
Impact Report // Composites and Biocomposites Research

Research in Manitoba Creates Economic Opportunities



Research
Manitoba

FLAX FIBRE



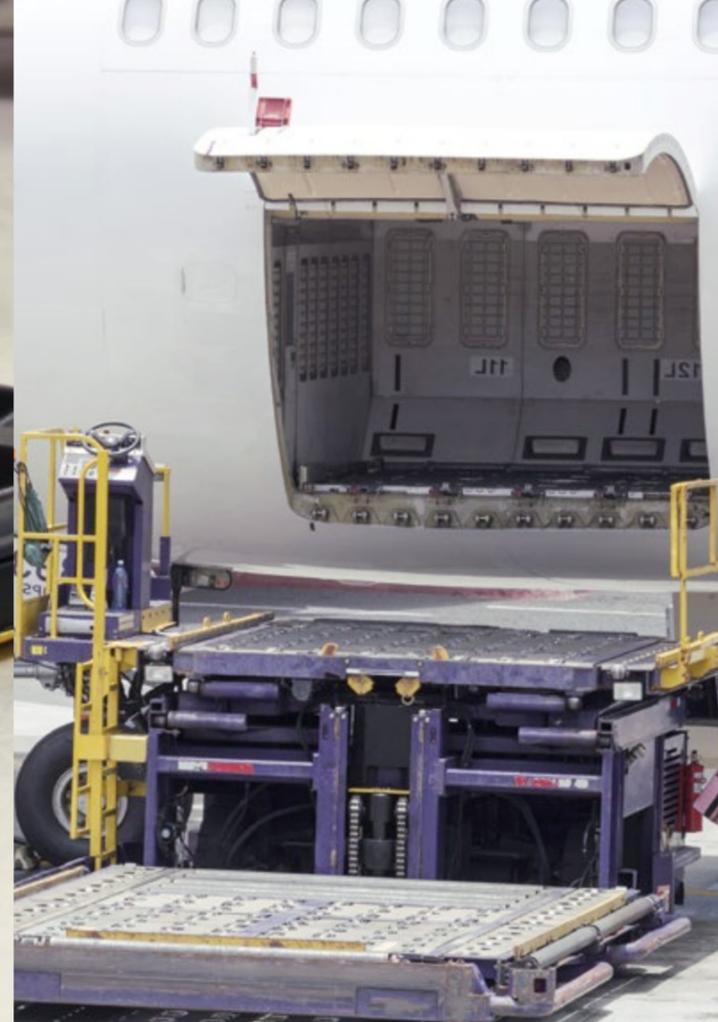
CARBON FIBRE



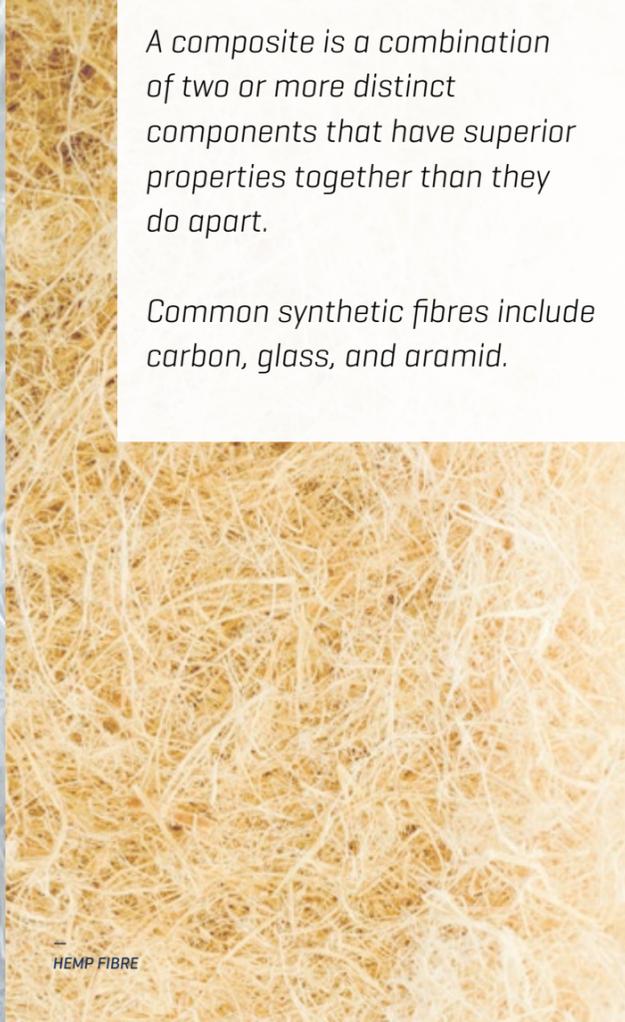
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Composite research and development in Manitoba is helping to create value-added products and expertise that benefits our economy and the world.



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Manitoba is rich with the raw materials that can be used in biocomposites to create next generation products in the manufacturing industry.



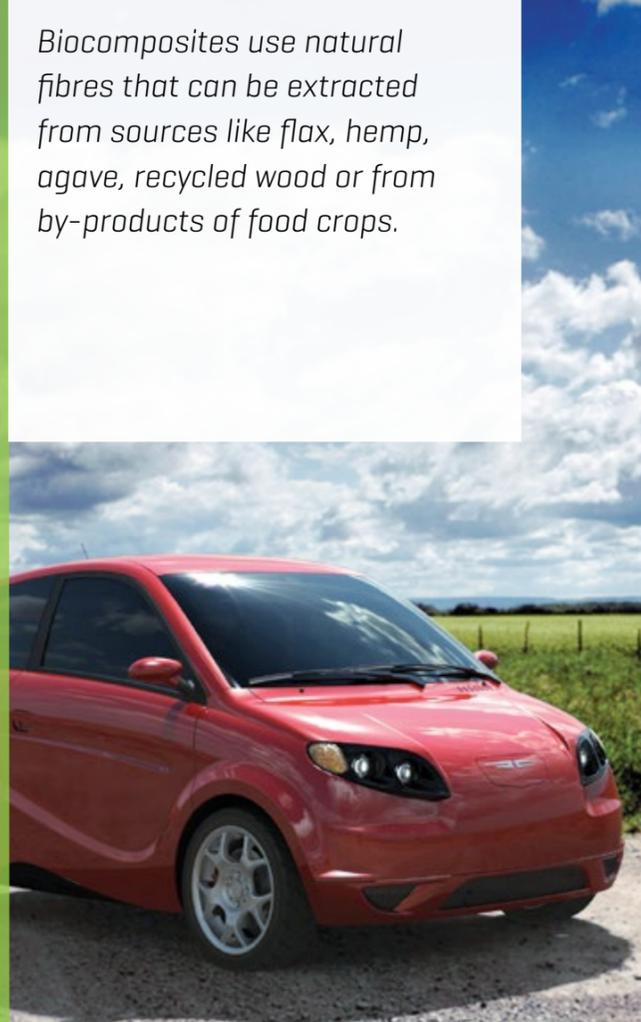
GLASS FIBRE



HEMP FIBRE

A composite is a combination of two or more distinct components that have superior properties together than they do apart.

Common synthetic fibres include carbon, glass, and aramid.



Biocomposites use natural fibres that can be extracted from sources like flax, hemp, agave, recycled wood or from by-products of food crops.



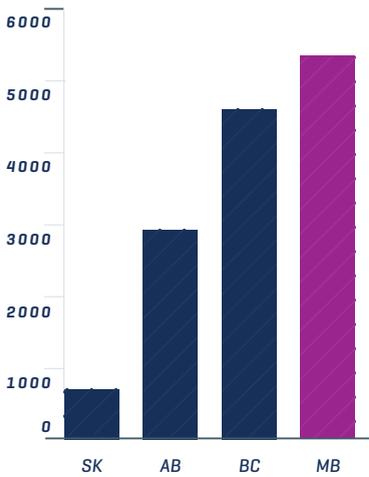
IMPACT REPORT // COMPOSITES AND BIOCOMPOSITES RESEARCH

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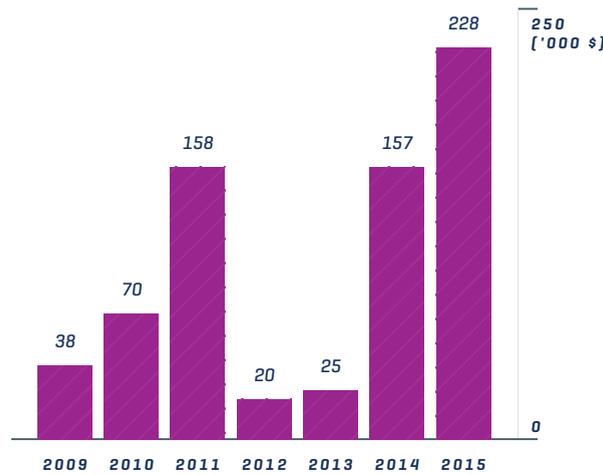
Research in Manitoba Creates Economic Opportunities

In Western Canada, composites companies in Manitoba produced the highest number of jobs in 2012.

COMPOSITE COMPANY JOBS BY PROVINCE



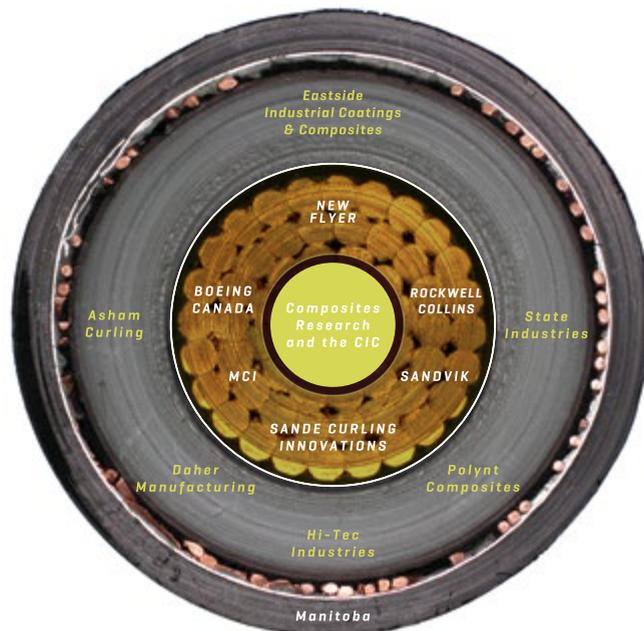
PROVINCIAL INVESTMENTS FROM 2009-2015



\$30.26 million
revenue generated in 2012
by the composite industry
in Manitoba

Research is at the core of Manitoba's composites industry

Collaborations with manufacturers have stimulated and strengthened Manitoba's economy and our reputation as a composites leader in Canada and around the world.



"Manitoba has a real opportunity to be a global biomaterial centre."

Mr. Simon Potter, former Vice President, Product Innovation and FibreCITY, CIC.

The effects of sourcing, transporting, and burning fossil fuels is one of the defining issues of our time. Every industry is looking for solutions.

Substantial market growth is widely expected over the next eight years.

6% growth rate
ANNUALLY, SINCE 1960

\$86.6 billion
GLOBAL COMPOSITES MARKET
SIZE IN 2015



The high costs and price fluctuations of fossil fuels are economic inhibitors to many industries, particularly in transportation, aerospace, and defense.

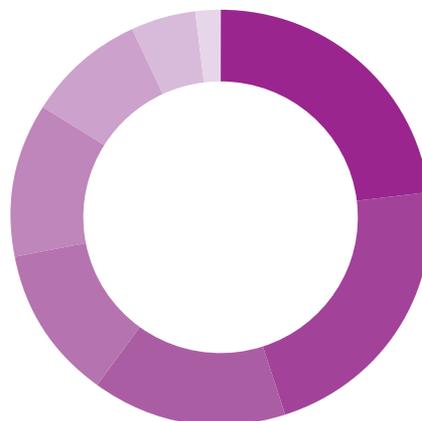
Traditional elements used in manufacturing like steel and aluminum require fossil fuel to produce, and result in end products that are strong but exceptionally heavy, meaning they require more fuel to function throughout their usable lifespan.

Key jurisdictions around the world are taking the lead and gaining market share in these new economies and Manitoba is one of the leaders.

In 2014, the North America composites market accounted for **35% [\$32.2 billion]** of the global composites industry

35% [3 million metric tons] in volume

There are approximately 300 composite companies that employ 50,000 people in Canada.



GLOBAL MARKET SIZE OF COMPOSITES, BY APPLICATION VALUE, 2010-2015

- AEROSPACE
- TRANSPORT
- CONSUMER GOODS
- BUILDING AND CONSTRUCTION
- WIND
- ELECTRICAL & ELECTRONICS
- MARINE
- PIPE & TANK

Manitoba Leads the Way

Manitoba has a strong transportation and aerospace industry and is **uniquely positioned to move goods across North America and around the world.**

Our province

- Is able to capitalize on the emerging revolution of bioproducts, including biocomposites.
- Has abundant biomass resources.
- Is rich with a large variety of natural fibres such as flax and hemp, giving us a competitive edge.
- Has important resource centers on materials including the Structural Innovation and Monitoring Technologies Resource Centre [SIMTReC]; the Manitoba Institute for Materials [MIM]; and the Composites Innovation Centre [CIC].

There is capacity to produce high value composite and biocomposite materials in Manitoba in partnership with our local transportation and aerospace industries that can significantly reduce weight loads, operational costs, and detrimental environmental impacts from heavy use industries locally, nationally, and internationally.

Canada's university R&D infrastructure supports an innovative, skilled workforce and new product development. Furthermore, Canadian universities have world-class university research programs in advanced composites from coast-to-coast.

Economically, Manitoba's composites industry is:

- Improving economic competitiveness
- Attracting new investment
- Fostering a skilled workforce
- Expanding Manitoba trade internationally and nationally
- Building on Manitoba's industrial strengths
- Demonstrating value for money

Winnipeg is a major national centre for manufacturing and maintenance in aerospace and ground transportation industries.

- These industries require new material solutions that decrease the weight of transportation vehicles, while maintaining strength and safety.
- Decreasing the weight and increasing the safety of manufacturing materials is a critical cost factor for the operations of aerospace, ground transportation, and defense vehicles throughout their lifetimes, making it a long-term financial priority for manufacturers.

This creates great economic opportunities in Manitoba.



Milestones in Manitoba and Canada

In 2001, key composite industry stakeholders in Manitoba recognized that there was no organization that could help drive the development of the local composites industry. This realization led to a series of surveys that were conducted with the support of the National Research Council Canada, the Government of Manitoba and the City of Winnipeg. The positive response from the surveys led to the decision to establish the Composites Innovation Centre Manitoba Inc. [CIC].

The CIC is a not-for-profit corporation, established in 2003, that



- assists industry to develop and commercialize composite applications and technologies.
- has leading capabilities in composite design, testing, and prototyping.
- includes 167 industry partners and 40 agency partners.
- attracts new composite industry and start-up companies in Manitoba and Western Canada.
- supports industries such as aerospace, ground transportation, biomaterials, as well as the development of industrial applications
- works to develop the local biomaterials supply chain from farmers to manufacturers.
- is active nationally and internationally.

“We could not have achieved our growth and success without the CIC’s support. We continue to rely on the CIC to accelerate technology adoption to strengthen our supply chain and global competitiveness.”

Mr. Chad Brick
President of Eastside Industrial
Coatings and Composites.

“The CIC team and facility have supported multiple investigations that otherwise would have required sending work out of the province to be performed.”

Mr. Richard Laurin
Senior Manager of Boeing Winnipeg.

2001

There were only two companies in Winnipeg, SWM International and Dow Bioproducts Ltd., engaged in the composites industry.

A comprehensive analysis of Winnipeg’s strength in the industrial sector determines that Winnipeg is ideally suited to develop a composites and advanced materials cluster.



2003

The Composites Innovation Centre Manitoba Inc. [CIC] is founded.



2004

Red River College plans a \$1.6 million Centre for Applied Research in Sustainable Infrastructure [CARSI] that will undertake applied research and testing of concrete and asphalt, advanced composite materials, large light frame wood structures, and the building envelopes.

2006

The national biofibres initiative is formed to coordinate 19 projects across Canada aiming to create new business startups and product developments in biocomposites.



2007

CANCOM, Canada’s major composites conference is held in Winnipeg, organized by the CIC and Boeing Canada Technology, Winnipeg Division.

2008

The CIC and the Cooperative Research Centre for Advanced Composites Structures Limited [CRC-ARS] in Melbourne, Australia launched collaborative work on composite technology and commercial applications.

2010

The Canadian Composites Manufacturing R&D Inc. Consortium is launched to advance the composite manufacturing technologies focusing on the aerospace sector in Canada.

A Biomaterials Consortium is inaugurated with the Life Sciences Association of Manitoba to support the Manitoba Bioproducts Policy and boost Manitoba’s supply chain.



2016

\$2.9 million in funding flowed from Agriculture and Agri-Food Canada [AAFC] to the CIC to identify quality gaps and develop quality standards and measurement techniques to facilitate the commercialization of Canadian biomass, and for research on how the strength and quality of composites can be affected by farming practices, varieties, and the weather.

2011

The Manitoba Bioproducts Strategy is launched.

The BioFibre Conference is held in Winnipeg, attracting organizations from Europe, Asia, USA and across Canada, which positions Manitoba as a biocomposites hub.

2012

The CIC launched the FibreCITY initiative, a centre of excellence for agricultural crop grading to benefit the biofibre industry.

In 2012, 33 companies were actively engaged in the Manitoban composite industry.



2013

Manitoba hemp used to replace synthetic fibre composite in vehicles.

Manitoba's World-Class Research

Manitoba's composites researchers have partnered with multiple research groups around the world.



“The future for biocomposites in Manitoba is very bright. As the world seeks to meet targets for reduction of greenhouse gas emissions, manufacturers will be looking for materials that make products lighter, especially for transportation vehicles.”

Mr. Rick Jensen
 Director, Government and Community Relations,
 Boeing Canada Technology, Winnipeg Division (Retired)

Leadership in research & application

Manitoba is recognized internationally as a hub for innovative, research and development, specifically in regards to composites.

We lead green initiatives such as the Manitoba Bioproducts Strategy, which supports the creation of a bioproducts industry using agricultural biomass.

We are pioneering innovative research like FibreCITY, an initiative of the CIC, a fibre grading database, and the Green Garage project, which highlight the use of entirely sustainable components in structures.

We have established collaborations across Canada and the globe.

Research in Manitoba Builds our Capacity

- Students are mentored through academic courses, internships, and association with student bodies of the University of Manitoba.
- Workshops and seminars have been conducted to disseminate knowledge about the composite manufacturing procedures and attract potential industrial partners to the sector.
- In the private sector, companies have gained capabilities that have increased their manufacturing capacities.

World-Class Solutions Thrive Here

FOUR RESEARCH-BASED MANITOBA COMPOSITES SUCCESS STORIES.

PROJECT OBJECTIVE

RESOURCES

ACTIVITIES

OUTCOMES

THE PROJECT

Sandvik Mining

Develop a new composite enclosure for the Eris Control Panel system used to control mining equipment.

Ensure the new enclosure can withstand the harsh mining environment and reduce manufacturing costs.

THE RESOURCES

\$21,875

FROM SANDVIK MINING AND THE CIC

People

- CIC Project Manager
- CIC engineers
- Students from the University of Manitoba

Other collaborators

- Eastside Industrial Coatings and Composites: fiberglass for the control panel
- Hi-Tech Industries: metal tapping plates & fasteners
- State Industries: rubber corners for the enclosure

THE ACTIVITIES

- CAD modelling
- Impact testing
- Project management

THE OUTCOMES

- Addition of new product design capability
- Cost reduction per unit for Sandvik
- Longer product lifespan
- Increased economic activity in Manitoba due to collaboration with local companies
- Job creation

THE PROJECT

Motor Coach Industries (MCI)

Transfer an innovative molding technology to improve MCI's manufacturing efficiency of lighter, cost-competitive, composite baggage doors.

THE RESOURCES

\$82,043

FROM MCI AND THE CIC

People

- CIC Project Manager
- CIC engineers
- Students from the University of Manitoba

Other collaborators

- Polynt implemented a new resin system which produces baggage doors with superior properties.

THE ACTIVITIES

- Create a structural design for the door
- Conduct materials properties research
- Modeling and analysis of composite doors

THE OUTCOMES

- Built the capacity of team members
- Improved manufacturing technology
- Dropped manufacturing cost
- Reduced the weight of baggage doors
- The ground vehicle sector adopted the resin application system and the RTM light molding process

THE PROJECT

Rockwell Collins

Develop an interior panel for the access door for the Pilatus aircraft using composites.

THE RESOURCES

\$400,000

FROM ROCKWELL COLLINS AND THE CIC WITH IN-KIND SUPPORT FROM THE CIC AND COMPOSITES RESEARCH NETWORK.

People

- Project managers, engineers from Rockwell Collins, the CIC, and CRN; student from Red River College

THE ACTIVITIES

- Technical support
- Panel design
- Testing materials
- Develop draft specifications and quality standards
- Develop and evaluate manufacturing process
- Meet quality specifications and implement production

THE OUTCOMES

- Mentored students on composite manufacturing process
- Exposed Rockwell Collins to new manufacturing technologies
- Enhanced design and production capacity
- Created jobs

THE PROJECT

Sande Curling Innovations (SCI)

Develop broom handles and heads for the sport of curling using composites.

THE RESOURCES

\$34,000

FROM SCI AND THE CIC

People

- CIC Project Manager
- CIC engineers
- Students from the University of Manitoba

THE ACTIVITIES

- CAD modelling
- Prototyping
- Stress analysis

THE OUTCOMES

- Introduced CIC staff to rapid prototyping
- Licensed new head and broom design to manufacturers
- Broom head commercially produced

Creating Our Future

Over the next five years, the
Composites Innovation Centre
Manitoba Inc.:

*Plans to help
bring industry
revenue up by
\$600 million.*

*Expects to help
create 700 jobs.*

Made in Manitoba



FibreCITY, an initiative of the CIC, is the world's first and foremost centre of excellence for agricultural fibre grading. With FibreCITY, the CIC plans to set the standards for the new bio economy, not only in Canada but throughout the world, build the next generation of vehicles, buildings and consumer products and form a unique network of technologies and experts to advance the global biomaterials industry.

The Future of Manitoba Composites and Biocomposites is strong.

- Demand for composite materials is increasing as aerospace and ground transport want to use lighter materials.
- Manitoba's biomass is readily available, environmentally sustainable, and a highly versatile manufacturing element.
- We continue to reduce industry's greenhouse effect/carbon footprint by protecting ecosystems and biodiversity.
- \$2.9 million dollars has been invested into the CIC to develop quality standards and measurement techniques and to determine the effect of farming practices, varieties and weather. The aim is to "create a global leading capability to process and test biomass for industrial applications."
- With help from Agriculture and Agri-Food Canada, the CIC is investing more time and resources in developing and commercializing fibres from locally grown crops.

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INSIDE COVER PHOTOS - CURLING BROOM AND VEHICLE: THE COMPOSITES INNOVATION CENTRE [CIC]

