International Composite Research Centre ICRC

Manufacturing and Application of Polymer Composites

What is the ICRC?

The ICRC is an entity of the Faculty of Engineering at Western University with members from several faculties within Western and from other universities across Ontario, Canada and around the globe.

Leveraging the resources and technological strengths of Western's Fraunhofer Project Centre (FPC), the ICRC focuses on applied research and development spanning the entire value chain of the polymer composites market.

The primary objective of the ICRC is to provide a collaborative, multi-disciplinary environment for fundamental and applied research in the manufacturing and application of polymer composites - promoting the accelerated adoption of these materials in the automotive (and other) industries. Special focus is given to issues related to mass production of lightweight materials for the transportation sector, and sustainable products for the building materials sector.

Training the next generation of engineers

The primary academic function of the ICRC is to facilitate the training of graduate students to conduct research, develop technology and transfer knowledge in fields associated with the processing and application of polymer composite materials.

ICRC graduate students will have the opportunity to complete an internship with Western's Fraunhofer Project Centre (FPC) or in a related industry in Ontario. An annual workshop with experts from industry and academia will be part of the experience for ICRC's graduate students, including expert keynote lectures, student oral and poster presentations, condensed short course(s), and ample opportunities for networking.

Participating Schools

KIT Karlsruhe Institute of Technology

LAMBTON college The bridge to your future

McMaster University

UNIVERSITY OF TORONTO

University of Windsor

Western UNIVERSITY · CANADA

Researchers and Areas of Expertise

J.T. Wood (Academic Director, ICRC, Western)
Structure – property relationships, lightweight structural materials for automotive applications, magnesium die-casting, composite materials.

A.N. Hrymak (Dean, Western Engineering; Deputy Director, FPC)
Complex rheology, filled polymer systems, polymer processing simulation.

F. Henning (Managing Director, FPC, Western; Karlsruhe Techological Institute (KIT)
Polymer engineering, lightweight design, manufacturing technologies for fiber reinforced composite parts, metal composites hybrid materials, simulation of flow phenomena.

R. Tutunea-Fatan (Mechanical and Materials Engineering, Western)
Multi-axis CNC machining, computer-aided design and manufacturing, intelligent machining systems, numerical methods.

K. Baines (Chemistry, Western)
Mechanistic organometallic chemistry, organometallic polymers, low-coordinator Si and Ge compounds, interference lithography.

M. Thompson (Chemical Engineering, McMaster University)
Granulation extrusion, composite processing, reactive modification, foam extrusion.

C. Park (Mechanical Engineering, University of Toronto)
Novel microcellular processing technologies development, cell nucleation analysis and control, cell growth and shaping, computational modeling of foaming, artificial wood development, thermophysical properties of polymer/supercritical fluids measurement and modeling.

W. Altenhof (Mechanical Engineering, Windsor University)
Crashworthiness, impact testing, finite element analysis (FEA), experimental (destructive) testing, stress analysis, dynamics, machine design.

B. Minaker (Mechanical Engineering, Windsor University)
Vehicle dynamics and control, multibody dynamics, numerical simulation of mechanical systems.

J. Johrendt (Mechanical Engineering, Windsor University)
Vehicle structures, vehicle durability, driver modeling, neural networks.

Background Information

The automotive industry is an integral component of Ontario's economy. With the highest density of Tier suppliers in North America, Ontario's automotive industry manufactures 30 percent of all parts on North American vehicles. Worldwide, the industry is pushing for lightweight solutions as a means of enabling alternative power train vehicles and improving fuel economy in conventional vehicles.

Polymer composites are among the lowest density structural materials, giving them strength- and stiffness-to-weight ratios that can exceed steel and aluminum. Therefore, they are of great interest to any industry that would benefit from mass reduction.

Development efforts by the automotive industry in this direction are focused on building confidence that a new material, process or product will perform reliably - developing technical knowledge that will offer a competitive edge in the market. Academic research questions in the field revolve around understanding the interactions between materials, processes, and properties so that performance can be predicted and controlled. ICRC's research is built around the synergy of these complimentary, but different goals.

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