts with observation. Drones equipped with high-resolution cameras and advanced sensors allow us to quietly track wildlife, where they nest, feed, or migrate, without disturbing them or putting people at risk.

This monitoring can include wildlife sweeps, habitat assessments, and habitat evaluations as part of the early planning process. This is especially valuable in places like wetlands, tailings ponds, and dense forests.

Step 2: Prevent

Prevention involves two distinct strategies that work together:

- **Vegetation management:** Using monitoring data, drones are deployed to precisely remove or treat vegetation

RoBird chasing birds during the Weir reconstruction project in Churchill, Manitoba.

Photo taken during the Edmonton International Airport's operations.

that attracts wildlife near high-risk areas like airports, mines, or energy corridors.

- **Deterrence:** Drones, such as RoBird™, are also used to mimic natural predators, encouraging wildlife to avoid sensitive areas before problems occur.

Vegetation management and wildlife deterrence, complement each other to reduce risks early in the process.

Step 3: Respond

Even with prevention, wildlife can still enter risky areas. That's where drones like RoBird come in. RoBird looks and flies like a bird of prey, gently guiding birds away from danger zones using their natural instincts, providing a safer, quieter alternative to loud deterrents or netting.

Together, this entire process offers a smarter, proactive way to manage wildlife risks, protecting both people and wildlife.

Impact and business case

This three-step approach is already being applied successfully in some of Canada's most challenging environments.

- At Canada's fifth busiest airport, Edmonton International Airport (YEG), RoBird has been central to daily wildlife operations since 2017. Through close collaboration, AERIUM Analytics and EIA became the first in Canada to formally integrate drones into airport operations. The result: an 86 per cent bird dispersal rate, with RoBird dramatically reducing bird strike risks and setting a new standard for airport wildlife management
- In the energy sector, our partnership with Imperial Oil (a subsidiary of ExxonMobil) proved just how effective RoBird can be. Prior to its use, the site saw three times more bird landings on critical infrastructure. After deploying RoBird, bird presence dropped significantly supporting Imperial Oil's environmental stewardship goals and contributing to their Clean Resources Innovation Network (CRIN) project.
- In Churchill, Manitoba, wildlife management near the historic weir required balancing safety and conservation. Over 400 drone flights were completed to monitor and manage bird activity with minimal disruption. The project successfully protected migrating birds and improved safety near river infrastructure, showing that drone-based solutions can work in sensitive, remote areas. Bird activity in the target area was almost nonexistent, while just 300 meters away, thousands of birds were still gathering.

These projects show how combining drone-based monitoring, vegetation management, and targeted deterrence can help manage wildlife risks more effectively.

As environmental expectations grow, industries adopting newer approaches will be better prepared for the future. Drone-based wildlife and habitat management offers a practical way to focus on prevention, precision, and long-term solutions over temporary fixes.

So, for organizations looking to stay ahead, now is the time to explore integrated drone solutions. AEAC remains one of the best places to connect with innovators, learn from experts, and shape the future of RPAS technologies in Canada.

Jordan Cicoria, President & CEO at AERIUM Analytics and Chair of Aerial Evolution Association of Canada. With a background in drone operations, airspace integration, and regulatory advocacy, he focuses on advancing RPAS technologies to support safe, efficient, and sustainable operations across Canada's airport, energy, and resource sectors.

Important Links:

You can learn more about the drone advantage for vegetation management by visiting https://aeriumanalytics.com/the-drone-advantage-in-vegetation-management-part-1/.

Learn more about the successful Churchill's study case here: https://aeriumanalytics.com/churchills,weir,innovative,wildlife,management/

If you'd like to stay updated on AERIUM Analytics' operations and success stories, make sure to follow the company on LinkedIn: https://www.linkedin.com/company/aeriumanalytics/?viewAsMember=true

FEATURE

Hide 'n Seek in Industrial Environments:

Using Drones to Change the Game in Corrosion Detection

By Dawn Zoldi, CEO of P3 Consulting & Autonomy Global, with support from Courtland Penk, President, Osprey Integrity

The morning sun glints off a maze of insulated pipes, tanks, and pressure vessels at a major energy facility. Instead of the usual army of workers assembling scaffolding, a small team unpacks a drone. Within minutes, the drone is airborne, gliding silently along the asset's surface, its sensors capturing both visible and invisible clues. In less than an hour, the inspection is done – no insulation stripped, no risky climbs, no production delays.

This isn't a vision of the future. It's happening now, thanks to a blend of ingenuity, technology, and a willingness to rethink old problems.

The hidden enemy: Corrosion lurking beneath

Corrosion under insulation (CUI) has long been the energy sector's silent saboteur. It hides beneath layers of insulation, quietly eating away at infrastructure, often undetected until disaster strikes. The global oil and gas industry loses an estimated $276 billion annually to corrosion, with CUI accounting for a staggering share of that sum.

Traditional inspection methods have always been a necessary evil – expensive, slow, and fraught with safety risks. But what if there was a better way?

Inspiration from Hollywood: The birth of a new approach

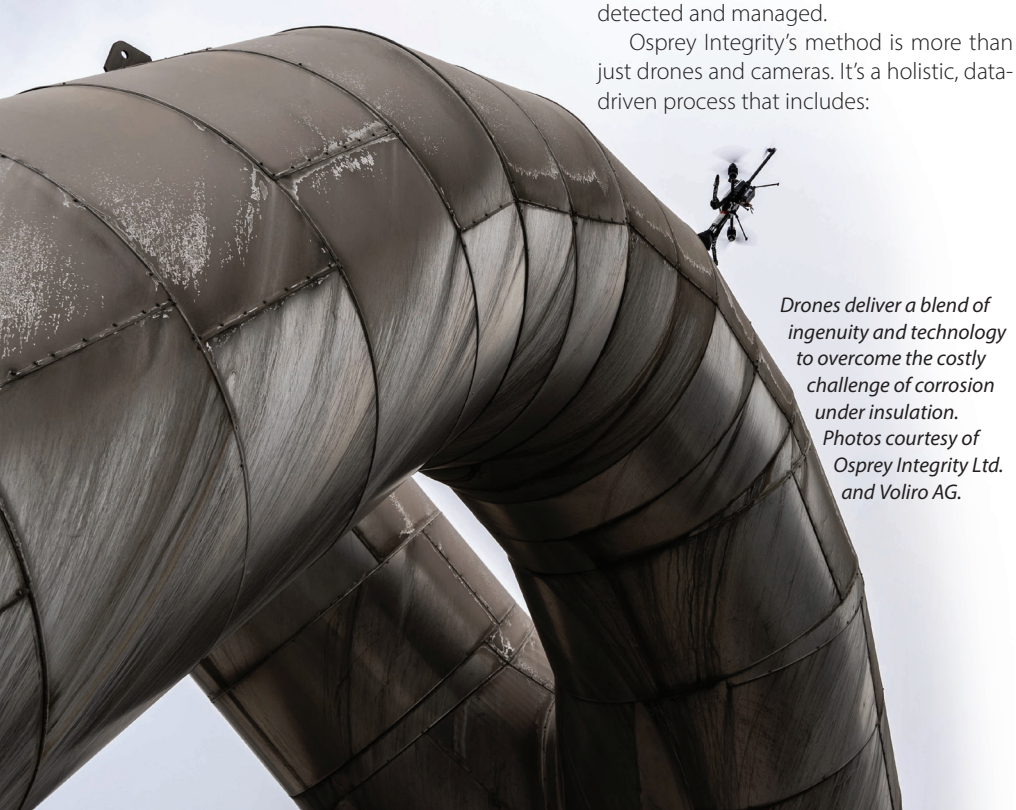
Sometimes innovation is found in the most unexpected places. For Osprey Integrity, it began with a client's offhand reference to the thermal vision portrayed in the 1987 Arnold Schwarzenegger movie, *Predator*.

The answer, it turned out, was yes – and then some.

A proof-of-concept drone flight over boiler seawater tanks, armed with thermal imaging, revealed problem areas that manual inspections later confirmed. This spark of inspiration set Osprey on a journey that would ultimately reshape how CUI is detected and managed.

Osprey Integrity's method is more than just drones and cameras. It's a holistic, data-driven process that includes:

- **Strategic targeting:** Each project begins with a review of asset history and operational data, zeroing in on likely trouble spots.
- **Dual-sensor inspections:** Drones equipped with both high-resolution and thermal cameras conduct comprehensive scans, day and night.
- **Layered data analysis:** Visual and thermal findings are cross-referenced with process data, filtering out false positives and focusing on real threats.
- **Precision quantification:** When anomalies are flagged, the Voliro-T drone, equipped with Pulsed Eddy Current (PEC) tools, measures metal thickness through insulation, providing actionable data without invasive procedures.
- **Digital collaboration:** All results are integrated into a digital platform, empowering clients to visualize, annotate, and manage asset health from anywhere.



Drones deliver a blend of ingenuity and technology to overcome the costly challenge of corrosion under insulation. Photos courtesy of Osprey Integrity Ltd. and Voliro AG.

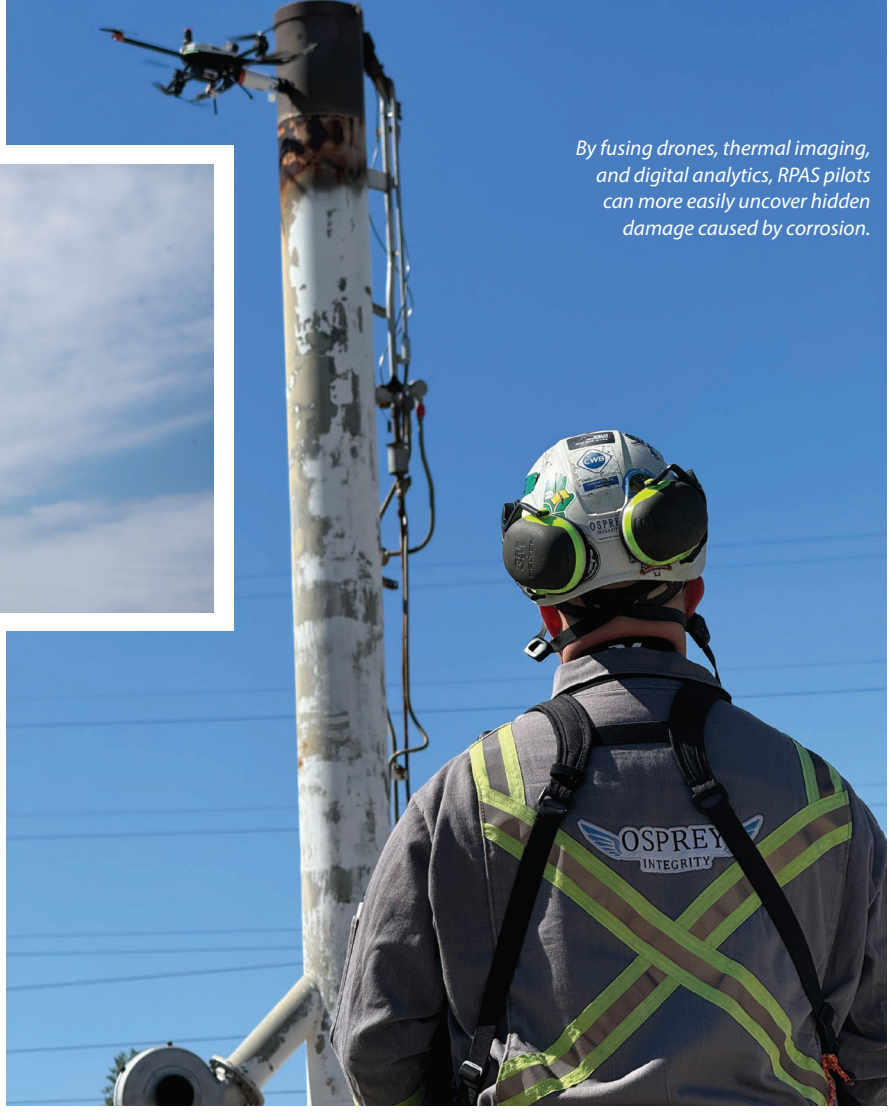
The ripple effect: What this means for the industry

For companies like Suncor Energy, the impact is profound, producing benefits such as:

- **Dramatic time savings:** What used to take days now takes less than an hour.
- **Cost reductions:** Drone inspections can slash costs by up to 90 per cent compared to traditional scaffolding.
- **Improved safety:** Less time at heights and hazardous areas means fewer accidents.
- **Smarter compliance:** Early, targeted detection helps operators stay ahead of regulations and avoid environmental incidents.

Osprey's 'fail fast, fail forward' mindset means each inspection – successful or not – feeds into a cycle of continuous improvement. The team is transparent about the limits of their technology: while drones excel on large-diameter assets, smaller

Traditional inspection methods tend to be expensive and potentially dangerous – factors the use of a drone for non-destructive testing mitigates.



By fusing drones, thermal imaging, and digital analytics, RPAS pilots can more easily uncover hidden damage caused by corrosion.

pipes still require traditional or robotic methods, and expert interpretation of thermographic data remains essential.

The big picture: A new era for asset integrity

As the energy sector faces mounting pressure to cut costs, improve safety, and meet tough environmental standards, the adoption of advanced inspection technologies is accelerating. Osprey Integrity's rapid evolution from a Canadian startup to a United States' industry partner is emblematic of a broader shift toward smarter, data-driven asset management.

The lesson is clear. In an industry where hidden threats can have catastrophic consequences, embracing new technologies isn't just smart – it's essential. By fusing drones, thermal imaging, and digital analytics, Osprey Integrity is helping operators see the unseen, act faster, and make better decisions.

Dawn M.K. Zoldi (Colonel, USAF, Retired) is a licensed attorney with 28 years of military and federal service and is the founder / CEO of P3 Tech Consulting. An internationally recognized expert in drone law and policy, she is also a podcast host, award-winning thought leader, author, and advocate for aerospace and emerging technology.

AeroVision's ANAVIA HT-100 is built for true BVLOS. Photo courtesy of AeroVision Canada.

Canada's New BVLOS Rules

By Kate Klassen, InDro Robotics & AEAC Board Member; with support from Brian Fentiman, BlueForce UAV, and Maxime LaPierre, FlytBox Aerial Solutions

Unless you are living under a rock, you most likely know by now that Transport Canada is rolling out new Remotely Piloted Aircraft System (RPAS) regulations. including the long-awaited regulations on Beyond Visual Line of Sight (BVLOS).

But what do these new regs actually include? And what other regulatory tidbits might you have missed? Read on for the highlights and some myth busting.

Highlights by certification category

On November 4, 2025, our now six-year-old *Part 9* will be tidied up. We're now seeing clarity around being able to have non-certified individuals fly while under supervision of certified ones, and fees for Special Flight Operations Certificates (SFOC) – that was nice while it lasted but we knew we were going to have to pay for that at some point.

There's a new kid on the certification block – *Level 1 Complex* or *L1C*. This is what you'll need if you want to fly routine (without SFOC) BVLOS. But I'm getting ahead of myself. Here are the highlights:

- **Microdrones:** less than 250 grams categorization still exists with most of the flexibility it has always had. To fly at advertised events, all Remotely Piloted Aircraft (RPA), including microdrones, require an SFOC. That means you need to get your application in with at least 30 working days notice.
- **Basic Certification:** Will receive minor cleanup but will be required to be a Visual Observer (VO) for Extended Visual Line of Sight (EVLOS) operations.
- **Advanced Certification:** Will allow you to fly EVLOS and Sheltered Operations and with heavier drones up to 150 kilograms, as well with increased distances from bystanders and manufacturer safety assurance requirements. I'm calling these baby BVLOS because you are operating the RPA where you as the pilot can no longer see it.

Understandably, they still have restrictions in place on where and when and how far the drones can operate, as well as crew required, but, if you're thinking you need BVLOS, double check if you can get your work done with these two without any new certification required.

- **Level 1 Complex Certification:** If you hold this certification and are operating under an RPAS Operating Certificate (RPOC), you are now certified for low risk BVLOS. You'll need to ensure you meet the operational requirements, of course, including having a Detect and Avoid (DAA) system.

Low risk is defined as: uncontrolled airspace; outside of aerodrome environments; and typically keeping one kilometre from populated areas – although this distance depends on the weight of your drone, the manufacturer declaration, and population density.

Myth-Busters: Separating truth from fiction

Let's bust some of the myths we've spotted on social media and deliver the TRUE / FALSE verdict.

Myth one: I took ground school for my advanced, so I've already met my Level 1 Complex requirement.

FALSE. To meet the certification requirements for Level 1 Complex, you need 20-hours of instructor-led training on *TP*

15530, which is a new knowledge requirement document. Your advanced ground school was based on *TP 15263*. Like with Advanced, Level 1 Complex also requires passing a written exam and a flight review – new and improved with BVLOS components. Your flight reviewer will be looking for proof of ground school completion prior to beginning your flight review.

As a trainer, I hear a lot of frustration around this ground school requirement. But, let me tell you – after creating that 20 hours of training – I learned so much. When done right, the knowledge you'll gain is relevant, practical, helpful, and saves you from learning all the lessons the hard way in the field.

Myth two: An RPAS Operating Manual (ROM) is mandatory for BVLOS.

TRUE. To fly as a Level 1 Complex pilot, you must be doing so under an organization that holds an RPAS Operating Certificate (RPOC) and in accordance with their procedures. To hold an RPOC, they must have, use and maintain an operating manual to fly BVLOS. No manual means no flying. Even if you're applying for SFOC BVLOS, much of that application will reference sections and information within the ROM.

Myth three: RPOC = DMP Declaration.

FALSE. Having an RPOC isn't as simple as the three-minute process on the Drone Management Portal makes it out to be. Sure, it's straightforward to tick a box that says you declare you meet the requirements but, in reality, it's a high bar to meet, with procedure and document development work to establish training and then yearly organizational maintenance as well.

You will need the following:

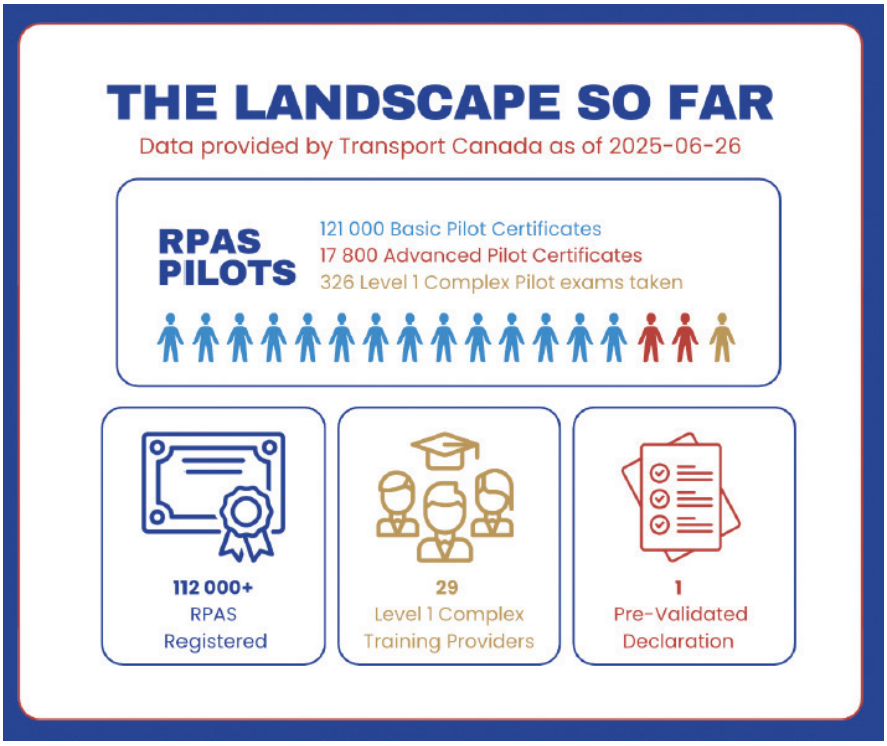
- An RPAS Operating Manual.
- Trained personnel and assigned roles.
- To maintain safety and risk assessment processes outlined in the Canadian Aviation Regulations (CARs).

Myth four: You can begin Level 1 Complex BVLOS contracts this flying season.

FALSE. Definitely use this lead up to November 4, 2025, to get all your certification ducks in order, but you can't operate under this regulatory framework until then.

Myth five: You don't need to be Advanced certified to pursue your Level 1 Complex certification.

TRUE. You do need to pass the advanced written exam, thereby demonstrating the prerequisite knowledge that your Level 1 Complex ground school presumes you to have, but you don't require an Advanced Flight Review. The flight review you do once your Level 1 Complex ground school and written exam are successfully completed will count toward ticking the advanced and Level 1 Complex boxes.



It's straightforward to tick a box that says you declare you meet the requirements but, in reality, it's a high bar to meet.

Myth six: We have so many technical DAA solutions.

Okay, no one actually said this one, but the verdict is still FALSE. Perhaps for the first time ever, regulation is ahead of technology. Transport Canada has paved the way for manufacturers of technical detection solutions (acoustic, radar, Electro-Optical/Infrared (EO/IR) etc.) to declare compliance to a standard, but few solutions meet that bar at this time.

Parting thoughts

Overall, the new regulations were what we were expecting, with a few fun curveballs to navigate. Use this time to prepare, learn your DAA options, be aware of misinformation, and get ready for a whole new ball game when flying season 2026 rolls around.

Want to talk more about regulations or chat with the regulators themselves? Join us in Edmonton at the Aerial Evolution Association of Canada (AEAC) Conference November 4-6. 2025. More information is available at www.aerialevolution.ca/aeconference/

Kate Klassen is a Level 1 Complex RPAS Operator and certified Flight Reviewer. She is the Training and Regulation Specialist at InDro Robotics, where she leads national RPAS training through FLYY. With a commercial pilot license and MBA, Kate serves on AEAC's board and has helped shape Transport Canada's RPAS curriculum, including RPAS 101 and advanced certification requirements.

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This year's event will be hosted by **Edmonton International Airport** at the Renaissance Hotel. 4236 - 36 St E, Edmonton International Airport, Alberta, Canada.

Hotel booking discounts are available, but limited!

Important Dates

- Early Bird Registration Rates End - August 31, 2025
- Conference Dates - November 4 to 6, 2025
- Live Demos - November 5, 2025

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FEATURE

Suncor Energy:

Pioneering Autonomy in the Heart of the Oil Sands

Suncor Energy is transforming to become a leader in adopting autonomous technologies – like drones – to revolutionize its operations in the energy sector. Photos courtesy of Suncor Energy Inc.

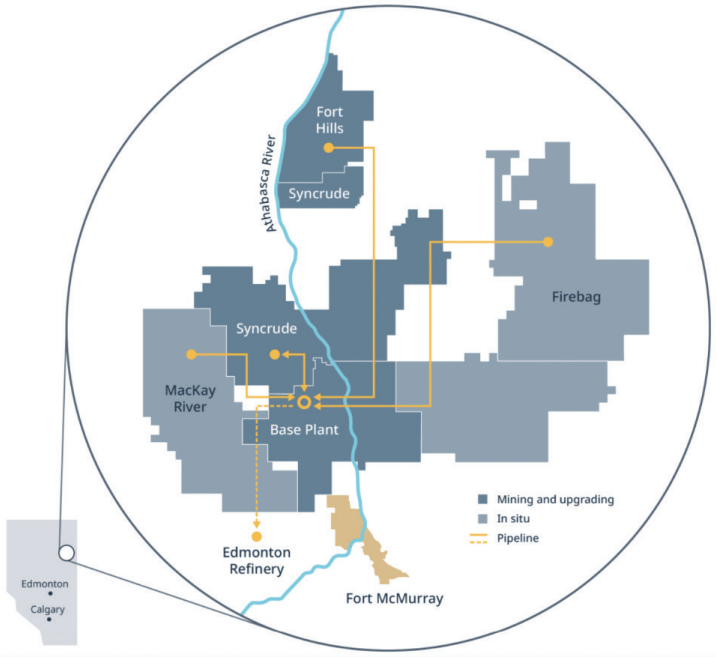
By Tedman Jess, Senior Aviation Advisor – RPAS, Suncor Energy Inc.

In the fast-evolving energy sector, Suncor Energy Inc. is leading the charge in adopting autonomous technologies to revolutionize its operations.

As Canada's largest fully integrated oil company, Suncor faces unique challenges across its vast network of open-pit mines, extensive pipelines, and offshore platforms. To overcome these hurdles and meet rigorous compliance demands, the company is increasingly turning to drones, robotics, and artificial intelligence, fundamentally reshaping how it approaches safety, efficiency, and environmental management, especially within the demanding conditions of the Canadian oil sands.

A hybrid approach to drone integration

Suncor's journey into autonomous operations exemplifies a strategic 'crawl, walk, run' methodology, which the company describes as currently being in the 'walk' phase, but rapidly approaching a full stride. The sheer scale of Suncor's assets,



Suncor is harnessing drones to significantly boost safety and operational efficiency throughout its operations in Alberta; and beyond.

Drones equipped with non-destructive testing (NDT) payloads are invaluable tools to catch problems before they happen along Alberta's extensive network of powerlines.

including oil sands sites spanning up to hundreds of square kilometers in northern Alberta and a full downstream pipeline infrastructure from coast to coast, necessitates a sophisticated approach. The drone program, for instance, has grown from a mere 250 flights in 2019 to over 18,000 missions across North America by mid 2025, demonstrating an exponential adoption rate.

To manage this immense operational footprint, Suncor has adopted a hybrid drone program. This model strategically blends the expertise of vetted third-party vendors, who handle more complex or specialized flights, with a robust internal pilot program. With more than Advanced RPAS Pilot Certificate holders from Transport Canada, Suncor empowers its own personnel to integrate drone technology directly into their daily toolkit. These internal pilots primarily conduct simple, repeatable, low-risk visual line of sight flights, effectively extending their eyes in the sky for immediate operational insights. This dual approach allows Suncor to leverage specialized capabilities while fostering internal proficiency and agility.

Drones as operational game-changers

The adoption of drones has fundamentally transformed Suncor's operational capabilities, with the company exploring more than 150 potential use cases internally. 90 per cent of Suncor's current drone missions are dedicated to survey flights. These continuous aerial mappings are crucial for monitoring and managing the ever-changing topography of their vast open-pit mines. For example, LiDAR-(Light Detection and Ranging) equipped drones scan kilometers of haul roads with unparalleled precision and frequency.

The resulting comprehensive 3D data is then processed through advanced machine learning algorithms, developed in collaboration with the University of Toronto, to pinpoint wear patterns and inform critical maintenance decisions. This proactive insight optimizes excavation, material movement, and overall mine planning, reducing operational costs, improving productivity, and significantly extending the lifespan of valuable infrastructure, including the costly tires of their massive 400-tonne dump trucks.

Beyond surveying, Suncor also harnesses drones for a wide array of critical functions, significantly boosting both safety and operational efficiency:

- **Inspections in plants and downstream facilities:** Suncor leverages drones extensively for maintaining the integrity of its large-scale plants, refineries, and other downstream facilities. Drones equipped with high-resolution visual, thermal, and even specialized non-destructive testing (NDT) payloads can perform detailed inspections of flare stacks, storage tanks, pressure vessels, pipe racks, and chimneys. This eliminates the need for personnel to work at hazardous heights, enter confined spaces, or operate near live processes. For instance, drones can conduct Corrosion Under Insulation (CUI) screening using thermal and pulsed eddy current (PEC) sensors, identifying potential issues without costly and time-consuming insulation removal or facility shutdowns. This ability to assess structural integrity, detect corrosion, and identify anomalies while operations continue significantly reduces downtime, enhances safety, and provides more frequent and comprehensive data for predictive maintenance.
- **Targeted herbicide application in tailings ponds:** Suncor is leveraging drone technology for precise and safe herbicide application within its extensive tailings ponds. Traditionally, managing vegetation in these large, often challenging environments could pose safety risks to ground crews due to the terrain and potential for exposure. Drones equipped with specialized spray nozzles and advanced GPS capabilities allow for highly targeted application, ensuring that herbicides are deployed only where needed. This significantly enhances worker safety by removing personnel from hazardous areas, reduces overall chemical use, minimizes environmental impact, and provides a far more efficient method for vegetation control and land management across these expansive sites.
- **Powerline inspections:** As one of Alberta's electricity producers, Suncor is piloting multi-sensor drones for comprehensive powerline inspections across its extensive transmission lines. Equipped with thermal, optical, corona and potentially LIDAR (Light Detection and Ranging) sensors, a single drone flight can now efficiently assess vegetation encroachment, insulation integrity, and corona discharge, identifying subtle anomalies before they escalate into major disruptions. This approach dramatically enhances grid reliability, reduces the need for hazardous manned helicopter flights or personnel climbing towers, and contributes directly to public safety by mitigating risks associated with electrical infrastructure.

Looking ahead: Regulatory certainty and continued innovation

Suncor's experience underscores the critical need for regulatory frameworks to evolve alongside technological advancements. They welcome the incoming update to regulations permitting simplified low-risk BVLOS (Beyond Visual Line of Sight) flights by November, offering a "paradigm shift" for extended pipeline scans and other operations, which would further unlock the safety and efficiency benefits of autonomous technology.

Driven by a commitment to safety, efficiency, and environmental performance, Suncor is continuously integrating and scaling autonomous solutions. The future of energy, as demonstrated by Suncor's pioneering efforts, will be increasingly shaped by intelligent, interconnected systems that transform how resources are extracted, transported, and managed.

Having spent the last 20 years in the aviation industry, Tedman Jess first joined the Suncor Energy Aviation Department in 2014 and has stewarded the Suncor Energy Drone Program since its inception.

Suncor Energy Inc. is Canada's leading integrated energy company. Suncor's operations include oil sands development, production and upgrading; offshore oil production; petroleum refining in Canada and the U.S.; and the company's Petro-Canada™ retail and wholesale distribution networks (including Canada's Electric Highway™, a coast-to-coast network of fast-charging EV stations).

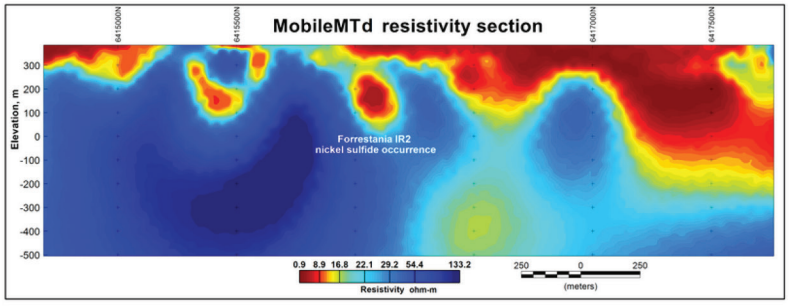
Revolutionizing Subsurface Exploration: UAV-Borne Geophysics

UAV-borne geophysics, particularly with magnetic field sensors, offers superior resolution over traditional heliborne systems. However, UAV-based electromagnetic (EM) methods using controlled primary field sources face limitations in depth of investigation (DOI). Integrating natural EM fields as a primary source has proven to be a game changer in mineral exploration.

Exploiting natural EM fields extends DOI significantly and aligns with the industry's evolving needs. UAVs offer key advantages, including low-speed operations for collecting data with higher density and with reduced motion noise, which enhance the quality of data and expand the low-frequency range crucial for deep exploration. Additionally, UAVs can operate after sunset, leveraging heightened natural EM field intensity benefit traditional helicopter systems lack.

In 2024, Expert Geophysics introduced MobileMTd, a drone-based EM technology tested over known targets in Western Australia. The system outperforms traditional heliborne EM methods, offering higher resolution and greater DOI. Its ability to gather data over a wider low-frequency range is critical specifically for exploring conductive regions and overburdens.

MobileMTd, with the ability to deploy multiple UAVs, assures maximum productivity, especially during peaks of natural electromagnetic activity. The system's wide resistivity detectability range, extended DOI from near-surface to over 1 kilometer, making it suitable for diverse tasks, from identifying mineral systems to exploring geothermal energy sources and CO_2 storage sites. Its adaptability to different tasks instills confidence in its versatility.



MobileMTd represents a significant leap forward in UAV-borne geophysics, combining drone precision with natural field EM sensing for deeper, more effective subsurface exploration.

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Real World Testing by AEAC Members are Turning Big Ideas into Operational Drone Breakthroughs

Innovations in drone technologies are today mitigating the challenges of under bridge inspections. Photos courtesy of ZeeDrone Aerial Solutions Inc.

Unlocking Under Deck Bridge Inspections: Drone Photogrammetry Without GPS

By Nicholas Zeeb, President of ZeeDrone Aerial Solutions Inc.

Infrastructure inspections beneath bridge decks present a persistent challenge for engineers and asset owners. Traditional methods – such as deploying inspectors with under bridge inspection vehicles (bucket trucks) or using telephoto lenses – are either costly, disruptive, or limited in detail and spatial accuracy. Drone photogrammetry offers a safer and more scalable solution but typically fails when GPS or RTK (Real-Time Kinematic) signals are lost under the structure, which has long hindered the creation of complete, accurate 3D models of bridges.

To address this, ZeeDrone Aerial Solutions collaborated with ConeLabs on a proof-of-concept project for the City of Kitchener, Ontario. The goal: to capture high-resolution photogrammetry models of two key bridges, including accurate stitching beneath the deck where GPS signals drop off. The success of this project may mark a new chapter in digital bridge inspections.

The drone solution

ZeeDrone deployed a DJI Mavic 3E for this inspection, capturing high-resolution imagery under challenging GPS conditions. While the drone was manually piloted due to GPS and RTK signal loss while underneath the structure, the flight paths were meticulously planned to maximize image overlap and coverage, and the onboard standard camera of the Mavic 3E collected thousands of images per structure. The first bridge was a single span of the Block Line Road bridge over a ravine, for a total of 6,350 images (six hours of capture), while the second bridge was a single span of a rail bridge running over Belmont Avenue, for a total of 4,850 images (four hours of capture).

ConeLabs processed the imagery using its proprietary photogrammetry software, designed specifically for challenging environments where GPS or RTK signals are unreliable. The system uses a combination of photogrammetry, computer vision, and sensor fusion to determine the exact position and orientation of each image, even when geotags are unavailable.

First, the software detects thousands of overlapping visual features across photos and uses Structure from Motion techniques to calculate each camera's position in 3D space based solely on image data. When GPS is lost, the software switches to Visual-Inertial Odometry, fusing data from the drone's camera and internal motion sensors to maintain accurate positioning and correct for drift. If the drone revisits a previously captured area, the system recognizes it in a process known as loop closure, which helps refine the model and minimize error across the dataset. This workflow allows for complete 3D reconstruction beneath bridge decks, where traditional photogrammetry tools often fail.

The final model supports artificial intelligence (AI)-based crack and corrosion detection, allowing engineers to interact with the model visually. Clicking on a feature in the model provides access to all original photography, significantly streamlining the review and documentation process.

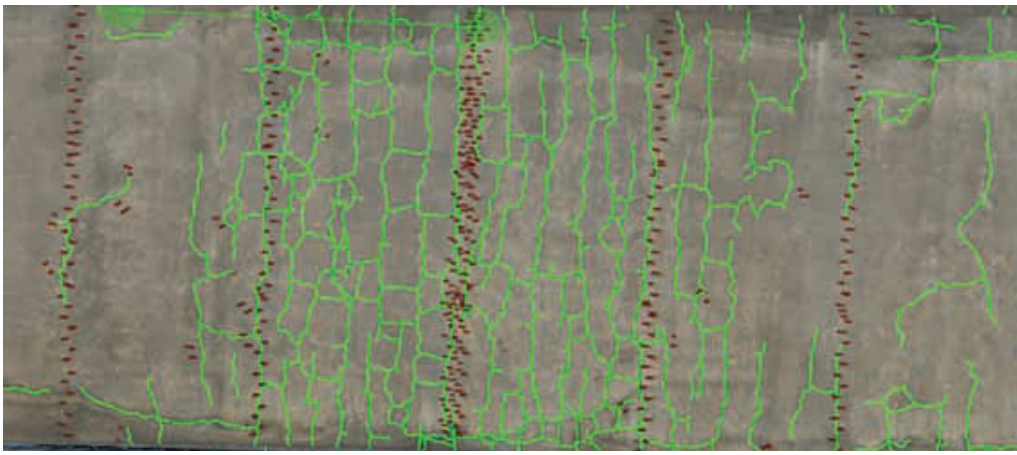
Impact and business case

Photogrammetry inspections using this method offer multiple advantages over traditional methods.

Normally, a bucket truck and lane closures are required for under-bridge access, often disrupting traffic for a full day or more at substantial cost to the owner and the populace that depend on that infrastructure. In contrast, the Belmont Avenue inspection only required a one-hour traffic stop, while the Block Line Road bridge was inspected with no traffic disruption at all.

For a direct cost comparison, the drone inspection costs should be compared to the cost of stopping traffic and to have a bucket truck on site with which to access the bridge deck from the roadway above. Traffic control in 2025 is estimated to cost $1,580 for an 8-hour day, with the specialized bucket truck with an operator costing $4,950 per day; totaling $6,530 per day.

It is estimated that the Belmont Bridge would have required one day to inspect, and that the Block Line Road Bridge would have taken two days to inspect: together totaling $13,060. Compare that to the cost of the drone inspection: Belmont bridge cost $4,200 (35 per cent savings) and Block Line Road Bridge Cost $6,500 (50 per cent savings). Furthermore, ConeLabs is confident that engineers using their models will reduce inspection time by 50 per cent when compared to a site inspection.



A screenshot of the underside of the Belmont bridge deck as a 3D model with AI crack feature detection.

Drone inspections offer significant cost savings over traditional methods, with the benefits increasing for larger bridges. These savings are even greater when factoring in the external economic costs of road or rail closures, such as traffic congestion in major Canadian cities. Additionally, by eliminating the need for working at heights, worker safety improves, and the expenses associated with safety measures or accidents are avoided. Faster data collection also accelerates project completion, reducing administrative overhead and delays.

Improving the data

The final models achieved a ground sampling distance of up to 0.5 centimetres per pixel, offering engineers a highly detailed view of the concrete conditions. In traditional setups without GPS-referenced photos, defects are often documented in isolation, making it difficult to track exact locations or contextualize issues within the structure. This becomes more challenging when defects repeat across a structure; for example, one image with concrete rebar corrosion looks like every other image with concrete rebar corrosion. The ConeLabs model solves this by linking every detected feature to precise 3D coordinates and back to its visual source. In this way, an engineer can look at a bridge model as if they were there in person, completing their virtual inspections faster and with confidence in the data.

For the City of Kitchener, this was a proof of concept – but it demonstrated how technology can reduce operational cost, improve safety, and create high-fidelity digital records. Future implementations could enable year-over-year tracking of defect evolution using layered inspections. Engineers and owners would also be able to track repair work across inspections, comparing defects to the implemented mitigation measures and validating the repair scope.

Beyond bridges, the solution is scalable to other complex environments like overpasses and tunnels – anywhere RTK and GPS signal may be lost partway through the drone flight. It enables drone operators and inspectors to confidently map areas previously considered unserviceable.

This collaboration between ZeeDrone and ConeLabs exemplifies how practical innovation in drone workflows can deliver transformative results in public infrastructure maintenance.

A call to action

As urban infrastructure ages and inspection demands grow, digital tools like those provided by this collaboration offer a powerful alternative to costly and dangerous manual methods. With reliable under-deck photogrammetry now possible, the standard for bridge inspections is poised to shift toward remote, precise, and data-rich modeling.

ConeLabs and ZeeDrone plan to expand this technology to similar projects across Canada, bringing advanced drone inspections to more municipalities and infrastructure owners.

To further explore how emerging drone technologies are transforming infrastructure inspections, as well as stay current on new regulations and standards, join us at the Aerial Evolution Association of Canada (AEAC) Annual Conference, November 4-6, 2025, in Edmonton. Learn more at www.aerialevolution.ca/conference.

Nicholas Zeeb is a Professional Engineer with degrees in engineering and business. He founded ZeeDrone Aerial Solutions Inc. to integrate drones into structural inspections, architectural modeling, and surveying. Certified for Advanced Operations, he also serves on the Aerial Evolution Association of Canada's Regulatory Committee.

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