CARIC: A National Collaboration Initiative for Canadian Aerospace, Defence & Space Industry Sectors

Best Defence Conference
London, Ontario November 8-9, 2016
CARIC’S PURPOSE

1. Delivering innovation to position industry for success
2. Building a network to create synergy coast-to-coast
3. Training personnel and Youth to ensure sustainability
INDUSTRIAL MEMBERS

BOMBARDIER

Pratt & Whitney Canada

CAE

Esterline

THALES

L3 MAS

3M

HEROÛX DEVTÉK

SAFRAN

SIEMENS

HUTCHINSON

StandardAero

OPAL-RT

Avier

3VGEOMATICS

CREAFORM

meloche

SAFRAN Messier-Bugatti-Dowty

TRANSTRONIC inc.

GROUP SOTREM-MALTECH

RAAS

emit inc

CONAIR

AERIAL FIGHTING

Génik

asco

Aerosystems International Inc.

Aéroports de Montréal

CORIOLIS Composites

SINTERS America

solaxis

Tekna

TEKNA

Comtek

COMTEK

MESOTEC

Advanced Powder Coating

PLASMIONIQUE

MDS

Chevron Advanced Structures

MD Precision

Sonaca

ViGILANT

STELiA

Techni Prodec

RTI Claro, Inc.

urthecast

C A R I C
UNIVERSITIES AND COLLEGES
RESEARCH ORGANIZATIONS AND ASSOCIATE MEMBERS
CARIC IN ONTARIO

In Ontario, CARIC works closely with the Ontario Aerospace Council (OAC) and its Research & Technology (R&T) Committee to conduct CARIC facilitation and support and assure strategic alignment with the Ontario Aerospace, Defence and Space sectors’ innovation and growth plans.
UPDATE
CONTRIBUTING TO AEROSPACE INNOVATION SINCE 2014

- 27 collaborative R&D projects for a total value of $36.4M
- 3 international projects with 7 countries
- +50 students participating in CARIC projects - more to come!
- 108 Industrial and research members
- +1500 participants at CARIC National Research Forum, in Montreal and Toronto
THE TAKEOFF OF A COAST-TO-COAST NETWORK

CARIC members from every region are now working together towards aerospace innovation. Covering all of Canada, the consortium’s five regional offices facilitate collaboration between provinces and R&D project participants.

118 MEMBERS

INTERMEDIATE COMPANIES
ENTREPRISES INTERMÉDIAIRES

Phenix Technologies Canada
Telesensia

SMMEs
PETE

THE MAP BELOW SHOWS AN OVERVIEW OF THE NUMBER OF PROJECTS EACH REGION IS TAKING PART IN ON A TOTAL OF 27.

La carte ci-dessous offre un aperçu du nombre de projets auxquels participe chaque région sur un total de 27.

LE DÉCOLLAGE D’UN RÉSEAU PANCANADIEN

Le CARIC compte aujourd’hui des membres dans chaque région qui travaillent ensemble pour l’innovation en aéronautique. Couvrant tout le territoire canadien, les cinq bureaux régionaux du consortium facilitent la collaboration d’une province à l’autre entre les acteurs dans les projets de R & D.
# Ontario CARIC Members

## Industrial organizations (15)
- 3M Canada
- Comtek Advanced Structures
- Cray Canada Corporation
- GasTOPS
- Huys Industries
- ImStrat Corp
- Liburdi
- MDS Aero
- Siemens Canada Limited
- Bubble Technology Industries
- Shimco North America*
- MHICA*
- Wheelabrator*
- TrackGen*
- Grip Metal*

## Academics or Research organizations (11)
- Carleton University
- Queen’s University
- National Research Council Canada
- Ryerson University
- University of Windsor
- University of Ottawa
- University of Ontario Institute of Technology
- University of Waterloo*
- McMaster University*

*Royal Military College (RMC)*

*Defence Research and Development Canada (DRDC)*

* Membership in process
CARIC’S OUTREACH

- 2nd CARIC National Research Forum in Toronto, October 2015 - 250 participants

- Regional initiatives
  - First Ontario R&T Day Event, in March 2016
  - 8th CRIAQ Research Forum in April 2016 - 730 participants
  - First Regional Research Forum in May 2016, in Manitoba - over 70 participants
  - CARIC session at ADSE, in August 2016
  - CARIC at DEFSEC Atlantic 2016, in September 2016

- International missions
  - UK, Japan, USA
CARIC PROJECT DOMAINS - MANAGEMENT FRAMEWORK

Driven by industry requirements

AVIO - Avionics and controls
AUT - Autonomous systems
PLE-P - Product and system development, productivity
OPR - Air operation and human factors - organizational innovation
COMP - Composites
DPHM - Acoustics, noise control, environment, de-icing
ENV - Interior design
INTD - Optimization of the supply chain and LEAN production
LEAN - Manufacturing and assembly processes, quality assurance
MANU - Manufacturing and assembly processes, quality assurance
MDO - Modeling, simulation, multidisciplinary optimization

Driven by industry requirements
14 PROJECTS INVOLVING 15 ONTARIO MEMBERS IN 6 RESEARCH DOMAINS

AVIO-506  Carleton University / Esterline CMC Electronics
AVIO-605  University of Ottawa / Esterline CMC Electronics
AVIO-707  U. of Toronto Institute of Technology / MDA Corporation
COMP-506  Carleton University / NRC / Bombardier Aerospace
COMP-709  Magellan / NRC / Boeing Canada
DPHM-702  University of Windsor / Thales
DPHM-711  Huys Industries / Standard Aero
ENV-708  Comtek / NRC / Pratt & Whitney Canada
ENV-709  GasTops / Bell Helicopter
ENV-715  MDS Aero / Carleton University / Bombardier Aerospace
EU-AMOS  Liburdi Automation / University of Ottawa / Pratt & Whitney Canada
MANU-601  Liburdi Automation / MDA Corporation
MDO-710  Cray Canada Corporation / Bombardier Aerospace
MDO-714  ImStrat Corporation / Urthecast

aero-collaboration.org
PROJECT ENV-715

Development and Evaluation of Noise Measurement Techniques in Low- and High-Speed Wind Tunnel

TRL: 2 - 4  |  Duration: 3 years  |  Project value: $353,645

Leverage for industrial leader: 1:4  |  Leverage for industrial partner: 1:10

**Description:** The proposed project aims to investigate various measurement techniques of wall-pressure fluctuations induced by turbulent flow and of noise in wind tunnel environments. It will enable the development and evaluation of various acoustic measurement techniques in low- and high-speed wind tunnels. Carleton University has a High-Speed Wind Tunnel, a unique facility non-existent elsewhere in Canada.

**Partners:**

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<tr>
<th>Industrials</th>
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<tr>
<td><strong>Bombardier Aerospace</strong> - Toronto, Ontario</td>
<td><strong>Carleton University</strong> - Ottawa, Ontario</td>
</tr>
<tr>
<td><strong>MDS Aero</strong> - Ottawa, Ontario</td>
<td><strong>U. of Toronto Institute for Aerospace Studies</strong> - Toronto, Ontario</td>
</tr>
<tr>
<td></td>
<td><strong>Université de Sherbrooke</strong> - Sherbrooke, Québec</td>
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CARIC
**PROJECT ENV-708**

Optimization of Fireproof, Pressurized Acoustic Sandwich Structures

**TRL:** 2 - 4  
**Duration:** 3 years  
**Project value:** $916,205

Leverage for industrial leader: **1:3.5**  
Leverage for industrial partner: **1:15**

**Description:** The primary purpose of this project is to focus on the fire protection of acoustic sandwich panels made of composite materials for use in bypass ducts of aircraft engines. The objectives of the project are to identify the failure modes of current sandwich structures and quantify the benefits that can be incurred through the use of various fireproofing strategies.

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<td>Polytechnique Montréal - Montréal, Québec</td>
</tr>
<tr>
<td>Comtek Advanced Structures - Burlington, Ontario</td>
<td>NRC - Ottawa, Ontario</td>
</tr>
<tr>
<td>Élastoproxy - Boisbriand, Québec</td>
<td>Université Laval - Québec, Québec</td>
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Additive Manufacturing Optimization and Simulation Platform for repairing and re-manufacturing of aerospace components

AMOS project aims to conduct fundamental research to understand the material integrity through chosen Direct Energy Deposition (DED) Additive Manufacturing (AM) processes, the accuracy and limitations of these deposition processes, effective defect geometry mapping and generation methods, and automated and hybrid DED and post-deposition machining strategies. This project intends to connect virtual and real repair and re-manufacturing strategies with design through accurate DED process simulation and novel multi-disciplinary design optimisation (MDO) methods to ultimately reduce the weakness of aerospace component at design stage and prolong their the lifecycles. Detailed objectives include:

- Study of DED process accuracy, repeatability, limitations and deposition interface integrity
- Develop an effective repair modeling system to generate defect geometry for repair
- Develop accurate thermomechanical models for the simulation of powder and wire deposition processes
- Develop a repair process planning and simulation platform for robotic and hybrid DED processes
- Develop a multidisciplinary optimization methodology for enhanced component design and lifing decisions using DED re-manufacturing and repairing strategies

**START DATE:** FEBRUARY 2016  
**DURATION:** 4 years

**Project value:** $1,463,950

Leverage for industrial leader: **1:8**  
Leverage for industrial partner: **1:9**

**ABOUT THE EU-CANADA COORDINATED CALL FOR RESEARCH PROJECTS IN AERONAUTICS - 2015**

This first ever Coordinated Call in Aeronautics is the culmination of 4 years of a sustained dialogue between Canadian and European experts under the CANAPE Coordinated Action. Canada and Europe financially support three successful teams whose research programs aim to address areas that are important to our sector: Reducing environmental impact through advanced design, Resource-efficient high-performance advanced-materials and manufacturing, More electrical aircraft and systems integration.

28 partners from 14 different countries are involved in the selected projects.

**FUNDING PARTNERS**
3rd CARIC NATIONAL FORUM 2017

August 9th, 2017 in Vancouver
PROJECT LAUNCH PROCESS

LET YOUR IDEAS FLY
BUILDING A COLLABORATIVE PROJECT
ONTARIO ACTIVITIES SINCE JUNE 2016

- 6 Expressions of Interest (EOI) involving 10 companies areas of:
  - AVIO
  - DPHM
  - ENV
  - OPR
  - MANU
  - AUT

- 1 Project funding submission in process
- Ottawa, Ontario event planned for January 2017 with OAC R&T Committee
- Eastern Ontario event planned for March 2017
- Western Ontario event planned for April 2017
- Northern Ontario Roadshow in planning Spring 2017
WHERE WE ARE HEADING

- Identifying key S&T drivers of competitiveness
- Balanced and flexible R&D program
- Support the entire Aerospace, Defence & Space value chain
- Brokering R&D services
- Active catalyst and collaborator connection to develop collaborative projects
- Support SMEs
- IRB/ITB conduit
CONTACT CARIC

For more information on how to participate:
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Email: marlene.conway-diels@caric.aero

Aero-Collaboration Portal: www.aero-collaboration.org

www.caric.aero