

Your Airfield

Solutions Partner



DRAFT



CART-RCR

Comprehensive Advanced Real Time
Runway Condition Reporting



ADVANCED RUNWAY CONDITION

Decision Support Tools

CART-RCR

CART-RCR represents a suite of decision support tools and software to offer airports the most comprehensive, advanced, real time, complete solution for Global Runway Condition Reporting. With industry leading situational awareness gained through CART's advanced technologies and artificial intelligence, Team Eagle is helping to create the safest runways possible.



Runway Condition Assessment Camera

Integrating specialized optical sensors and Artificial Intelligence (AI) software to accurately and objectively assess and report contaminants present on runways.



Aircraft Braking Availability Tester

Objective Measurement of Aircraft Anti-Skid Braking System Braking Availability. The only device in the world that measures how slippery a runway is for aircraft.



WinterOps™ RSC

Analytic & Reporting Software
FAA Takeoff And Landing Performance Assessment (TALPA), ICAO Global Reporting Format (GRF), Transport Canada or U.S. Military RCR Format, and can be used as stand-alone / manual input or can integrate data from CART sensors / applications.



ChemicalOps™

Monitoring runway deicing practices and enabling operators to target precise application for safety and economic and environmental savings.



Aircraft Deceleration Early Warning System

An intelligent system that silently monitors aircraft landing data to alert of potentially slippery, or degrading runway conditions.
24/7/365 Global Monitoring of landing aircraft braking (deceleration), stopping distances, steering control & artifacts / anomalies of interest.

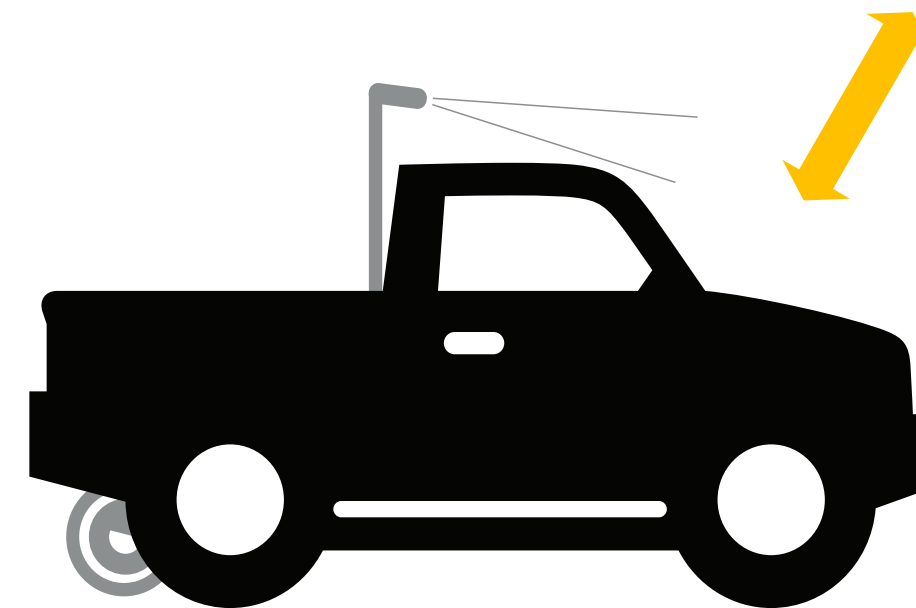
Smart Technologies

CART-RCR

Dedicated to ensuring the safest runways for 47 years, Team Eagle, along with technology partners, continue to focus on developing and delivering innovative products that will assist airfield operators in obtaining objective runway condition measurements and aircraft braking availability performance for FAA, TALPA and GRF reporting requirements.

Cloud-based Software

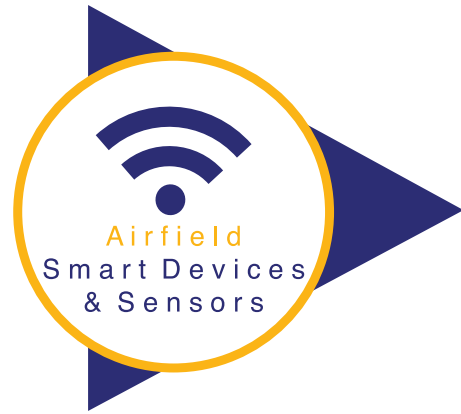
- Cloud-based software suite with dynamic dashboards and report generation making it easy to administer the CART-RCR applications from a central location.
- GIS/GPS enabled applications for Assessing & Reporting Runway Conditions



Runway Condition Reporting Inspection Vehicle

Safest Runways - Easy to Manage

RCAM



Runway Surface Condition Assessment Camera System

Runway Condition Reporting Decision Support Tool

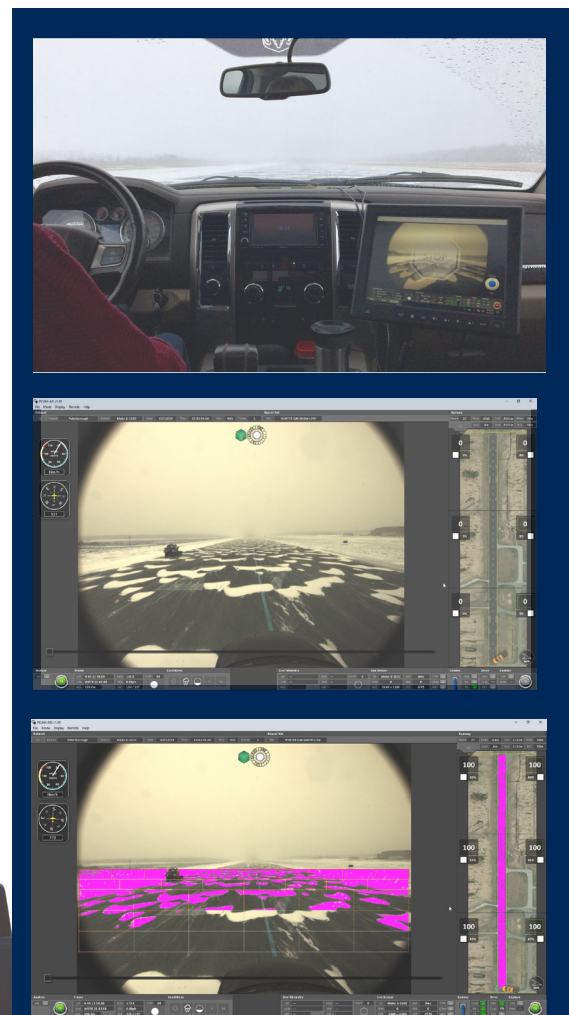
Designed to provide real-time, continuous runway condition assessment during changing situations.

The RCAM 1.0 integrates specialized optical sensors and Artificial Intelligence (AI) software, to accurately and objectively assess and reports contaminant coverage on runways.

Simply mount to an airfield vehicle for precise, real-time contaminant (water, slush, snow and ice, etc.) detection and percent coverage measurement.



Supporting the Runway Condition Assessment Matrix and auditable reporting requirements for FAA, TALPA, ICAO-GRF.



Increase Operational Efficiency

RCAM

The RCAM System is designed to provide airports with a decision support tool for real-time, continuous runway condition assessment during changing conditions while improving assessment objectivity across operations staff.

RCAM provides an objective measure of contaminant coverage to aid in the selection of the Runway Condition code when using the Runway Condition Assessment Matrix for FAA-TALPA and ICAO-GRF mandated reporting.

RCAM also provides an auditable record, combining Geo-spatial information with a photographic record of runway condition.

Coming Soon

- RCAM 2.0+ - Added capability to identify type, and depth of water-based contaminants.



CART-RCR
Comprehensive Advanced Real Time
Runway Condition Reporting

Objective Assessment of Runway Conditions

Increased Operational Efficiency

Reduce Cost of Labour and Chemical Usage

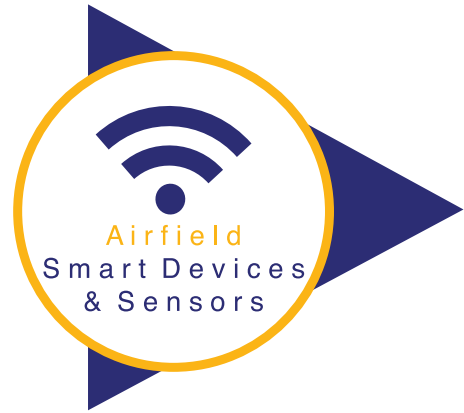
Advanced Environmental Awareness

Audit-able Record

Report Generation



BAT™



Aircraft Braking Availability Tester (BAT™)

Runway Condition Reporting Decision Support Tool

The BAT™ is the only device in the world that measures how slippery a runway is for aircraft. Intelligently integrating an actual aircraft anti-skid braking components into a ground-based vehicle, the BAT™ system emulates an aircraft's in-situation anti-skid braking system operation and measures the resulting braking coefficient which indicates the expected aircraft braking deceleration performance available. This information is communicated in real-time for enhanced decision-making for takeoff and landing requirements.



The BAT™ is a decision support tool that assists with FAA Takeoff and Landing Performance Assessment (TALPA) and Global Reporting Format -GRF) input requirements supporting Runway Condition Assessment with objective measurement.



BAT™

An aircraft anti-skid braking system (ASBS) and landing gear are mounted into the BAT™ RCR inspection ground vehicle and controlled by an ASBS algorithm.



Helping to Prevent Excursions

Rather than measuring runway friction, the BAT™ precisely measures aircraft anti-skid wheel braking coefficient; the only objectively measured value that can be safely and reliably reconciled to determine safe aircraft wheel braking stopping distances as well as directional controllability in adverse wind conditions.



Helps Prevent Runway Excursions

Increased Operational Efficiency With Less Time On The Runway

Cost Savings in Chemical Usage

Real-Time Reporting

TALPA & GRF Decision Support



Objective Measurements

WinterOps™ RSC



Managing Winter Airfield Operations

Runway Condition Reporting

WinterOps™ RSC

WinterOps™ RSC is an AIROps™ application designed to help airports keep the airfield open longer while supporting safer operations in winter snow and ice conditions.

WinterOps™ RSC collects, records and stores runway condition data for post analysis and reporting to the control tower and other airport stakeholders.

WinterOps™ RSC also helps operators target precise application of runway chemicals for economic and environmental savings.

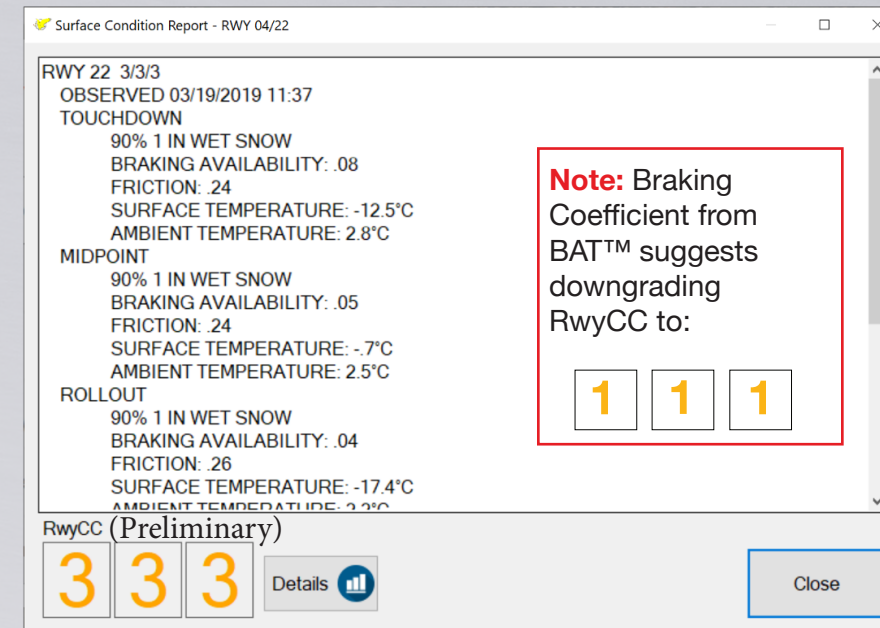
Compliant with FAA TALPA and ICAO GRF reporting format.



WinterOps™ is an AIROps™ application for electronic airfield inspection software that helps airports with TALPA / GRF compliance reporting.



WinterOps™



WinterOps™ RSC also acts as a “Decision Support Tool” by gathering and presenting inputs such as temperatures, friction values, CRFI measurements, braking availability, contaminant coverage and the in-situation effectiveness of runway de-icing chemicals.

This provides a comprehensive view of runway surface conditions while improving assessment objectivity across operations staff and changing conditions.



Integrate Input from Friction Measuring Systems and Decelerometers

Integrate Input from BAT and RCAM sensors

Integrate Input from Temperature Sensor

Enable Real-time Input to Chemical Spraying / Spreading

Quick Access to Critical Electronic Documents

Collect, Store & Report Runway Surface Condition Data



Runway Condition Reporting

ChemicalOps™



Managing Airfield Chemical Usage

ChemicalOps™

A simple solution to assist airfield operators with oversight and decision support tools for effective and efficient use of airfield chemicals.

As part of the AIROps™ software platform, ChemicalOps™ easily integrates with chemical application vehicles; collecting, storing and transferring data related to chemical usage.

Working with WinterOps™ RSC, chemical applications can be noted in runway surface condition reporting based on measured conditions such as friction coefficients and temperature.



ADM Aéroports de Montréal

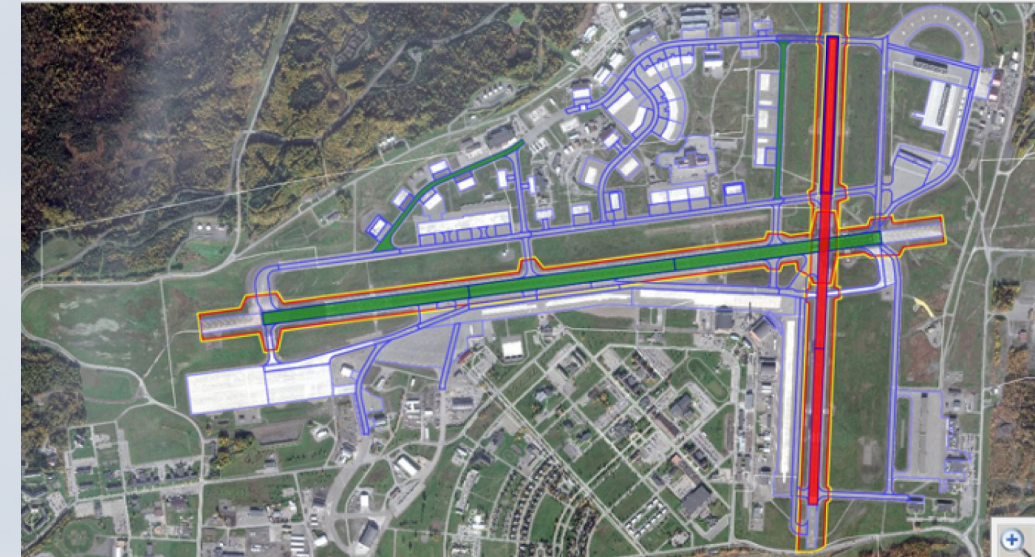
ChemOps Application Report
 ChemOps Zone Layer: ChemOps_Zones_Feb2020
 Date Range: Mar 15, 2022 (00:00 - 23:59)
 Vehicle: 232
 Controller: Epoke
 Locations: All

Totals For Selected Locations											
Dry					PreWet						
4605.9 kg					588.6 L						
Tuesday Mar 15, 2022											
Entered	Exit	Speed km/h	Material	Started	Rate	Total (kg)	Material	Started	Rate	Total (L)	
Barrères (B-Aéroquai)											
07:38:05	07:39:01	5.8	Sodium Formate	ON	10	38.6	Potassium Acetate	ON	30	3.4	
07:43:44	07:47:51	12.5	Sodium Formate	ON	10	109.9	Potassium Acetate	ON	30	20.5	
07:48:02	07:48:37	13.3	Sodium Formate	ON	10	27.5	Potassium Acetate	ON	30	4.6	
07:48:51	07:49:45	15.9	Sodium Formate	OFF	10	38.7	Potassium Acetate	ON	30	7.3	
07:50:00	07:51:24	19.4	Sodium Formate	ON	10	46.4	Potassium Acetate	ON	30	12.6	
Total Dry						261.1 kg	Total PreWet				48.4 L
Barrères (B-Américaines)											
02:34:27	02:36:43	18.9	Sodium Formate	ON	5	87.5	Potassium Acetate	OFF	30	3.1	
02:37:26	02:37:59	25.1	Sodium Formate	ON	5	30.2	Potassium Acetate	OFF	30	1.3	
08:06:03	08:06:08	28.3	Sodium Formate	ON	10	9.3	Potassium Acetate	ON	30	3.7	
Total Dry						127 kg	Total PreWet				8.1 L



ChemicalOps™ is an AIROps™ application for electronic airfield inspection software that helps airports with Part 139 (US), TP312 (Canada) and ICAO-GRF compliance requirements.

ChemicalOps™



GIS/GPS enabled, allowing for winter contamination situational awareness to better manage chemical use and analysis.

Use ChemicalOps™ Pro for remote command and control tasking of chemical de-icing equipment.



CART-RCR
 Comprehensive Advanced Real Time Runway Condition Reporting

Track & Manage Airfield Chemical Activities via GPS

Stores Data for Historical Query, Analysis & Reporting

Easily Integrates with Airfield Chemical Application Vehicles

Enable Real-time Input to Chemical Spraying / Spreading

Combine with WinterOps Software Application

Wireless Command and Control Options



Managing Chemical Applications



Aircraft Deceleration Early Warning System

Helping to Reduce the Risk of Excursions.

ADEW is a cloud-based AI and machine learning platform that leverages real time aircraft position and weather data to provide a pro-active & continuous assessment of your runway conditions. ADEW alerts airport operators with runway locations that may have the potential to be slipperier than previously reported / understood.

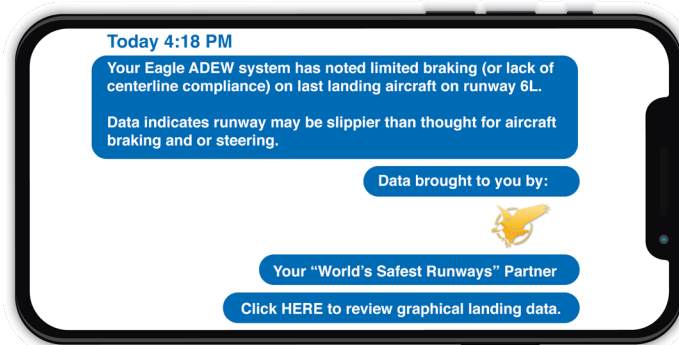
Proactive Response

Alerts are stored in a manner that allows fast and easy mining where ADEW has identified poor deceleration or directional compliance on contaminated runways. This could mean rubber build up, snow/ice/other contaminants, loss of texture, or the development of runway surface irregularities.

Benefits

- Increase safety
- Increase confidence in RCR trending
- Enhance maintenance efficiency
- Maintain the safest runways in the world

Provides an alert via short message service (SMS) and/or e-mail message to individuals or groups.



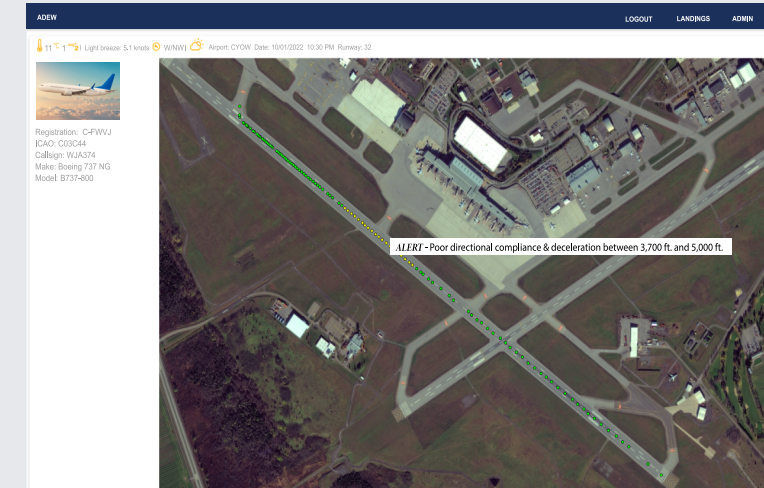
24/7 Monitoring of Aircraft Deceleration & Directional Control

Date	Time	Runway	ICAO	CallSign	Class	Map	Analysis	Alert Status
2021-08-31	03:02 AM	25	C08811	THUB70	Small (15,000 to 75,000 lbs)			
2021-08-31	01:06 AM	14	C01121	CPGMDQ	Light (1-15,000 lbs)			
2021-08-31	01:03 AM	25	C096F4	ACA356	Large (75,000 to 300,000 lbs)			
2021-08-31	12:34 AM	32	C020Y1	JDA754	Large (75,000 to 300,000 lbs)			
2021-08-31	12:30 AM	32	C020Y1	FL6403	Large (75,000 to 300,000 lbs)			Alert

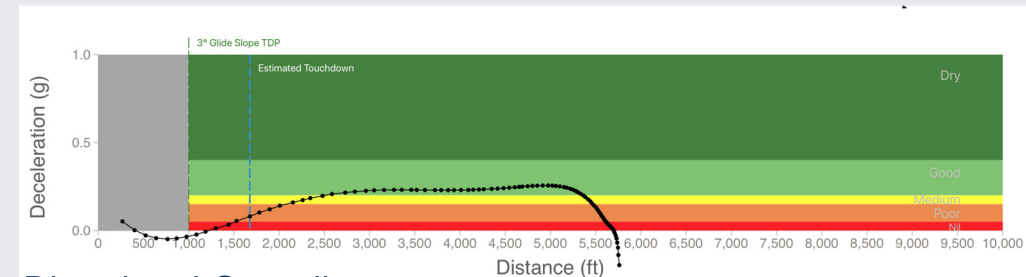
Deceleration vs. Time

Directional Compliance

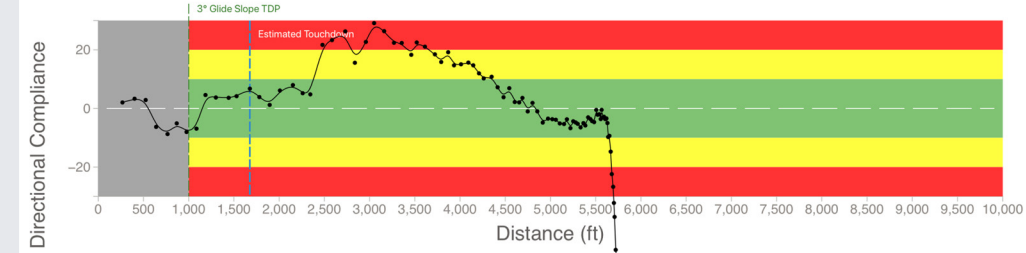
Continuous aircraft landing monitoring to alert airport operators of unknown or unanticipated poor runway conditions.



Deceleration Over Distance



Directional Compliance



- ADEW generates a set of analysis graphs to better understand the landing characteristics. The dashboard view also clearly identifies any landings where an “alert” was issued.
- The data is also archived to provide an auditable record providing the ability to generate reports to search based on such fields such as: runway, aircraft type, date, alert status etc.

Key features of
ADEW Release 1.0

User Friendly
Dashboard

Weather Data

Slippery or
Degrading Alerts

Mapping of All
Landing Data

Audit-able Record

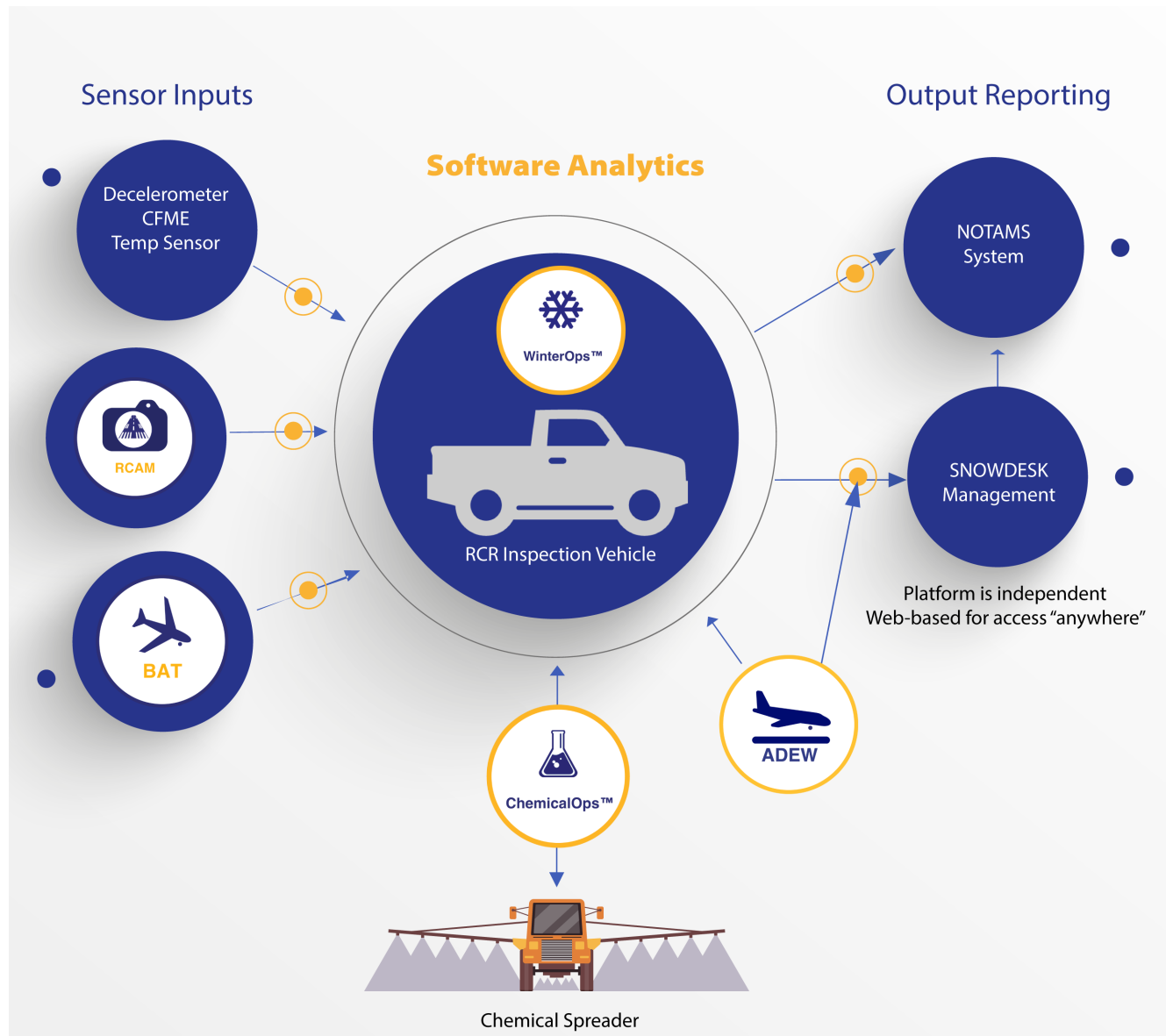
Report Generation



CART-RCR

The CART-RCR solution utilizes a range of technologically advanced sensors along with software analytics to provide intelligent decision support outputs to provide airports with the most Comprehensive, Advanced, Real Time solutions for Runway Condition Reporting.

CART-RCR scales with your airport's needs. Start with just 1 sensor or software element and grow to include them all.



CART-RCR software is offered solely as a subscription service, with options to include sensors, hardware and equipment.

CART-RCR Partners

Team Eagle & Eagle Aerospace would like to thank the following research partners and collaborators for their invaluable assistance in the creation and launch of CART-RCR:





Your “world’s safest runways” partner

team-eagle.com