

# Quebec's Center of Aluminum Expertise – CeAl

## *Developing an Informational Hub to Support Innovation*

The Quebec aluminum cluster, AluQuébec, was designed to increase the competitiveness of the aluminum industry in Quebec, Canada, through collaboration between producers, processors, and equipment suppliers, along with research, development, and training centers. One of the cluster's key activities is focused on supporting the Québec Aluminum Development Strategy launched in 2015, which aims to double the quantity of downstream aluminum processed in Quebec over a period of ten years. As a part of this strategy, AluQuébec formed the Centre d'expertise sur l'aluminium (CeAl) in 2016 to encourage and facilitate a broader usage of aluminum, develop tools to support innovation, and provide technical training to universities and the industry.

### A Network of Knowledge

Despite aluminum's many advantages, the metal remains under-recognized and under-utilized in many market sectors where it has enormous potential. CeAl's mandate as a technical center is to encourage and facilitate a broader usage of aluminum by engineers and designers in a variety of industries, as well as to be a technical toolbox and knowledge hub for the industry. To achieve this, the center has adopted a deployment plan for 2018–2020 based on four strategies:

- Promoting of the usage of aluminum, namely by informing professionals of the norms and building codes, advantages, and possibilities of usage
- Coordinating training activities on the benefits of using aluminum with information on regulatory and technical aspects for engineers and designers, as well as providing professional training
- Coordinating activities touching on innovation, research, and development
- Promoting existing expertise within the Quebec region

"We spread knowledge on aluminum alloys and their standards, relay the best practices, and offer technical support to those who wish to profit from the benefits of the metal," explains David Prud'homme (Figure 1), director of CeAl. "We also provide case studies that document the advantages of aluminum to designers, architects, and engineers."



Figure 1. David Prud'homme.

#### Promote Usage of Aluminum:

CeAl works to disseminate clearly explained and accessible technical information in order to promote aluminum use. The center developed a website ([www.ceal-aluquebec.com](http://www.ceal-aluquebec.com)) that provides a wealth of information on the advantages, applications, alloys, and manufacturing processes involved in using aluminum. Applications and achievements in the implementation are presented, along with a breakdown of aluminum use in various market sectors. For example, the section on transportation provides information on online aluminum use in the automotive, aerospace, rail, and marine industries, as well as transportation industry statistics and information on the environmental considerations of lightweighting. "In order to demystify and stimulate the use of alumi-

num, CeAl documents and regularly diffuses case studies and information on the successes and accomplishments of the aluminum processing industry," said Prud'homme.

CeAl has positioned itself so that it can collaborate in the development and updates to the aluminum specifications and standards available, and it makes sure to be informed of any updates when they occur. The center provides a comprehensive list of these international aluminum specifications and standards on the website.

In addition, CeAl and Alcoa Innovation launched the *Concours d'idées en architecture* competition, with a view to supporting and encouraging innovative aluminum use among architects. "In building and construction, the person you want on your side is the architect," said Prud'homme. "They're the person who is going to decide what materials are going to be in the final structure, and many know almost nothing about aluminum. So, the contest works to inform architects about aluminum and bring us close to them."

**Training:** CeAl initiated a three-year training strategy, in which conferences and webinars are presented regularly to engineers, architects, designers, and students in order to inform them of the latest developments in aluminum. The content for these training programs are produced by universities and research centers. The center launched a pilot project at Laval University, where one hour classes on aluminum have been conducted, and the aim is to expand these classes to all of the universities and colleges in Quebec. One aspect of this training is to not only teach students, but to provide resources and education for the professors and teachers themselves, so that they bring aluminum into their classrooms.

In addition, CeAl provides professional training in order to support the growth of the aluminum industry. The center gathers information from the primary aluminum producers, recyclers, semis manufacturers, and equipment providers to determine what type of technical information and training is needed. This is one of the ways that the center is combating the challenge of an aging workforce. "We need to train a new generation of leaders and technical experts," said Prud'homme.

**Coordination of Activities:** The center recently set up an R&D committee in order to coordinate activities in innovation, research, and development. The committee brings together leading scientific innovators from the aluminum industry and research centers, with the aim of reaching a consensus on what the next four or five technologies the North American industry will be able to introduce to the world. The aim is to analyze the applications and technology that will contribute to doubling the quantity of aluminum semis processed in Quebec, as well as to consider what research and development could contribute to this goal. "The question is what do we need to control in order to be the forerunner of future aluminum developments," noted Prud'homme. "Take 3D printing, for example. How can Quebec be a leader in 3D printing? Would it require control of the production of powder? These are the kinds of things the committee is considering."

**Promote Existing Expertise:** The Quebec region has a significant source of aluminum and manufacturing expertise. CeAl has access to this expertise through its eight technical collaborators: Quebec Metallurgy Center (CMQ), Centre de technologie avancée (CTA-BRP), Aluminum Technology Centre (NRC ATC), Centre de recherche indus-

trielle du Québec (CRIQ), Aluminum Research Centre (REGAL), Alcoa Innovation, ParadeSIGN, and PreciCAD.

CeAl aims to be a liaison, facilitating cooperation between the aluminum industry and these collaborators and, to that end, has developed a matrix of expertise (Table I) as a reference for

the industry. The matrix provides a guide detailing the various competencies of each collaborator, enabling professionals to quickly discover which experts are best suited to their development needs. Table I shows an abbreviated version of the matrix. The complete list of headings include: Alloys; Assembly; Tests, Study, Analysis; Forming; Molding; Production of Aluminum; Surface Treatment; Engineering Services, Simulation, and Analysis; and Machining. This matrix has been extended and validated by an expert panel comprised of CeAl’s technical collaborators and is made available on the website.

The collaborators are also called upon to combine their expertise and knowledge in order to work towards a common goal, including improving the usage of aluminum in various industries, such as aerospace, building and construction, packaging, infrastructure and bridges, maritime, transportation equipment, consumer goods, and other sectors.

Expertise	REGAL	CMQ	CTA-BRP	CNRC	CRIQ	Alcoa Innovation	Paradesign	PreciCAD
<b>Alloys</b>								
Wrought Alloys	X	X	X	X				
Foundry Alloys	X	X	X	X				
Metal Composites	X	X	X	X				
New Al-Based Materials	X	X	X	X				
Heat Treatment	X	X		X				
<b>Assembly</b>								
Bolting	X		X	X		X	X	X
Brazing	X	X		X				
Folding	X		X					
Riveting	X		X	X				
Welding (Tig GTAW, GMAW Mig)	X	X	X	X				
Electron Beam Welding	X							
Friction Stir Welding	X	X		X	X			
Laser Welding	X		X	X				
Resistance Spot Welding	X	X		X				

Table I. This is an abbreviated example of the first edition of the matrix of expertise (translated from French).

## Conclusion

CeAl is enabling and supporting the commitment, knowledge sharing, and synergy developed by academic, government, and industrial circles in Quebec. These elements are essential to the development of the region’s aluminum industry, as it hopes to continue to enhance its reputation on the world stage. By encouraging technical advances and the creation of new value-added products, CeAl is creating new business opportunities as it becomes an important asset for economic vitality. “Ultimately, CeAl wishes to contribute to the reinforcement of the whole aluminum value chain,” said Prud’homme. “That’s why we are banking on the cooperation of all the research centers and organizations that are committed to seeing aluminum be a leading industry, here in Quebec and in the export markets. With a strong industrial ecosystem formed through AluQuébec and CeAl, we will all be winners.” ■