## The Québec Aerospace Cluster

September 2024



## Aéro Montréal, Québec's Aerospace Cluster

A strategic think tank that groups all major decision makers in Québec's aerospace sector

#### Mission / Vision

- Mobilize stakeholders in Québec's aerospace ecosystem to support its global reach, innovation capacity and growth.
- Our vision is to become the most innovative aerospace cluster in the world.





## Québec, One of the World's Major Aerospace Centres

- 6<sup>th</sup> worldwide in sales
- Montréal : 3<sup>rd</sup> largest aerospace center in the world
- Many of our companies in the top 100 worldwide



### Aerospace in Québec: A Major Economic Impact



## Aerospace in Québec: Strong and Diversified Industrial Capabilities



Civil helicopters



Defence & commercial **landing gear** systems



Regional, **commercial and business aircraft** 



Maintenance, repairs and overhaul of commercial and military fleets



Small gas turbine engines



Avionics and cockpit systems



**Simulation** and training equipment



Advanced air mobility



**Space** technologies



Drones



## 4 Strategic Pillars of Aero Montreal

NEXT GENERATION & WORKFORCE	<u>GROWTH</u>	INNOVATION & COMPETITIVENESS	IMAGE & SUSTAINABLE AEROSPACE
<ol> <li>STRATEGIC FOCUS</li> <li>Attract the next generation of students to our aerospace training and careers in a highly competitive environment</li> <li>Ensure the attraction of manpower and the transfer of knowledge</li> </ol>	<ol> <li>STRATEGIC FOCUS</li> <li>Promote the consolidation and financing of businesses</li> <li>Support diversification and business development</li> <li>Promote promising niches</li> </ol>	<ol> <li>STRATEGIC FOCUS</li> <li>Accelerate the commercialization of sustainable &amp; intelligent air mobility (decarbonization, electrification, sustainable materials, autonomy, interconnectivity, cybersecurity</li> <li>Increase the competitiveness of companies to become environmentally responsible preferred suppliers</li> </ol>	<ul> <li>STRATEGIC FOCUS</li> <li>1. Stimulate the interest of the next generation of workers in the aerospace industry</li> <li>2. Ensure the sustainable gositioning of the Quebec aerospace industry in Canada and internationally</li> </ul>
			AERDY

MONTREAL

Working Groups and Working Committee addressing the Industry challenges

- Human Resources
- Innovation
- Defence & Security
- Growth & resilient supply chain
- UAV (Uncrewed Aerial Vehicles) / Advanced Air Mobility
- SPACE
- MRO (Maintenance, Repair & Overhaul)
- Image & Environment

Mid and long term development of the supply chain

For a **carbon-neutral**, **competitive**, and **inclusive** supply chain

#### De-risking the supply chain

- The future of the supply chain will gravitate towards 6 strategic paths of intervention:
  - 1. Sustainability and competitiveness
  - 2. Cybersecurity
  - 3. Advanced Air Mobility
  - 4. Diversification: Defence and security, space, drones
  - 5. Inclusion and diversity
  - 6. Growth and international collaboration





#### **NOS INITIATIVES**

#### **BOITE À OUTILS 360° AU SERVICE DES ENTREPRISES**

- > Formation
- > Accompagnement
- > Partage de bonnes pratiques
- > Financement
- > Certification

#### - Nos répertoires -

- Défense et sécurité (SDQuébec)
- Civil
- > RPAS
- > MRO

#### MACH FAB 4.0

Propulser l'usine du futur Towards the factory of the future

Implantation des technologies numériques et de fabrication avancée au sein des entreprises

#### EC® RESPONSABILITE

Soutien des entreprises dans la réduction de leur empreinte carbone à travers la mise en place de pratiques écoresponsables



Accompagnement des entreprises pour les rendre cyber-résilientes tout en soutenant l'obtention des certifications clés

> StartAēro 360

> > Commercialisation de l'innovation en aérospatiale et soutien spécifique des startups et scale-up (TRL 7 à 9)

#### ACCELERATEUR 360<sup>7</sup> MOTEUR DE CROISSANCE

Actions collaboratives de développements de marchés internationaux et soutien aux fusions-acquisitions

#### Fournisseurs Privilēgiēs <del>a</del>>

Création de champions pour renforcer des verticaux stratégiques dans le secteur et positionner la chaîne d'approvisionnement québécoise auprès des OEM

#### **AéroPortail**

MACH

Chaîne d'approvisionnement Supply Chain

opérationnelle des PME

Amélioration de l'excellence

Plateforme d'emplois et des formations en aérospatiale

Augmentation de la productivité des PME par une meilleure utilisation des talents et des compétences

#### Propulsion Relēve 🗘 Inclusive

Soutien aux entreprises dans la mise en œuvre de pratiques favorisant l'équité, la diversité et l'inclusion dans une optique de recrutement et de développement d'une main-d'œuvre diversifiée

MAIN-D'ELL



## Reaching for Excellence: Offering our members a personalised roadmap

MACH ACCELERATEUR MACH FAB 4.0 INITIATIVE INITIATIVE INITIATIVE INITIATIVE INITIATIVE MACH ACCÉLÉRATEUR **CYBERSÉCURITÉ MACH FAB 4.0** 360° Accelerate Support Increase development of companies in Stimulate productivity improving **SMEs in** collaboration through the compliance and international integration of and accreditations markets through innovation digital and during strategic within the advanced cybersecurity mergers, supply chain manufacturing partnerships & certification technologies consolidations audits





JUNE 2024

## ESPACE AÉRO



### QUEBEC INNOVATION ZONE STRATEGY



FRANÇOIS LEGAULT

Cap sur un Québec gagnant Le Projet Saint-Laurent

#### A Government Priority

- Derived from the Premier's economic vision detailed in the book "Le Projet Saint-Laurent" (The St. Lawrence project)
- A new economic development model to foster growth and prosperity

#### Basic Concept of Innovation Zone

- Recognize <u>existing</u> innovation ecosystems
- Built on strong expertise and "*flagship*" companies
- Offer Quebec "a right to win" internationally
- Ecosystem capable of attracting international investments and talents
- Located on a delimited geography offering an attractive living environment





#### **EVOLUTION SINCE 2018**





**Ouébec** 

• 5 projects under analysis





## MISSION OF THE INNOVATION ZONE

#### ACCELERATE THE TIME BETWEEN IDEA & COMMERCIALISATION

#### 1. Decarbonisation

- Greener vehicle configurations
- Lighter and sustainable structures
- New propulsion and advanced electric systems

#### 2. Autonomy

Development, testing and certification of advanced air mobility solutions:

- Automatic and intelligent piloting
- Artificial Intelligence & 5G/6G communications
- Flight safety, inconnectivity & cybersecurity

A ZONE THAT WELCOMES REGIONAL, NATIONAL & INTERNATIONAL COLLABORATIVE INNOVATION PROJECTS

Make Quebec a world leader in sustainable and intelligent air mobility by consolidating the experienced strengths of research, innovation and training on two strategic themes





### **THREE COMPLEMENTARY HUBS**

projects

#### **Autonomy**

Large-scale tests of autonomous technologies (airspace management, airport environment), drone & eVTOL virtual simulation and testing



#### **Decarbonisation**

Training, testing and certification of technologies related to decarbonisation (systems, test benches / iron bird)



## LONGUEUIL

#### Aéro Campus : Expansion of ÉNA & CTA

#### 1. New ÉTS Campus

- Integrated into the ÉNA upcoming expansion
- New department of Aerospace Engineering
- Bachelor's degree (2025), master's and doctorate
- 15 professor-researchers and 400 students

#### 2. Center of Excellence in hybrid propulsion

- Phase 1 Test bench in operation
- Pratt Whitney Investment; Raytheon; CEL
- Phase 2 under analysis

#### 3. Certification and Flight Test Center

DASH-8-100 test aircraft (2,5 M\$)



#### **Institutional Partners**

ÉNA, ÉTS, University of Sherbrooke, NRC

#### **Industrial Partners**

Boeing, CAE, H55, Pratt & Whitney, 3C (Cert Center Canada), Ricardo, Air Richelieu, Chrono, Héroux-Devtek, Air Médic, Limosa, CEL Aérospace, Koptair, Porter



## LONGUEUIL

#### LIA: Living lab for Innovative Aerospace

Launched by MET at the Farnborough Airshow

- LIVING LAB D'INNOVATION AÉROSPATIALE
- Airport infrastructure available for research and experimentation (researchers, students and businesses)
- Example of projects: electrification, solar panels, agriculture, etc.
- A turnkey solution for innovative businesses

#### **Targeted themes**

- Decarbonisation
- Space

#### Longueuil's welcoming process (DEL)

- One-stop shop
- Technical sheets

#### **Our collaboration**





## MIRABEL

## Aéro Cité : Development on lands of Aéroports de Montréal (YMX)

- 1. AAM Living Lab (ZEMAM)
  - Infrastructure & equipment for flight testing & monitoring
  - Bridgehead of the Drone Center of Excellence (CED)
  - Mirabel-Alma experimental flight corridor

#### 2. AAM simulation environment (ENSIM)

 Infrastructure, equipment & expertise for flight simulation & virtual testing

#### 3. Expansion of Cégep St-Jérôme

- Establishment of a specialized training center
- Relocation of the Quebec Composites Development Center (CCTT)
- New material research based on a sustainable circular economy



#### **Institutional Partners**

Aéroports de Montréal, CRIAQ, Nav Canada, TC, NRC, IVADO, Calcul Québec, CDCQ, Cegep St Jerome, Polytechnique

#### Industrial Partners

Airbus, Boeing, Bombardier, CAE, Laflamme, CMC, Eurocontrol, Aerocycle, Avianor, Stelia, Safran



### MIRABEL

### Aéro Cité : Development on lands of Aéroports de Montréal (YMX)

#### 4. Advanced Air Mobility Institute (AAMI)

- Act as a research and training observatory for the AAM
- Raise awareness among different communities and stakeholders about the emergence of a new sector of activity.
- Contribute to positioning Quebec and Canada as a center of influence internationally in the field of AAM.

#### **5.** T.E.A.M. project launches (<u>Technologies for Electric Air Mobility</u>)

- Digital Twin for Electric Air Mobility (Polytechnique & UQAM)
- Optimizing Vertiport Operations and eVTOL Integration (ÉTS)
- Systems and Architecture requirement for eVTOL (University of Sherbrooke)





# AUTONOMY

-

One College Two College Technology Transfer Centers (CCTT) with areas of expertise in all activity sectors, including aerospace!

CDCQ: Composite materials, decarbonation and valorization

IVI: Electrification, sustainable mobility, autonomy











Institut du véhicule innovant



# Establishment of a Specialized Training Center

- Implementation of distinctive and specialized training offer, centered on the current and future needs of the aerospace industry.
  - Use of different teaching modes : face-to-face, virtual or immersive training.
- Skills development at the technical level through customized company training.
- A hub for knowledge and technology transfers between academics and industry partners
- Establishment of a Workforce Training Committee to deploy a collaborative digital platform for :
  - Attraction of the workforce;
  - Management of professional placement;
  - Coordination of qualifying training and internships.







Espace Aéro

Mirabel

# The Composites Development Center of Quebec (CDCQ)



**E**space Aéro

Mirabel

The CDCQ is an applied research center with expertise in thermoset and thermoplastic composites across all activity sectors with services in applied research, technical assistance, and training on composite materials.

Research areas :

PARTNERS

- Decarbonation : Valorization of composites parts at the end of their useful life, lighter and durable parts;
- Development of new recyclable composite materials;
- Ecodesign of processes.
- Characterization and qualification of parts.
- Knowledge transfer to partners and the industrial sector.



## Relocation of the Composites Development Center of Quebec (CDCQ)

## Expansion : 2,5 times the current footprint, expanding to 45,000 sq. ft.

Addition of new equipment related to decarbonation and advanced materials:

- Recycling and valorization (scaling up from laboratory to pilot plant);
- Development of high value-added advanced composites with products derived from valorization processes;
- Development of high-performance durable composites parts.
- Qualification of materials and parts with our ISO 17025 accredited laboratory.







Pièce assemblée sur train Source : Alstom

Démonstration d'une boucle d'écocircularité pour utiliser les chutes de production de l'aéro (Bell et Bombardier) dans le ferroviaire (Alstom)





Aéroports de Montréa



ANADA FOUNDATION BRINNOVATION DRINNOVATION



## Research project on valorization of composite parts at the end of their useful life

#### SOME OBSERVATIONS:

We are seeing an increase in the use of composite materials to reduce weight across all sectors, not just in aerospace.

Consequence: an increase in residual materials (production scraps and end-of-life parts) being sent to landfills.

The University of Cambridge in England estimates that the intensification of wind farms will generate 43 million tons of composite material waste (fiberglass and carbon fiber) by 2050.

Quebec: Aerospace industry, Mass Transportation and Wind Farms.

- Replacement of blades expected around 2035.
- No recycling solution for composite materials currently exists in Quebec.







**E**space Aéro

Mirabel

CDCC

## **Research project on valorization of composite** parts at the end of their useful life



space Aéro

concept Proof of Of the valorization chain, from aircraft dismantling to the valorization and use of recycled materials.

Three-year project (2025– 2028).

Funding from : NSERC, CRIAQ and industry partners

#### **PROJET DELIVERABLES**:

Development of ecodesign practices in the aerospace sector. Development of composite recycling techniques

- Strengthening recycling capacities in Quebec and Canada.
- Knowledge transfer to other sectors: Energy (wind), Transportation, Maritime, Automotive sectors.
- Ultimate objectives: decarbonation
- Minimizing environmental the impact through implementation of an ecodesign center;
- Significant reduction of composite waste in landfills.



**INDUSTRIAL PARTNERS:** AIRBUS HUTCHINSON® PYROM//////E **EFilspec** 

AVOIR RÉINVENTEI





## MONTRÉAL (Technoparc Saint-Laurent)

**AUTONOMY** 

#### Aéro Lab : Collaboration center

57 companies in aerospace 8,800 employees

**TECHNOPARC** 

- World-class collaborative infrastructure
- Mutualised laboratories (university & NRC)
- Largest concentration of master's and doctoral students in aerospace in Canada
- Indoor flight testing (drones ≤25kg)
- Planned opening 2027

#### CONSTRUCTIVE COLLISION BETWEEN ACADEMIA & INDUSTRY

#### Accessible by REM (Station Marie Curie)

- In the center of the Technoparc
- 15 to 20 minutes from Polytechnique, McGill, Concordia and ÉTS
- 1 station / 5 minutes from Pierre-Trudeau Airport (YUL)

#### **Institutional Partners**

4 universities (Polytechnique Montréal – Concordia – McGill – ÉTS ), NRC, Transport Canada

#### **Industrial Partners**

Boeing, Bombardier, CAE, CMC, Thales, ARA Robotics + partners from LPCAD, SA<sup>2</sup>GE, INSAT

<image>



## AÉRO LAB: COLLABORATION CENTER



Creation of a Factory of the Future

Establishment of niche AAM hub in Canada

Bridge for students to the ecosystem

Gateway to Canada's experts and unique facilities

Facilitator of international partnerships



## AÉRO LAB: COLLABORATION CENTER



Montreal's Technoparc is first scientific park in Canada

Réseau express métropolitain (REM) at 1 station from the Airport and 15 min. to downtown. Bridge for students to the ecosystem

New master plan that will structure the territory: access, mobility, services, communications, etc.

Signature building that will respect the new concepts of industrial parks (energy loop, solar walls, etc.)

Reception and visit of younger students to promote the professions of the sector

## Thank you !

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